PRELIMINARY HYDROLOGY AND HYDRAULICS REPORT FOR THE RIDGE – IDYLLWILD GUEST RANCH

COUNTY OF RIVERSIDE
CALIFORNIA

PREPARED FOR:

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REVISED:
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MAY 26, 2023

This report has been prepared by or under the direction of the following registered civil engineer who attests to the technical information contained herein. The registered civil engineer has also judged the qualifications of any technical specialists providing engineering data upon which recommendations, conclusions, and decisions are based.

5/26/2023

Joseph L. Castaneda RCE 59835   Date   Seal
   Registered Civil Engineer

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I. PURPOSE AND SCOPE

The purpose of this report is to evaluate the drainage patterns and potential runoff that emanates from the project referred to as The Ridge – Idyllwild Guest Ranch. Surface runoff flows from the northern edge of the project site to the southern and western edges of the project site, discharging into Hurkey Creek.

The scope of the study includes the following:
1. Determination of points of flow concentration and watershed subareas for the project site.
2. Determination of the 100-year peak storm flows based on the post-project condition utilizing the Rational Method for the purpose of storm drain sizing.
3. Determination of the 2-year and 10-year peak storm flows based on the pre-project and post-project conditions utilizing the Unit Hydrograph method for the purpose of basin sizing.
4. Assessment of the onsite hydraulics.
5. Assessment of the offsite runoff to the north of Apple Canyon Rd comparing flow rates from the Rational Method and the hydraulic cross sectional capacity calculations.
6. Preparation of a hydrology report, which consist of hydrological and analytical results and exhibits.

II. PROJECT SITE AND DRAINAGE AREA OVERVIEW

The Ridge – Idyllwild Guest Ranch is a proposed wellness center. The project site is bounded by Apple Canyon Road to the north and Highway 74 to the south. Hurkey Creek runs along the western edge of the project site. The project site is located in the County of Riverside, to the northeast of Lake Hemet, see Figure 1 Vicinity Map.

The existing project site area is currently undeveloped with open brush land cover. Hurkey Creek runs adjacent to the western edge of the project site. Runoff from the project site flows from the northern edge to the south and west, discharging into Hurkey Creek. A preliminary study by Albert A. Webb Associates (WEBB) studied the 100-year flood plain of Hurkey Creek, see Excerpt A. The limits of the flood plain are shown on Figure 2 and the project site is proposed such as to minimize the impacts to this existing flood plain.

Apple Canyon Road borders the project site to the north. The existing roadway currently crosses Hurkey Creek. The existing roadway experiences flooding during the 100-year storm event, see Figure 2. WEBB and Associates prepared a hydrology and flood plain assessment for Hurkey Creek which has been included in Excerpt A. The project will not propose improvements that would resolve the Hurkey Creek flooding experienced by Apple Canyon Road. Moreover, the portion of Apple Canyon Road along the project frontage as approximately 5.9 acres of tributary watershed area. The 5.9 acre watershed will be collected by Apple Canyon Road and it will be directed to the east, see Figure 3.

Hurkey Creek discharges into Lake Hemet. Any overflows from Lake Hemet will discharge into the San Jacinto River which is part of the Santa Ana watershed. As a result, the project will be required to implement the Santa Ana WQMP Guidance Document.

The proposed project collects runoff from the project site using the proposed 24 feet drive, the natural terrain, proposed grade shallow swale areas and proposed storm drain facilities. The runoff emanating from the project will be discharged into water quality self-retaining or proposed bioretention basins. The project has provided one bio-retention basin located on the southern portion of the project site which will be used as a multi-use basin to mitigate water quality and hydromodification impacts. The watershed study area for the project site is approximately 16.5 acres.

III. HYDROLOGY

The Riverside County Hydrology Manual (Reference 1), was used to develop the hydrological parameters for the hydrology analyses. The rational method and unit hydrograph method was used for the analyses and the computations were performed using the computer program developed by Civil Cadd/Civil Design.

Rainfall depths were obtained from NOAA Atlas 14 based on the values used in the WEBB Study. The rainfall depths used in the hydrology calculations for that rational method and unit hydrographs are as follows:

Storm Event & Duration	Rainfall (inches)
2-Year, 1-Hour	0.72
2-Year, 24-Hour	2.79
100-Year, 1-Hour	2.05
100-Year, 24-Hour	7.72
Slope of Intensity	0.55

The existing soil classification for the on-site area consists of Hydrologic Soil Group "A", as shown in Excerpt B. Excerpt B is a Soils Map obtained from the National Resource Conservation Service Websoil Survey. An Antecedent Moisture Condition of II was used for the 10-year and 100-year calculations, and Antecedent Moisture Condition of I was used for the 2-year calculations.

The rational method outlined in the RCFC&WCD Hydrology Manual and implemented by the CivilDesign Hydrology Program restrict land use parameters to be entered into the program for initial areas due to the empirical equation used to establish the initial time of concentration. As part of the rational method hydrology study, the impervious ratios were calculated for each sub-area identified in the hydrology map for the project site plan. The impervious ratios for the subareas are documented in Table 1. The impervious ratio for the

subareas are approximately 30%. Due to land use constraints used by for the with initial areas in the rational method program, JLC elected to use Residential ½ Acre Lots to represent the land use characteristics for Subarea A1 through A4. Residential ½ Acre lots has a higher impervious ratio than the actual pervious ratios within the site. Area A5 which has been designated as an open space land use. Table 2 provides the Runoff Index and Impervious Percent for these land uses.

Table 1 – Impervious Ratios for Subareas

Subarea	Actual Impervious Ratio	Land Cover Used in Rational Method	Impervious Ratio Used
A1	0.26	Residential, ½ Ac	0.4
A2	0.33	Residential, ½ Ac	0.4
A3	0.32	(User Input)	0.32
A4	0.32	Residential, ½ Ac	0.4
A5	0.37	Residential, ½ Ac	0.4
A6	0	(User Input)	0
A7	0	(User Input)	0

Table 2 – Runoff Index No. & Impervious Ratio Based on Land Use Cover

Land Use Cover	Runoff Index Number (Soil "A")	Impervious Ratio
Residential, ½ Acre Lots	32	0.4
Open Brush (Fair)	46	0

Site specific topography was provided by the client and used for elevation values for the rational method analysis and unit hydrograph analyses. Additional topographic mapping was obtained for the regional area using the USGS 1 meter DEM data.

A post-project condition rational method analysis was performed to determine the peak flows for storm drain and inlet sizing purposes. It should be noted, a pre-project condition rational method analysis was not performed for the project. The rational method pre-project condition was not developed for the project site since pre-project peak flow rate were not required to assess any storm drain facilities. However, a pre-project and post-project unit hydrograph analysis were performed to determine mitigation requirements for hydromodifications which will be required to demonstrate that the project conforms with the WQMP Guidance Document.

The rational method analysis analyzed Area A, which consisted of 7 sub-boundary areas in the post-project condition. The analysis resulted in a time of concentration of 19.4 minutes and peak flow rate of 39.9 ft^3/s for a 100-year storm.

The unit hydrograph analyses for the pre-project and post-project conditions utilized the 13.79 acre watershed boundary from the rational method analysis minus the pervious basin

area that is held constant for both calculations. An overall impervious fraction of 0.27 was calculated for the post-project condition based on the site plans. However, an impervious ratio of 0.35 was used as calculated from the rational method analysis. And impervious fraction of 0 was used for the pre-project condition.

Table 3 provides the impervious percentage used in the unit hydrograph analysis and the true impervious fraction of the project site. The impervious fraction used for the unit hydrograph analyses was calculated from the rational method analysis. This number is more conservative in quantifying the impervious fraction of the project site for reasons discussed earlier such as the land cover estimation shown in Table 1. Since the impervious ratio used for the analyses is larger than the actual ratio, the mitigation volume tabulated from the unit hydrograph analyses will be larger and result in a more conservative estimation. Table 4 provides the Runoff Index.

Table 3 – Impervious Ratio: Actual vs Used in the Unit Hydrograph Analysis

Area A	Actual Impervious Ratio	Impervious Ratio Used
Pre-Project	0	0
Post-Project	0.27	0.35

Table 4 – Runoff Index No. & Impervious Ratio for Unit Hydrograph Analysis

Area A	Runoff Index Number (Soil "A")	Impervious Ratio
Pre-Project	46.0	0
Post-Project	33.6	0.35

Unit hydrographs were run for the 2-year 24-hour storm and 10-year 24-hour storm, the results of which are shown below:

Area A	Area (ac)	2-Year, 24-Hour, Q (CFS)	10-Year, 24-Hour Q (CFS)
Pre-Project	12.23	0.5	1.4
Post-Project	12.23	1.8	3.0
Delta	0	+1.3	+1.6

The results show an increase in peak flow rate for both storm events. This increase is due to the increase in impervious surfaces within the project site. To mitigate this increase, flows are routed to a basin which is sized based on the following values taken out of the unit hydrograph analysis.

From the 2-year, 24-hour post-project unit hydrograph, the following values were taken:

Time (hours+minutes)	Volume (acre-feet)	Flow rate (ft^3/s)
6+40	0.1	0.5
16+10	1.0	0.5

Before time 6+40 and after time 16+10 the flow rate is below 0.5, which is the peak flow rate from the pre-project condition. The volume difference between these two times is 0.9 acre-feet (1.0-0.1=0.9).

From the 10-year, 24-hour post-project unit hydrograph, the following values were taken:

Time (hours+minutes)	Volume (acre-feet)	Flow rate (ft^3/s)
8+40	0.4	1.4
16+05	1.7	1.4

Before time 8+40 and after time 16+05 the flow rate is below 1.4, which is the peak flow rate from the pre-project condition. The volume difference between these two times is 1.3 acre-feet (1.7-0.4=1.3).

Basin 1 has been designed to store 3.1 acre-ft of mitigation runoff which exceeds the 1.3 acre-ft needed to mitigate the flow rate for the 10-year, 24-hour storm. This ensures that the flow rates will not exceed the pre-project flow rate of 1.4 CFS for the 10-year, 24-hour storm.

The post-project rational method hydrology calculations have been included in Appendix A, and the post-project rational method hydrology map has been included as Exhibit A. The pre-project unit hydrograph calculations haven been included in Appendix B, and the pre-project unit hydrograph map has been included as Exhibit B. The post-project unit hydrograph calculations have been included in Appendix C, and the post-project unit hydrograph map has been included as Exhibit C. The basin volume calculations are included in Appendix D.

IV. HYDRAULIC ASSESSMENT

The project site is impacted by the Hurkey Creek flood plain, see Figure 2, which was studied by WEBB and Associates. The flood plain assessment performed by WEBB has been included in Excerpt A. The project site created a development that would be located outside the 100-year flood plain limits as defined by WEBB and shown in Figure 2. The study performed by WEBB indicates that the Hurkey Creek watershed area is approximately 7,000 acres and has a peak flow rate of 6,074 ft3/s. As part of this assessment, JLC reviewed the county of Riverside increased runoff criteria and ordinance number 458. Based upon previous projects processed through the county of Riverside, RCFC&WCD has exempted the increased runoff criteria when projects discharge into an adequate outlet. It is JLC's opinion that Hurkey Creek is an adequate outlet due to the magnitude of the watershed area and peak flow rate. Therefore, the county runoff criteria were not applied.

An offsite flow rate analysis was done to ensure runoff from the north of Apple Canyon Road did not overflow into the project site. The flow rate from node 108 to 109 of the Offsite

Hydrology Map (Exhibit E), is 5.9-12.8 CFS. This flow runs parallel to the project site on the opposing side of Apple Canyon Road. To ensure that this flow did not cross the road into the project site, hydraulic cross section calculations were done. The hydraulic flow rate calculations of the cross sections detail the maximum capacity flow rate that the given terrain of the cross section can contain. This flow rate calculation is independent of the amount of rainfall because it strictly details the capacity of flow that the terrain can contain without the runoff frow overflowing. Separately, the rational method flow rate is calculated for the 100 year peak rain fall storm. Based off this analysis, the offsite flow will not flow into the project site when the hydraulic capacity is larger than the rational method flow rate. Sections A, B, C, and D shown on Exhibit F detail the rational method flow rate as Q_{HYD} = 5.9-12.8 CFS. The hydraulic capacity flow rate for each cross section is defined as Q_{CAP}. Along sections A through D the hydraulic capacity flow rate is larger than the rational method flow rate. From this analysis the terrain on the northern side of Apple Canyon Road can sufficiently contain offsite flows, preventing runoff from crossing into the project site. For flows traveling from node 106 to 109, cross section J provides a Q_{CAP} = 235.3 CFS. The Q_{HYD} = 178.5-221.4 CFS for this flow path and does not exceed the hydraulic capacity flow rate for this cross section as shown on Exhibit F. The flow path can be seen to travel along the contours to node 109, to the northeast of the project site. It is JLC's opinion that according to the hydraulic cross section analysis, offsite flow will not cross into the project site and will be tributary to the stream A creek, west along Apple Canyon Road.

The offsite rational method hydrology map has been included as Exhibit E. The offsite rational method hydrology calculations have been included in Appendix E. An exhibit of the offsite flow rate analysis with cross sections has been included as Exhibit F. The cross section calculations have been included in Appendix F.

The project site proposed a drive aisle with an AC dike along the interior edge to collect runoff from the project site. Additionally, local storm drain facilities are proposed to collect and route runoff within the project site. A drainage facilities map has been included as Exhibit D. The drainage facilities have been proposed in order to flood protect the project and meet Riverside county ordinate number 458.

Bioretention Basin 1 is proposed on the project site for the purposes of water quality. Additionally, Basin 1 is sized as a detention basin to mitigate hydromodification and the 10-year, 24-hour storm event from increase in flows emanating from the project site. Basin 1, located in the southern portion of the project site is designed to store 3.1 acre-feet of mitigation runoff, which exceeds the required volume of 1.3 acre-feet to provide mitigation based on the 10-year, 24-hour unit hydrograph analysis. The basin volume calculations are included in Appendix D.

V. FINDINGS

The hydrology analysis and hydraulic assessment evaluated the proposed development to determine the potential impact from the runoff emanating from the project site. It has been concluded that:

1. The proposed project created a grading and development strategy that avoids the Hurkey Creek flood plain which has a drainage area of approximately 7,000 acres and a flow rate of 6,000 ft^3/s for the 100-year, 6-hour storm, see Figure 2 and Excerpt A. It is JLC's opinion that Hurkey Creek should be considered an adequate outlet due to the magnitude of the Hurkey Creek watershed in comparison to the 13.79 acres of the developed condition watershed.

2. The existing land cover is undeveloped open brush and is completely pervious. In comparison, the proposed project site will have a post-project impervious ratio of 27% and landscaped areas. This resulted in an increase in flow rate and shall be mitigated to meet the hydromodification criteria as part of the Santa Ana WQMP Guidance Document.

3. The hydromodification criteria requires project to mitigate runoff for the 10-year, 24-hour storm event. The peak flow rate increased from 1.4 to 3.0 ft^3/s for the 10-year, 24-hour storm event. The required storage volume to mitigate the increased runoff is 1.3 acre-feet. The project proposes Basin 1 which provides 3.1 acre-feet of mitigation storage to mitigate the increased runoff.

4. The proposed mitigation strategy will sufficiently mitigate the increase in runoff as required per the hydromodification criteria.

5. A separate document defined as a Water Quality Management Plan was prepared to determine the water quality features and BMPs required for the project. The proposed basins identified as part of this project are sufficient to mitigate water quality runoff from the project site.

6. A drainage facilities map, Exhibit D, has been prepared to identify the storm drain systems required to collect runoff from the project site. The storm drain facilities identified in Exhibit D will provide the required flood protection, which will meet county ordinance 458.

7. Offsite flows to the north of Apple Canyon Rd will not impact the project site and are tributary to Stream A to the east of the project site.

VI. REFERENCES

1. Riverside County Flood Control and Water Conservation District Hydrology Manual, April 1978.

2. County of Riverside Ordinance 458

3. Santa Ana WQMP Guidance Document for Riverside County

4. Technical Memorandum – "Preliminary Hydrology & Floodplain Analysis for the Ridge, August 2020

FIGURES

FIGURE 1: VICINITY MAP

STATE HIGHWAY 74

APPLE CANYON ROAD

LAKE HEMET

PROJECT LOCATION

VICINITY MAP

N

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FIGURE 1

FIGURE 2: FLOOD PLAIN MAP

APPLE CANYON ROAD

PROJECT LOCATION

FLOOD PLAIN

HIGHWAY 74

FLOOD PLAIN MAP

N
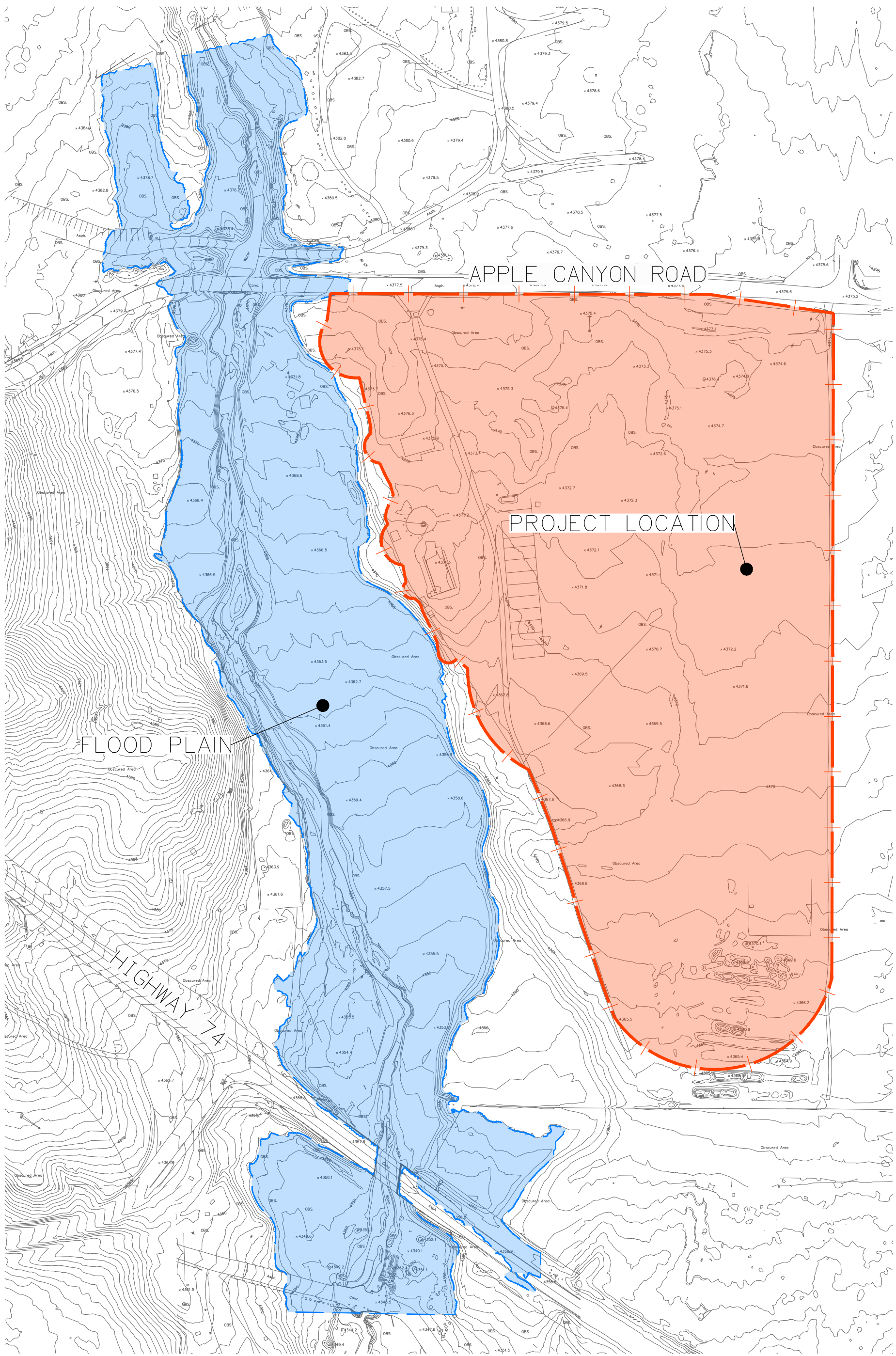
FIGURE 3: WATERSHED TRIBUTARY TO APPLE CANYON ROAD

APPLE CANYON ROAD

WATERSHED TRIBUTARY
TO APPLE CANYON RD
94.1 ACRES

PROJECT LOCATION

FLOOD PLAIN

HIGHWAY 74

WATERSHED TRIBUTARY TO
APPLE CANYON RD

N

JLC
Engineering & Consulting, Inc.
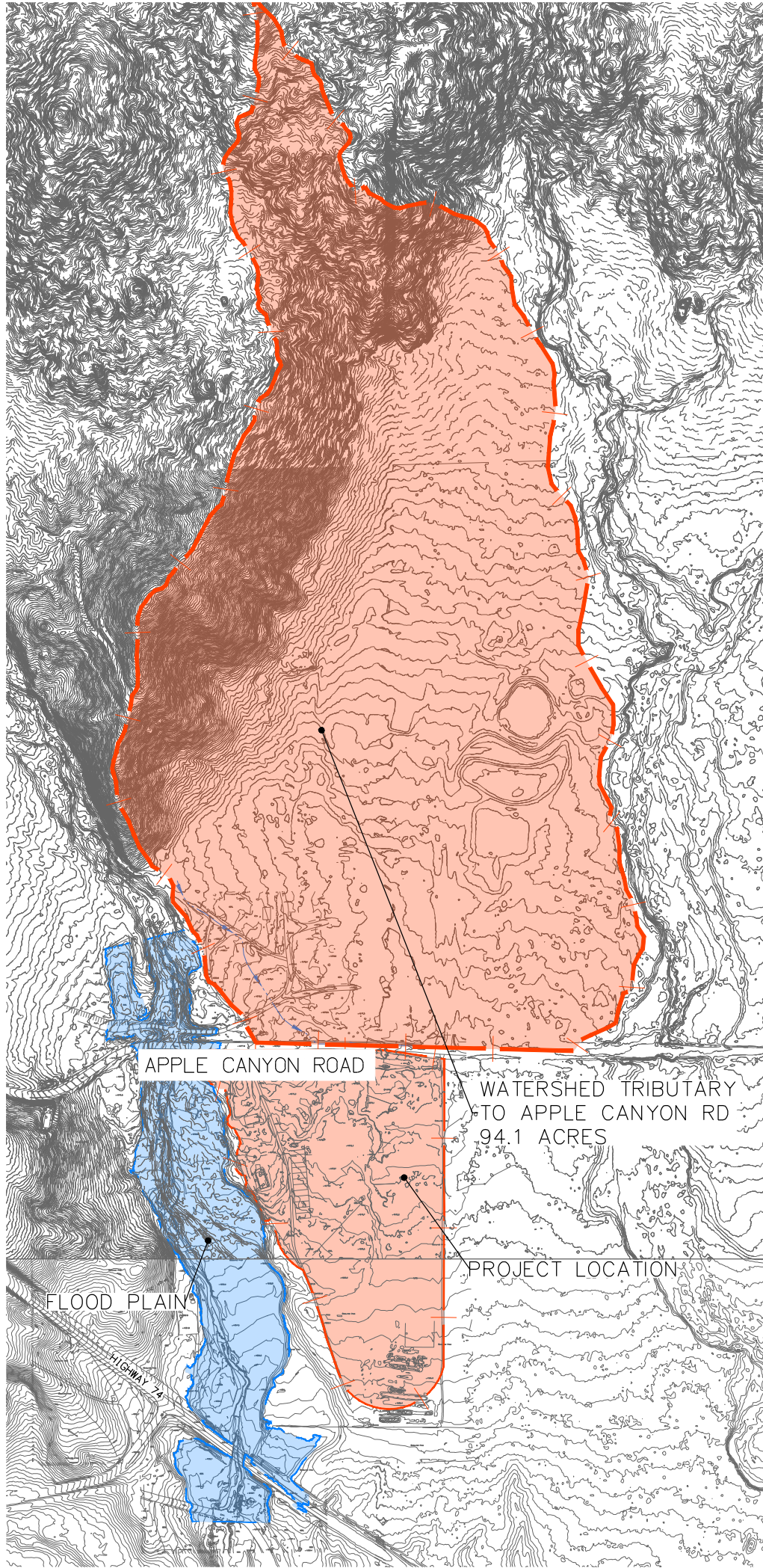
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FIGURE 3

APPENDICES

APPENDIX A: **POST-PROJECT CONDITION RATIONAL METHOD HYDROLOGY**

APPENDIX A.1: RATIONAL METHOD 100 YR ANALYSIS, AREAS "A"

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 – 2014 Version 9.0
    Rational Hydrology Study   Date: 05/23/23 File:ARA100.out
----
302.01.21
AREA A
100 YR STORM
POST PROJECT

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

 English (in-lb) Units used in input data file

Program License Serial Number 6279

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 100.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation = 0.720(In.)
100 year, 1 hour precipitation = 2.100(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 2.100(In/Hr)
Slope of intensity duration curve = 0.5500

+++
Process from Point/Station   101.000 to Point/Station   102.000
**** INITIAL AREA EVALUATION ****
_____
Initial area flow distance =   695.000(Ft.)
Top (of initial area) elevation =   78.000(Ft.)
Bottom (of initial area) elevation =   70.300(Ft.)
Difference in elevation =   7.700(Ft.)
Slope =   0.01108 s(percent)=   1.11
TC = k(0.420)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 14.163 min.
Rainfall intensity =   4.646(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/2 Acre Lot)
Runoff Coefficient = 0.695
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 32.00
Pervious area fraction = 0.600; Impervious fraction = 0.400
Initial subarea runoff =   14.475(CFS)

```
Total initial stream area =        4.480(Ac.)
Pervious area fraction = 0.600


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** IMPROVED CHANNEL TRAVEL TIME ****
_____
Upstream point elevation =     70.300(Ft.)
Downstream point elevation =     68.300(Ft.)
Channel length thru subarea  =   229.000(Ft.)
Channel base width       =    1.000(Ft.)
Slope or 'Z' of left channel bank =   2.000
Slope or 'Z' of right channel bank =   2.000
Estimated mean flow rate at midpoint of channel =     15.427(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =     15.427(CFS)
Depth of flow =   0.919(Ft.), Average velocity =   5.913(Ft/s)
Channel flow top width =    4.677(Ft.)
Flow Velocity =    5.91(Ft/s)
Travel time  =    0.65 min.
Time of concentration =   14.81 min.

Sub-Channel No. 1 Critical depth =      1.063(Ft.)
    '     '      '      Critical flow top width =      5.000(Ft.)
    '     '      '      Critical flow velocity=    4.657(Ft/s)
    '     '      '      Critical flow area =      3.313(Sq.Ft)

 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.665
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.680; Impervious fraction =  0.320
Rainfall intensity =     4.533(In/Hr) for   100.0 year storm
Subarea runoff =      1.838(CFS) for       0.610(Ac.)
Total runoff =     16.313(CFS)       Total area =       5.090(Ac.)
Depth of flow =   0.943(Ft.), Average velocity =   5.998(Ft/s)

Sub-Channel No. 1 Critical depth =      1.094(Ft.)
    '     '      '      Critical flow top width =      5.000(Ft.)
    '     '      '      Critical flow velocity=    4.703(Ft/s)
    '     '      '      Critical flow area =      3.469(Sq.Ft)



+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____
Upstream point/station elevation =     67.200(Ft.)
Downstream point/station elevation =     67.000(Ft.)
Pipe length  =   130.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    16.313(CFS)
Nearest computed pipe diameter  =    30.00(In.)
Calculated individual pipe flow  =    16.313(CFS)
```

```
Normal flow depth in pipe =    24.98(In.)
Flow top width inside pipe =    22.39(In.)
Critical Depth =   16.38(In.)
Pipe flow velocity =       3.73(Ft/s)
Travel time through pipe =    0.58 min.
Time of concentration (TC) =    15.39 min.



+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station       104.000
**** CONFLUENCE OF MAIN STREAMS ****
_____
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =        5.090(Ac.)
Runoff from this stream =       16.313(CFS)
Time of concentration =   15.39 min.
Rainfall intensity =     4.439(In/Hr)
Program is now starting with Main Stream No. 2



+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station       106.000
**** INITIAL AREA EVALUATION ****
_____
Initial area flow distance =    859.000(Ft.)
Top (of initial area) elevation =     78.000(Ft.)
Bottom (of initial area) elevation =     70.300(Ft.)
Difference in elevation =      7.700(Ft.)
Slope =     0.00896  s(percent)=       0.90
TC = k(0.420)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   16.082 min.
Rainfall intensity =      4.332(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/2 Acre Lot)
Runoff Coefficient = 0.686
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =   32.00
Pervious area fraction =  0.600; Impervious fraction =  0.400
Initial subarea runoff =     14.216(CFS)
Total initial stream area =        4.780(Ac.)
Pervious area fraction = 0.600



+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.000 to Point/Station       109.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____
Upstream point/station elevation =     69.000(Ft.)
Downstream point/station elevation =     67.600(Ft.)
Pipe length  =   460.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     14.216(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    14.216(CFS)
Normal flow depth in pipe =    18.80(In.)
Flow top width inside pipe =    24.83(In.)
Critical Depth =   15.74(In.)
Pipe flow velocity =       4.81(Ft/s)
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```
Travel time through pipe =     1.60 min.
Time of concentration (TC) =    17.68 min.


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      109.000 to Point/Station      109.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 2 in normal stream number 1
Stream flow area =       4.780(Ac.)
Runoff from this stream =      14.216(CFS)
Time of concentration =   17.68 min.
Rainfall intensity =     4.113(In/Hr)


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.000 to Point/Station      108.000
**** INITIAL AREA EVALUATION ****
_____
Initial area flow distance =    573.000(Ft.)
Top (of initial area) elevation =     75.700(Ft.)
Bottom (of initial area) elevation =     69.500(Ft.)
Difference in elevation =      6.200(Ft.)
Slope =     0.01082  s(percent)=       1.08
TC = k(0.420)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.172 min.
Rainfall intensity =      4.835(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/2 Acre Lot)
Runoff Coefficient = 0.700
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =   32.00
Pervious area fraction =  0.600; Impervious fraction =  0.400
Initial subarea runoff =       5.453(CFS)
Total initial stream area =         1.610(Ac.)
Pervious area fraction = 0.600


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      109.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____
Upstream point/station elevation =     68.500(Ft.)
Downstream point/station elevation =     67.600(Ft.)
Pipe length  =    252.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =      5.453(CFS)
Nearest computed pipe diameter  =      18.00(In.)
Calculated individual pipe flow  =      5.453(CFS)
Normal flow depth in pipe =    12.96(In.)
Flow top width inside pipe =    16.16(In.)
Critical Depth =    10.80(In.)
Pipe flow velocity =       4.00(Ft/s)
Travel time through pipe =     1.05 min.
Time of concentration (TC) =    14.22 min.


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      109.000
```

**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 2 in normal stream number 2
Stream flow area =   1.610(Ac.)
Runoff from this stream =   5.453(CFS)
Time of concentration =   14.22 min.
Rainfall intensity =   4.635(In/Hr)
Summary of stream data:

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

1   14.216   17.68   4.113
2   5.453   14.22   4.635
Largest stream flow has longer time of concentration
Qp =   14.216 + sum of
         Qb   Ia/Ib
          5.453 *   0.887 =   4.838
Qp =   19.054

Total of 2 streams to confluence:
Flow rates before confluence point:
      14.216   5.453
Area of streams before confluence:
        4.780   1.610
Results of confluence:
Total flow rate =   19.054(CFS)
Time of concentration =   17.677 min.
Effective stream area after confluence =   6.390(Ac.)

+++
Process from Point/Station   109.000 to Point/Station   111.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____
Upstream point/station elevation =   67.600(Ft.)
Downstream point/station elevation =   67.200(Ft.)
Pipe length =   87.00(Ft.)   Manning's N = 0.013
No. of pipes = 1 Required pipe flow =   19.054(CFS)
Nearest computed pipe diameter =   27.00(In.)
Calculated individual pipe flow =   19.054(CFS)
Normal flow depth in pipe =   20.16(In.)
Flow top width inside pipe =   23.49(In.)
Critical Depth =   18.33(In.)
Pipe flow velocity =   5.98(Ft/s)
Travel time through pipe =   0.24 min.
Time of concentration (TC) =   17.92 min.

+++
Process from Point/Station   111.000 to Point/Station   111.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 2 in normal stream number 1
Stream flow area =   6.390(Ac.)
Runoff from this stream =   19.054(CFS)
Time of concentration =   17.92 min.
Rainfall intensity =   4.082(In/Hr)

```
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      111.000
**** INITIAL AREA EVALUATION ****
_____
Initial area flow distance =    338.000(Ft.)
Top (of initial area) elevation =    70.200(Ft.)
Bottom (of initial area) elevation =    68.300(Ft.)
Difference in elevation =     1.900(Ft.)
Slope =    0.00562  s(percent)=       0.56
TC = k(0.420)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.158 min.
Rainfall intensity =      5.053(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/2 Acre Lot)
Runoff Coefficient = 0.706
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =   32.00
Pervious area fraction =  0.600; Impervious fraction =  0.400
Initial subarea runoff =      2.640(CFS)
Total initial stream area =         0.740(Ac.)
Pervious area fraction = 0.600


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      111.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.740(Ac.)
Runoff from this stream =      2.640(CFS)
Time of concentration =   12.16 min.
Rainfall intensity =      5.053(In/Hr)
Summary of stream data:

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


1      19.054     17.92                 4.082
2       2.640     12.16                 5.053
Largest stream flow has longer time of concentration
Qp =      19.054 + sum of
         Qb          Ia/Ib
          2.640 *    0.808 =     2.133
Qp =      21.186

Total of 2 streams to confluence:
Flow rates before confluence point:
      19.054        2.640
Area of streams before confluence:
        6.390        0.740
Results of confluence:
Total flow rate =      21.186(CFS)
Time of concentration =    17.920 min.
Effective stream area after confluence =      7.130(Ac.)
```

```
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      111.000 to Point/Station      104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____
Upstream point/station elevation =     67.200(Ft.)
Downstream point/station elevation =     67.000(Ft.)
Pipe length  =    130.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    21.186(CFS)
Nearest computed pipe diameter  =      33.00(In.)
Calculated individual pipe flow  =    21.186(CFS)
Normal flow depth in pipe =   27.75(In.)
Flow top width inside pipe =   24.14(In.)
Critical Depth =   18.23(In.)
Pipe flow velocity =      3.98(Ft/s)
Travel time through pipe =    0.54 min.
Time of concentration (TC) =    18.46 min.


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      111.000 to Point/Station      104.000
**** CONFLUENCE OF MAIN STREAMS ****
_____
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =       7.130(Ac.)
Runoff from this stream =     21.186(CFS)
Time of concentration =   18.46 min.
Rainfall intensity =     4.015(In/Hr)
Summary of stream data:

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


1      16.313     15.39               4.439
2      21.186     18.46               4.015
Largest stream flow has longer time of concentration
Qp =     21.186 + sum of
        Qb          Ia/Ib
        16.313 *    0.905 =     14.757
Qp =     35.943

Total of 2 main streams to confluence:
Flow rates before confluence point:
     16.313      21.186
Area of streams before confluence:
      5.090         7.130


Results of confluence:
Total flow rate =      35.943(CFS)
Time of concentration =    18.465 min.
Effective stream area after confluence  =      12.220(Ac.)


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      112.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____
Upstream point/station elevation =     67.000(Ft.)
```

```
Downstream point/station elevation =    61.000(Ft.)
Pipe length  =   262.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    35.943(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    35.943(CFS)
Normal flow depth in pipe =   21.00(In.)
Flow top width inside pipe =   15.87(In.)
Critical depth could not be calculated.
Pipe flow velocity =     12.34(Ft/s)
Travel time through pipe =    0.35 min.
Time of concentration (TC) =    18.82 min.


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       112.000 to Point/Station       112.000
**** SUBAREA FLOW ADDITION ****
_____
USER INPUT of soil data for subarea
Runoff Coefficient = 0.646
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =   46.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Time of concentration =    18.82 min.
Rainfall intensity =     3.974(In/Hr) for a   100.0 year storm
Subarea runoff =      1.745(CFS) for      0.680(Ac.)
Total runoff =     37.687(CFS)     Total area =      12.900(Ac.)


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       112.000 to Point/Station       113.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____
Upstream point/station elevation =    61.000(Ft.)
Downstream point/station elevation =    58.000(Ft.)
Pipe length  =   167.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    37.687(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    37.687(CFS)
Normal flow depth in pipe =   20.18(In.)
Flow top width inside pipe =   23.46(In.)
Critical Depth =   24.70(In.)
Pipe flow velocity =     11.83(Ft/s)
Travel time through pipe =    0.24 min.
Time of concentration (TC) =    19.05 min.
End of computations, total study area =         12.90 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.625
Area averaged RI index number =  32.7
```

APPENDIX A.2:   RATIONAL METHOD 10 YR ANALYSIS, AREAS "A"

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
     Rational Hydrology Study   Date: 05/23/23 File:ARA10.out
----
302.01.21
AREA A
10 YR STORM
POST PROJECT

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

 English (in-lb) Units used in input data file

Program License Serial Number 6279

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =   10.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation = 0.720(In.)
100 year, 1 hour precipitation = 2.100(In.)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 1.288(In/Hr)
Slope of intensity duration curve = 0.5500

++
Process from Point/Station   101.000 to Point/Station   102.000
**** INITIAL AREA EVALUATION ****
_____
Initial area flow distance =   695.000(Ft.)
Top (of initial area) elevation =   78.000(Ft.)
Bottom (of initial area) elevation =   70.300(Ft.)
Difference in elevation =   7.700(Ft.)
Slope =   0.01108 s(percent)=   1.11
TC = k(0.420)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.163 min.
Rainfall intensity =   2.849(In/Hr) for a   10.0 year storm
SINGLE FAMILY (1/2 Acre Lot)
Runoff Coefficient = 0.631
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 32.00
Pervious area fraction = 0.600; Impervious fraction = 0.400
Initial subarea runoff =   8.050(CFS)

```
Total initial stream area =        4.480(Ac.)
Pervious area fraction = 0.600


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** IMPROVED CHANNEL TRAVEL TIME ****
_____
Upstream point elevation =     70.300(Ft.)
Downstream point elevation =     68.300(Ft.)
Channel length thru subarea  =   229.000(Ft.)
Channel base width       =     1.000(Ft.)
Slope or 'Z' of left channel bank =   2.000
Slope or 'Z' of right channel bank =   2.000
Estimated mean flow rate at midpoint of channel =      8.598(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel   =     1.000(Ft.)
Flow(q) thru subarea =      8.598(CFS)
Depth of flow =   0.702(Ft.), Average velocity =   5.092(Ft/s)
Channel flow top width =     3.809(Ft.)
Flow Velocity =     5.09(Ft/s)
Travel time  =     0.75 min.
Time of concentration =    14.91 min.

Sub-Channel No. 1 Critical depth =       0.813(Ft.)
   '      '       '       Critical flow top width =      4.250(Ft.)
   '      '       '       Critical flow velocity=    4.031(Ft/s)
   '      '       '       Critical flow area =      2.133(Sq.Ft)

 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.591
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =   32.00
Pervious area fraction =  0.680; Impervious fraction =  0.320
Rainfall intensity =      2.769(In/Hr) for a    10.0 year storm
Subarea runoff =      0.998(CFS) for      0.610(Ac.)
Total runoff =      9.048(CFS)      Total area =       5.090(Ac.)
Depth of flow =   0.719(Ft.), Average velocity =   5.159(Ft/s)

Sub-Channel No. 1 Critical depth =       0.836(Ft.)
   '      '       '       Critical flow top width =      4.344(Ft.)
   '      '       '       Critical flow velocity=    4.051(Ft/s)
   '      '       '       Critical flow area =      2.234(Sq.Ft)



+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____
Upstream point/station elevation =     67.200(Ft.)
Downstream point/station elevation =     67.000(Ft.)
Pipe length  =    130.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.048(CFS)
Nearest computed pipe diameter  =    24.00(In.)
Calculated individual pipe flow  =     9.048(CFS)
```

```
Normal flow depth in pipe =    20.11(In.)
Flow top width inside pipe =    17.69(In.)
Critical Depth =   12.88(In.)
Pipe flow velocity =        3.22(Ft/s)
Travel time through pipe =    0.67 min.
Time of concentration (TC) =    15.59 min.


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      104.000
**** CONFLUENCE OF MAIN STREAMS ****
_____
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =        5.090(Ac.)
Runoff from this stream =        9.048(CFS)
Time of concentration =   15.59 min.
Rainfall intensity =     2.703(In/Hr)
Program is now starting with Main Stream No. 2


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      106.000
**** INITIAL AREA EVALUATION ****
_____
Initial area flow distance =    859.000(Ft.)
Top (of initial area) elevation =     78.000(Ft.)
Bottom (of initial area) elevation =     70.300(Ft.)
Difference in elevation =      7.700(Ft.)
Slope =     0.00896  s(percent)=        0.90
TC = k(0.420)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   16.082 min.
Rainfall intensity =      2.657(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/2 Acre Lot)
Runoff Coefficient = 0.621
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =   32.00
Pervious area fraction =  0.600; Impervious fraction =  0.400
Initial subarea runoff =      7.890(CFS)
Total initial stream area =        4.780(Ac.)
Pervious area fraction = 0.600


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.000 to Point/Station      109.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____
Upstream point/station elevation =     69.000(Ft.)
Downstream point/station elevation =     67.600(Ft.)
Pipe length  =    460.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =      7.890(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =      7.890(CFS)
Normal flow depth in pipe =    15.61(In.)
Flow top width inside pipe =    18.35(In.)
Critical Depth =   12.49(In.)
Pipe flow velocity =        4.11(Ft/s)
```

```
Travel time through pipe =    1.86 min.
Time of concentration (TC) =    17.95 min.



+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      109.000 to Point/Station      109.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 2 in normal stream number 1
Stream flow area =        4.780(Ac.)
Runoff from this stream =        7.890(CFS)
Time of concentration =   17.95 min.
Rainfall intensity =      2.501(In/Hr)



+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.000 to Point/Station      108.000
**** INITIAL AREA EVALUATION ****
_____
Initial area flow distance =    573.000(Ft.)
Top (of initial area) elevation =     75.700(Ft.)
Bottom (of initial area) elevation =     69.500(Ft.)
Difference in elevation =      6.200(Ft.)
Slope =     0.01082  s(percent)=       1.08
TC = k(0.420)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.172 min.
Rainfall intensity =      2.965(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/2 Acre Lot)
Runoff Coefficient = 0.636
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.600; Impervious fraction =  0.400
Initial subarea runoff =        3.036(CFS)
Total initial stream area =         1.610(Ac.)
Pervious area fraction = 0.600



+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      109.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____
Upstream point/station elevation =     68.500(Ft.)
Downstream point/station elevation =     67.600(Ft.)
Pipe length  =    252.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =      3.036(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =      3.036(CFS)
Normal flow depth in pipe =    10.03(In.)
Flow top width inside pipe =    14.12(In.)
Critical Depth =     8.40(In.)
Pipe flow velocity =       3.48(Ft/s)
Travel time through pipe =    1.21 min.
Time of concentration (TC) =    14.38 min.



+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      109.000
```

```
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 2 in normal stream number 2
Stream flow area =        1.610(Ac.)
Runoff from this stream =       3.036(CFS)
Time of concentration =   14.38 min.
Rainfall intensity =     2.825(In/Hr)
Summary of stream data:

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


1        7.890       17.95                2.501
2        3.036       14.38                2.825
Largest stream flow has longer time of concentration
Qp =       7.890 + sum of
         Qb          Ia/Ib
         3.036 *    0.885 =      2.688
Qp =       10.578

Total of 2 streams to confluence:
Flow rates before confluence point:
      7.890        3.036
Area of streams before confluence:
        4.780          1.610
Results of confluence:
Total flow rate =      10.578(CFS)
Time of concentration =    17.946 min.
Effective stream area after confluence =      6.390(Ac.)


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      109.000 to Point/Station      111.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____
Upstream point/station elevation =      67.600(Ft.)
Downstream point/station elevation =     67.200(Ft.)
Pipe length  =     87.00(Ft.)   Manning's N = 0.013
No. of pipes = 1 Required pipe flow  =     10.578(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     10.578(CFS)
Normal flow depth in pipe =   16.92(In.)
Flow top width inside pipe =   16.61(In.)
Critical Depth =   14.55(In.)
Pipe flow velocity =       5.09(Ft/s)
Travel time through pipe =    0.28 min.
Time of concentration (TC) =    18.23 min.


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      111.000 to Point/Station      111.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 2 in normal stream number 1
Stream flow area =       6.390(Ac.)
Runoff from this stream =     10.578(CFS)
Time of concentration =   18.23 min.
Rainfall intensity =     2.480(In/Hr)
```

```
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station       111.000
**** INITIAL AREA EVALUATION ****
_____
Initial area flow distance =    338.000(Ft.)
Top (of initial area) elevation =    70.200(Ft.)
Bottom (of initial area) elevation =    68.300(Ft.)
Difference in elevation =     1.900(Ft.)
Slope =    0.00562  s(percent)=       0.56
TC = k(0.420)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.158 min.
Rainfall intensity =      3.098(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/2 Acre Lot)
Runoff Coefficient = 0.642
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =   32.00
Pervious area fraction =  0.600; Impervious fraction =  0.400
Initial subarea runoff =       1.472(CFS)
Total initial stream area =         0.740(Ac.)
Pervious area fraction = 0.600


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station       111.000
**** CONFLUENCE OF MINOR STREAMS ****
_____
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.740(Ac.)
Runoff from this stream =      1.472(CFS)
Time of concentration =   12.16 min.
Rainfall intensity =     3.098(In/Hr)
Summary of stream data:

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


1       10.578     18.23                 2.480
2        1.472     12.16                 3.098
Largest stream flow has longer time of concentration
Qp =      10.578 + sum of
         Qb         Ia/Ib
         1.472 *    0.800 =      1.178
Qp =      11.756

Total of 2 streams to confluence:
Flow rates before confluence point:
     10.578         1.472
Area of streams before confluence:
       6.390         0.740
Results of confluence:
Total flow rate =      11.756(CFS)
Time of concentration =    18.231 min.
Effective stream area after confluence =       7.130(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       111.000 to Point/Station       104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____
Upstream point/station elevation =     67.200(Ft.)
Downstream point/station elevation =     67.000(Ft.)
Pipe length  =    130.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     11.756(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =     11.756(CFS)
Normal flow depth in pipe =    21.38(In.)
Flow top width inside pipe =    21.93(In.)
Critical Depth =    14.24(In.)
Pipe flow velocity =      3.48(Ft/s)
Travel time through pipe =    0.62 min.
Time of concentration (TC) =     18.85 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       111.000 to Point/Station       104.000
**** CONFLUENCE OF MAIN STREAMS ****
_____
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =       7.130(Ac.)
Runoff from this stream =     11.756(CFS)
Time of concentration =   18.85 min.
Rainfall intensity =     2.434(In/Hr)
Summary of stream data:

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


1        9.048     15.59              2.703
2       11.756     18.85              2.434
Largest stream flow has longer time of concentration
Qp =     11.756 + sum of
       Qb           Ia/Ib
       9.048 *    0.901 =      8.149
Qp =     19.904

Total of 2 main streams to confluence:
Flow rates before confluence point:
      9.048      11.756
Area of streams before confluence:
       5.090         7.130


Results of confluence:
Total flow rate =      19.904(CFS)
Time of concentration =    18.853 min.
Effective stream area after confluence  =     12.220(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       104.000 to Point/Station       112.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____
Upstream point/station elevation =     67.000(Ft.)
```

```
Downstream point/station elevation =     61.000(Ft.)
Pipe length  =   262.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    19.904(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    19.904(CFS)
Normal flow depth in pipe =   14.60(In.)
Flow top width inside pipe =   19.33(In.)
Critical Depth =   19.15(In.)
Pipe flow velocity =     11.15(Ft/s)
Travel time through pipe =    0.39 min.
Time of concentration (TC) =    19.24 min.


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      112.000 to Point/Station      112.000
**** SUBAREA FLOW ADDITION ****
_____
USER INPUT of soil data for subarea
Runoff Coefficient = 0.545
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =   46.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Time of concentration =    19.24 min.
Rainfall intensity =     2.407(In/Hr) for a    10.0 year storm
Subarea runoff =     0.893(CFS) for      0.680(Ac.)
Total runoff =    20.797(CFS)     Total area =      12.900(Ac.)


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      112.000 to Point/Station      113.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____
Upstream point/station elevation =     61.000(Ft.)
Downstream point/station elevation =     58.000(Ft.)
Pipe length  =   167.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    20.797(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    20.797(CFS)
Normal flow depth in pipe =   16.83(In.)
Flow top width inside pipe =   16.76(In.)
Critical Depth =   19.39(In.)
Pipe flow velocity =     10.06(Ft/s)
Travel time through pipe =    0.28 min.
Time of concentration (TC) =    19.52 min.
End of computations, total study area =          12.90 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.625
Area averaged RI index number =  32.7
```

APPENDIX B: PRE-PROJECT UNIT HYDROGRAPH METHOD HYDROLOGY

APPENDIX B.1:   U<small>NIT</small> H<small>YDROGRAPH</small> A<small>NALYSIS</small>, A<small>REAS</small> "A"

2-YEAR, 24-HOUR STORM EVENT

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

           Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2014, Version 9.0
                  Study date  02/16/23 File: ara242.out


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
      ----------------------------------------------------------------------

      Riverside County Synthetic Unit Hydrology Method
      RCFC & WCD Manual date - April 1978


      Program License Serial Number 6279


      --------------------------------------------------------------------
       English (in-lb) Input Units Used
       English Rainfall Data (Inches) Input Values Used

       English Units used in output format




      --------------------------------------------------------------------
      302.01.21
      AREA A
      2 YR STORM
      PRE PROJECT
      --------------------------------------------------------------------
      Drainage Area =      12.23(Ac.)  =       0.019 Sq. Mi.
      Drainage Area for Depth-Area Areal Adjustment =       12.23(Ac.)  =       0.019
Sq. Mi.
      Length along longest watercourse =     1105.90(Ft.)
      Length along longest watercourse measured to centroid =       610.60(Ft.)
      Length along longest watercourse =        0.209 Mi.
      Length along longest watercourse measured to centroid =       0.116 Mi.
      Difference in elevation =        9.50(Ft.)
      Slope along watercourse =      45.3567 Ft./Mi.
      Average Manning's 'N' = 0.040
      Lag time =     0.113 Hr.
      Lag time =      6.79 Min.
      25% of lag time =      1.70 Min.
      40% of lag time =      2.71 Min.
      Unit time =      5.00 Min.
      Duration of storm = 24 Hour(s)
      User Entered Base Flow =      0.00(CFS)

      2 YEAR Area rainfall data:


      Area(Ac.)[1]        Rainfall(In)[2]        Weighting[1*2]
           12.23                2.79                    34.12


      100 YEAR Area rainfall data:


      Area(Ac.)[1]        Rainfall(In)[2]        Weighting[1*2]
           12.23                7.72                    94.42
```

```
        STORM EVENT (YEAR) =     2.00
        Area Averaged 2-Year Rainfall =     2.790(In)
        Area Averaged 100-Year Rainfall =    7.720(In)


        Point rain (area averaged) =     2.790(In)
        Areal adjustment factor =  100.00 %
        Adjusted average point rain =    2.790(In)


        Sub-Area Data:
        Area(Ac.)          Runoff Index   Impervious %
           12.230              46.00          0.000
         Total Area Entered =      12.23(Ac.)


        RI     RI    Infil. Rate Impervious   Adj. Infil. Rate  Area%       F
        AMC2 AMC-2     (In/Hr)     (Dec.%)       (In/Hr)        (Dec.)    (In/Hr)
        46.0  46.0     0.611       0.000         0.611          1.000      0.611
                                                               Sum (F) =   0.611
        Area averaged mean soil loss (F) (In/Hr) =  0.611
        Minimum soil loss rate ((In/Hr)) =  0.306
        (for 24 hour storm duration)
        Soil low loss rate (decimal) =   0.900
        ----------------------------------------------------------------------

                U n i t   H y d r o g r a p h
                      MOUNTAIN S-Curve
        ----------------------------------------------------------------------
                    Unit Hydrograph Data
        ----------------------------------------------------------------------
        Unit time period   Time % of lag   Distribution   Unit Hydrograph
             (hrs)                           Graph %           (CFS)
        ----------------------------------------------------------------------
           1   0.083          73.674          15.042           1.854
           2   0.167         147.347          36.939           4.553
           3   0.250         221.021          14.894           1.836
           4   0.333         294.694           8.503           1.048
           5   0.417         368.368           5.644           0.696
           6   0.500         442.041           3.929           0.484
           7   0.583         515.715           3.090           0.381
           8   0.667         589.388           2.520           0.311
           9   0.750         663.062           2.116           0.261
          10   0.833         736.736           1.784           0.220
          11   0.917         810.409           1.461           0.180
          12   1.000         884.083           1.329           0.164
          13   1.083         957.756           1.326           0.163
          14   1.167        1031.430           1.423           0.175
                                        Sum = 100.000   Sum=    12.326
        ----------------------------------------------------------------------


     The following loss rate calculations reflect use of the minimum calculated loss
     rate subtracted from the Storm Rain to produce the maximum Effective Rain value

     Unit Time    Pattern   Storm Rain     Loss rate(In./Hr)     Effective
         (Hr.)    Percent    (In/Hr)       Max  |  Low           (In/Hr)
      1   0.08     0.07       0.022      (  1.083)    0.020        0.002
      2   0.17     0.07       0.022      (  1.079)    0.020        0.002
      3   0.25     0.07       0.022      (  1.075)    0.020        0.002
      4   0.33     0.10       0.033      (  1.071)    0.030        0.003
      5   0.42     0.10       0.033      (  1.067)    0.030        0.003
```

6	0.50	0.10	0.033	(1.063)	0.030	0.003
7	0.58	0.10	0.033	(1.058)	0.030	0.003
8	0.67	0.10	0.033	(1.054)	0.030	0.003
9	0.75	0.10	0.033	(1.050)	0.030	0.003
10	0.83	0.13	0.045	(1.046)	0.040	0.004
11	0.92	0.13	0.045	(1.042)	0.040	0.004
12	1.00	0.13	0.045	(1.038)	0.040	0.004
13	1.08	0.10	0.033	(1.034)	0.030	0.003
14	1.17	0.10	0.033	(1.030)	0.030	0.003
15	1.25	0.10	0.033	(1.026)	0.030	0.003
16	1.33	0.10	0.033	(1.021)	0.030	0.003
17	1.42	0.10	0.033	(1.017)	0.030	0.003
18	1.50	0.10	0.033	(1.013)	0.030	0.003
19	1.58	0.10	0.033	(1.009)	0.030	0.003
20	1.67	0.10	0.033	(1.005)	0.030	0.003
21	1.75	0.10	0.033	(1.001)	0.030	0.003
22	1.83	0.13	0.045	(0.997)	0.040	0.004
23	1.92	0.13	0.045	(0.993)	0.040	0.004
24	2.00	0.13	0.045	(0.989)	0.040	0.004
25	2.08	0.13	0.045	(0.985)	0.040	0.004
26	2.17	0.13	0.045	(0.981)	0.040	0.004
27	2.25	0.13	0.045	(0.977)	0.040	0.004
28	2.33	0.13	0.045	(0.973)	0.040	0.004
29	2.42	0.13	0.045	(0.969)	0.040	0.004
30	2.50	0.13	0.045	(0.965)	0.040	0.004
31	2.58	0.17	0.056	(0.961)	0.050	0.006
32	2.67	0.17	0.056	(0.957)	0.050	0.006
33	2.75	0.17	0.056	(0.953)	0.050	0.006
34	2.83	0.17	0.056	(0.950)	0.050	0.006
35	2.92	0.17	0.056	(0.946)	0.050	0.006
36	3.00	0.17	0.056	(0.942)	0.050	0.006
37	3.08	0.17	0.056	(0.938)	0.050	0.006
38	3.17	0.17	0.056	(0.934)	0.050	0.006
39	3.25	0.17	0.056	(0.930)	0.050	0.006
40	3.33	0.17	0.056	(0.926)	0.050	0.006
41	3.42	0.17	0.056	(0.922)	0.050	0.006
42	3.50	0.17	0.056	(0.918)	0.050	0.006
43	3.58	0.17	0.056	(0.915)	0.050	0.006
44	3.67	0.17	0.056	(0.911)	0.050	0.006
45	3.75	0.17	0.056	(0.907)	0.050	0.006
46	3.83	0.20	0.067	(0.903)	0.060	0.007
47	3.92	0.20	0.067	(0.899)	0.060	0.007
48	4.00	0.20	0.067	(0.895)	0.060	0.007
49	4.08	0.20	0.067	(0.892)	0.060	0.007
50	4.17	0.20	0.067	(0.888)	0.060	0.007
51	4.25	0.20	0.067	(0.884)	0.060	0.007
52	4.33	0.23	0.078	(0.880)	0.070	0.008
53	4.42	0.23	0.078	(0.877)	0.070	0.008
54	4.50	0.23	0.078	(0.873)	0.070	0.008
55	4.58	0.23	0.078	(0.869)	0.070	0.008
56	4.67	0.23	0.078	(0.865)	0.070	0.008
57	4.75	0.23	0.078	(0.862)	0.070	0.008
58	4.83	0.27	0.089	(0.858)	0.080	0.009
59	4.92	0.27	0.089	(0.854)	0.080	0.009
60	5.00	0.27	0.089	(0.850)	0.080	0.009
61	5.08	0.20	0.067	(0.847)	0.060	0.007
62	5.17	0.20	0.067	(0.843)	0.060	0.007
63	5.25	0.20	0.067	(0.839)	0.060	0.007
64	5.33	0.23	0.078	(0.836)	0.070	0.008
65	5.42	0.23	0.078	(0.832)	0.070	0.008

66	5.50	0.23	0.078	(	0.828)	0.070	0.008
67	5.58	0.27	0.089	(	0.825)	0.080	0.009
68	5.67	0.27	0.089	(	0.821)	0.080	0.009
69	5.75	0.27	0.089	(	0.818)	0.080	0.009
70	5.83	0.27	0.089	(	0.814)	0.080	0.009
71	5.92	0.27	0.089	(	0.810)	0.080	0.009
72	6.00	0.27	0.089	(	0.807)	0.080	0.009
73	6.08	0.30	0.100	(	0.803)	0.090	0.010
74	6.17	0.30	0.100	(	0.800)	0.090	0.010
75	6.25	0.30	0.100	(	0.796)	0.090	0.010
76	6.33	0.30	0.100	(	0.792)	0.090	0.010
77	6.42	0.30	0.100	(	0.789)	0.090	0.010
78	6.50	0.30	0.100	(	0.785)	0.090	0.010
79	6.58	0.33	0.112	(	0.782)	0.100	0.011
80	6.67	0.33	0.112	(	0.778)	0.100	0.011
81	6.75	0.33	0.112	(	0.775)	0.100	0.011
82	6.83	0.33	0.112	(	0.771)	0.100	0.011
83	6.92	0.33	0.112	(	0.768)	0.100	0.011
84	7.00	0.33	0.112	(	0.764)	0.100	0.011
85	7.08	0.33	0.112	(	0.761)	0.100	0.011
86	7.17	0.33	0.112	(	0.757)	0.100	0.011
87	7.25	0.33	0.112	(	0.754)	0.100	0.011
88	7.33	0.37	0.123	(	0.751)	0.110	0.012
89	7.42	0.37	0.123	(	0.747)	0.110	0.012
90	7.50	0.37	0.123	(	0.744)	0.110	0.012
91	7.58	0.40	0.134	(	0.740)	0.121	0.013
92	7.67	0.40	0.134	(	0.737)	0.121	0.013
93	7.75	0.40	0.134	(	0.733)	0.121	0.013
94	7.83	0.43	0.145	(	0.730)	0.131	0.015
95	7.92	0.43	0.145	(	0.727)	0.131	0.015
96	8.00	0.43	0.145	(	0.723)	0.131	0.015
97	8.08	0.50	0.167	(	0.720)	0.151	0.017
98	8.17	0.50	0.167	(	0.717)	0.151	0.017
99	8.25	0.50	0.167	(	0.713)	0.151	0.017
100	8.33	0.50	0.167	(	0.710)	0.151	0.017
101	8.42	0.50	0.167	(	0.707)	0.151	0.017
102	8.50	0.50	0.167	(	0.703)	0.151	0.017
103	8.58	0.53	0.179	(	0.700)	0.161	0.018
104	8.67	0.53	0.179	(	0.697)	0.161	0.018
105	8.75	0.53	0.179	(	0.693)	0.161	0.018
106	8.83	0.57	0.190	(	0.690)	0.171	0.019
107	8.92	0.57	0.190	(	0.687)	0.171	0.019
108	9.00	0.57	0.190	(	0.684)	0.171	0.019
109	9.08	0.63	0.212	(	0.680)	0.191	0.021
110	9.17	0.63	0.212	(	0.677)	0.191	0.021
111	9.25	0.63	0.212	(	0.674)	0.191	0.021
112	9.33	0.67	0.223	(	0.671)	0.201	0.022
113	9.42	0.67	0.223	(	0.668)	0.201	0.022
114	9.50	0.67	0.223	(	0.664)	0.201	0.022
115	9.58	0.70	0.234	(	0.661)	0.211	0.023
116	9.67	0.70	0.234	(	0.658)	0.211	0.023
117	9.75	0.70	0.234	(	0.655)	0.211	0.023
118	9.83	0.73	0.246	(	0.652)	0.221	0.025
119	9.92	0.73	0.246	(	0.649)	0.221	0.025
120	10.00	0.73	0.246	(	0.645)	0.221	0.025
121	10.08	0.50	0.167	(	0.642)	0.151	0.017
122	10.17	0.50	0.167	(	0.639)	0.151	0.017
123	10.25	0.50	0.167	(	0.636)	0.151	0.017
124	10.33	0.50	0.167	(	0.633)	0.151	0.017
125	10.42	0.50	0.167	(	0.630)	0.151	0.017

126	10.50	0.50	0.167	(	0.627)	0.151	0.017
127	10.58	0.67	0.223	(	0.624)	0.201	0.022
128	10.67	0.67	0.223	(	0.621)	0.201	0.022
129	10.75	0.67	0.223	(	0.618)	0.201	0.022
130	10.83	0.67	0.223	(	0.615)	0.201	0.022
131	10.92	0.67	0.223	(	0.612)	0.201	0.022
132	11.00	0.67	0.223	(	0.609)	0.201	0.022
133	11.08	0.63	0.212	(	0.606)	0.191	0.021
134	11.17	0.63	0.212	(	0.603)	0.191	0.021
135	11.25	0.63	0.212	(	0.600)	0.191	0.021
136	11.33	0.63	0.212	(	0.597)	0.191	0.021
137	11.42	0.63	0.212	(	0.594)	0.191	0.021
138	11.50	0.63	0.212	(	0.591)	0.191	0.021
139	11.58	0.57	0.190	(	0.588)	0.171	0.019
140	11.67	0.57	0.190	(	0.585)	0.171	0.019
141	11.75	0.57	0.190	(	0.582)	0.171	0.019
142	11.83	0.60	0.201	(	0.579)	0.181	0.020
143	11.92	0.60	0.201	(	0.576)	0.181	0.020
144	12.00	0.60	0.201	(	0.573)	0.181	0.020
145	12.08	0.83	0.279	(	0.571)	0.251	0.028
146	12.17	0.83	0.279	(	0.568)	0.251	0.028
147	12.25	0.83	0.279	(	0.565)	0.251	0.028
148	12.33	0.87	0.290	(	0.562)	0.261	0.029
149	12.42	0.87	0.290	(	0.559)	0.261	0.029
150	12.50	0.87	0.290	(	0.556)	0.261	0.029
151	12.58	0.93	0.312	(	0.554)	0.281	0.031
152	12.67	0.93	0.312	(	0.551)	0.281	0.031
153	12.75	0.93	0.312	(	0.548)	0.281	0.031
154	12.83	0.97	0.324	(	0.545)	0.291	0.032
155	12.92	0.97	0.324	(	0.542)	0.291	0.032
156	13.00	0.97	0.324	(	0.540)	0.291	0.032
157	13.08	1.13	0.379	(	0.537)	0.341	0.038
158	13.17	1.13	0.379	(	0.534)	0.341	0.038
159	13.25	1.13	0.379	(	0.532)	0.341	0.038
160	13.33	1.13	0.379	(	0.529)	0.341	0.038
161	13.42	1.13	0.379	(	0.526)	0.341	0.038
162	13.50	1.13	0.379	(	0.524)	0.341	0.038
163	13.58	0.77	0.257	(	0.521)	0.231	0.026
164	13.67	0.77	0.257	(	0.518)	0.231	0.026
165	13.75	0.77	0.257	(	0.516)	0.231	0.026
166	13.83	0.77	0.257	(	0.513)	0.231	0.026
167	13.92	0.77	0.257	(	0.510)	0.231	0.026
168	14.00	0.77	0.257	(	0.508)	0.231	0.026
169	14.08	0.90	0.301	(	0.505)	0.271	0.030
170	14.17	0.90	0.301	(	0.503)	0.271	0.030
171	14.25	0.90	0.301	(	0.500)	0.271	0.030
172	14.33	0.87	0.290	(	0.497)	0.261	0.029
173	14.42	0.87	0.290	(	0.495)	0.261	0.029
174	14.50	0.87	0.290	(	0.492)	0.261	0.029
175	14.58	0.87	0.290	(	0.490)	0.261	0.029
176	14.67	0.87	0.290	(	0.487)	0.261	0.029
177	14.75	0.87	0.290	(	0.485)	0.261	0.029
178	14.83	0.83	0.279	(	0.482)	0.251	0.028
179	14.92	0.83	0.279	(	0.480)	0.251	0.028
180	15.00	0.83	0.279	(	0.477)	0.251	0.028
181	15.08	0.80	0.268	(	0.475)	0.241	0.027
182	15.17	0.80	0.268	(	0.472)	0.241	0.027
183	15.25	0.80	0.268	(	0.470)	0.241	0.027
184	15.33	0.77	0.257	(	0.468)	0.231	0.026
185	15.42	0.77	0.257	(	0.465)	0.231	0.026

186	15.50	0.77	0.257	(	0.463)	0.231	0.026
187	15.58	0.63	0.212	(	0.460)	0.191	0.021
188	15.67	0.63	0.212	(	0.458)	0.191	0.021
189	15.75	0.63	0.212	(	0.456)	0.191	0.021
190	15.83	0.63	0.212	(	0.453)	0.191	0.021
191	15.92	0.63	0.212	(	0.451)	0.191	0.021
192	16.00	0.63	0.212	(	0.449)	0.191	0.021
193	16.08	0.13	0.045	(	0.447)	0.040	0.004
194	16.17	0.13	0.045	(	0.444)	0.040	0.004
195	16.25	0.13	0.045	(	0.442)	0.040	0.004
196	16.33	0.13	0.045	(	0.440)	0.040	0.004
197	16.42	0.13	0.045	(	0.437)	0.040	0.004
198	16.50	0.13	0.045	(	0.435)	0.040	0.004
199	16.58	0.10	0.033	(	0.433)	0.030	0.003
200	16.67	0.10	0.033	(	0.431)	0.030	0.003
201	16.75	0.10	0.033	(	0.429)	0.030	0.003
202	16.83	0.10	0.033	(	0.426)	0.030	0.003
203	16.92	0.10	0.033	(	0.424)	0.030	0.003
204	17.00	0.10	0.033	(	0.422)	0.030	0.003
205	17.08	0.17	0.056	(	0.420)	0.050	0.006
206	17.17	0.17	0.056	(	0.418)	0.050	0.006
207	17.25	0.17	0.056	(	0.416)	0.050	0.006
208	17.33	0.17	0.056	(	0.414)	0.050	0.006
209	17.42	0.17	0.056	(	0.412)	0.050	0.006
210	17.50	0.17	0.056	(	0.410)	0.050	0.006
211	17.58	0.17	0.056	(	0.408)	0.050	0.006
212	17.67	0.17	0.056	(	0.406)	0.050	0.006
213	17.75	0.17	0.056	(	0.404)	0.050	0.006
214	17.83	0.13	0.045	(	0.402)	0.040	0.004
215	17.92	0.13	0.045	(	0.400)	0.040	0.004
216	18.00	0.13	0.045	(	0.398)	0.040	0.004
217	18.08	0.13	0.045	(	0.396)	0.040	0.004
218	18.17	0.13	0.045	(	0.394)	0.040	0.004
219	18.25	0.13	0.045	(	0.392)	0.040	0.004
220	18.33	0.13	0.045	(	0.390)	0.040	0.004
221	18.42	0.13	0.045	(	0.388)	0.040	0.004
222	18.50	0.13	0.045	(	0.386)	0.040	0.004
223	18.58	0.10	0.033	(	0.384)	0.030	0.003
224	18.67	0.10	0.033	(	0.382)	0.030	0.003
225	18.75	0.10	0.033	(	0.380)	0.030	0.003
226	18.83	0.07	0.022	(	0.379)	0.020	0.002
227	18.92	0.07	0.022	(	0.377)	0.020	0.002
228	19.00	0.07	0.022	(	0.375)	0.020	0.002
229	19.08	0.10	0.033	(	0.373)	0.030	0.003
230	19.17	0.10	0.033	(	0.372)	0.030	0.003
231	19.25	0.10	0.033	(	0.370)	0.030	0.003
232	19.33	0.13	0.045	(	0.368)	0.040	0.004
233	19.42	0.13	0.045	(	0.366)	0.040	0.004
234	19.50	0.13	0.045	(	0.365)	0.040	0.004
235	19.58	0.10	0.033	(	0.363)	0.030	0.003
236	19.67	0.10	0.033	(	0.361)	0.030	0.003
237	19.75	0.10	0.033	(	0.360)	0.030	0.003
238	19.83	0.07	0.022	(	0.358)	0.020	0.002
239	19.92	0.07	0.022	(	0.356)	0.020	0.002
240	20.00	0.07	0.022	(	0.355)	0.020	0.002
241	20.08	0.10	0.033	(	0.353)	0.030	0.003
242	20.17	0.10	0.033	(	0.352)	0.030	0.003
243	20.25	0.10	0.033	(	0.350)	0.030	0.003
244	20.33	0.10	0.033	(	0.349)	0.030	0.003
245	20.42	0.10	0.033	(	0.347)	0.030	0.003

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246  20.50      0.10         0.033      (   0.346)        0.030          0.003
247  20.58      0.10         0.033      (   0.344)        0.030          0.003
248  20.67      0.10         0.033      (   0.343)        0.030          0.003
249  20.75      0.10         0.033      (   0.341)        0.030          0.003
250  20.83      0.07         0.022      (   0.340)        0.020          0.002
251  20.92      0.07         0.022      (   0.339)        0.020          0.002
252  21.00      0.07         0.022      (   0.337)        0.020          0.002
253  21.08      0.10         0.033      (   0.336)        0.030          0.003
254  21.17      0.10         0.033      (   0.335)        0.030          0.003
255  21.25      0.10         0.033      (   0.333)        0.030          0.003
256  21.33      0.07         0.022      (   0.332)        0.020          0.002
257  21.42      0.07         0.022      (   0.331)        0.020          0.002
258  21.50      0.07         0.022      (   0.330)        0.020          0.002
259  21.58      0.10         0.033      (   0.328)        0.030          0.003
260  21.67      0.10         0.033      (   0.327)        0.030          0.003
261  21.75      0.10         0.033      (   0.326)        0.030          0.003
262  21.83      0.07         0.022      (   0.325)        0.020          0.002
263  21.92      0.07         0.022      (   0.324)        0.020          0.002
264  22.00      0.07         0.022      (   0.323)        0.020          0.002
265  22.08      0.10         0.033      (   0.322)        0.030          0.003
266  22.17      0.10         0.033      (   0.321)        0.030          0.003
267  22.25      0.10         0.033      (   0.320)        0.030          0.003
268  22.33      0.07         0.022      (   0.319)        0.020          0.002
269  22.42      0.07         0.022      (   0.318)        0.020          0.002
270  22.50      0.07         0.022      (   0.317)        0.020          0.002
271  22.58      0.07         0.022      (   0.316)        0.020          0.002
272  22.67      0.07         0.022      (   0.315)        0.020          0.002
273  22.75      0.07         0.022      (   0.314)        0.020          0.002
274  22.83      0.07         0.022      (   0.313)        0.020          0.002
275  22.92      0.07         0.022      (   0.312)        0.020          0.002
276  23.00      0.07         0.022      (   0.312)        0.020          0.002
277  23.08      0.07         0.022      (   0.311)        0.020          0.002
278  23.17      0.07         0.022      (   0.310)        0.020          0.002
279  23.25      0.07         0.022      (   0.310)        0.020          0.002
280  23.33      0.07         0.022      (   0.309)        0.020          0.002
281  23.42      0.07         0.022      (   0.308)        0.020          0.002
282  23.50      0.07         0.022      (   0.308)        0.020          0.002
283  23.58      0.07         0.022      (   0.307)        0.020          0.002
284  23.67      0.07         0.022      (   0.307)        0.020          0.002
285  23.75      0.07         0.022      (   0.306)        0.020          0.002
286  23.83      0.07         0.022      (   0.306)        0.020          0.002
287  23.92      0.07         0.022      (   0.306)        0.020          0.002
288  24.00      0.07         0.022      (   0.306)        0.020          0.002
              (Loss Rate Not Used)
    Sum =      100.0                                      Sum =       3.3
     Flood volume = Effective rainfall       0.28(In)
      times area       12.2(Ac.)/[(In)/(Ft.)] =        0.3(Ac.Ft)
     Total soil loss =        2.51(In)
     Total soil loss =       2.559(Ac.Ft)
     Total rainfall =        2.79(In)
     Flood volume =          12385.9 Cubic Feet
     Total soil loss =        111472.9 Cubic Feet
    -----------------------------------------------------------------
     Peak flow rate of this hydrograph =       0.456(CFS)
    -----------------------------------------------------------------
    +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                     24 - H O U R     S T O R M
                  R u n o f f     H y d r o g r a p h
    -----------------------------------------------------------------
              Hydrograph in   5   Minute intervals ((CFS))
```

```
      ----------------------------------------------------------------
      Time(h+m) Volume Ac.Ft   Q(CFS)   0        2.5       5.0       7.5      10.0
      ----------------------------------------------------------------
        0+ 5      0.0000       0.00  Q          |         |         |         |
        0+10      0.0001       0.01  Q          |         |         |         |
        0+15      0.0003       0.02  Q          |         |         |         |
        0+20      0.0004       0.02  Q          |         |         |         |
        0+25      0.0006       0.03  Q          |         |         |         |
        0+30      0.0008       0.03  Q          |         |         |         |
        0+35      0.0011       0.03  Q          |         |         |         |
        0+40      0.0013       0.04  Q          |         |         |         |
        0+45      0.0016       0.04  Q          |         |         |         |
        0+50      0.0019       0.04  Q          |         |         |         |
        0+55      0.0022       0.05  Q          |         |         |         |
        1+ 0      0.0025       0.05  Q          |         |         |         |
        1+ 5      0.0028       0.05  Q          |         |         |         |
        1+10      0.0032       0.04  Q          |         |         |         |
        1+15      0.0035       0.04  Q          |         |         |         |
        1+20      0.0037       0.04  Q          |         |         |         |
        1+25      0.0040       0.04  Q          |         |         |         |
        1+30      0.0043       0.04  Q          |         |         |         |
        1+35      0.0046       0.04  Q          |         |         |         |
        1+40      0.0049       0.04  Q          |         |         |         |
        1+45      0.0052       0.04  Q          |         |         |         |
        1+50      0.0055       0.04  Q          |         |         |         |
        1+55      0.0058       0.05  Q          |         |         |         |
        2+ 0      0.0062       0.05  Q          |         |         |         |
        2+ 5      0.0065       0.05  Q          |         |         |         |
        2+10      0.0069       0.05  Q          |         |         |         |
        2+15      0.0073       0.05  QV         |         |         |         |
        2+20      0.0076       0.05  QV         |         |         |         |
        2+25      0.0080       0.05  QV         |         |         |         |
        2+30      0.0084       0.05  QV         |         |         |         |
        2+35      0.0088       0.06  QV         |         |         |         |
        2+40      0.0092       0.06  QV         |         |         |         |
        2+45      0.0096       0.06  QV         |         |         |         |
        2+50      0.0101       0.07  QV         |         |         |         |
        2+55      0.0105       0.07  QV         |         |         |         |
        3+ 0      0.0110       0.07  QV         |         |         |         |
        3+ 5      0.0115       0.07  QV         |         |         |         |
        3+10      0.0119       0.07  QV         |         |         |         |
        3+15      0.0124       0.07  QV         |         |         |         |
        3+20      0.0129       0.07  QV         |         |         |         |
        3+25      0.0133       0.07  QV         |         |         |         |
        3+30      0.0138       0.07  QV         |         |         |         |
        3+35      0.0143       0.07  Q V        |         |         |         |
        3+40      0.0148       0.07  Q V        |         |         |         |
        3+45      0.0152       0.07  Q V        |         |         |         |
        3+50      0.0157       0.07  Q V        |         |         |         |
        3+55      0.0162       0.08  Q V        |         |         |         |
        4+ 0      0.0168       0.08  Q V        |         |         |         |
        4+ 5      0.0173       0.08  Q V        |         |         |         |
        4+10      0.0179       0.08  Q V        |         |         |         |
        4+15      0.0184       0.08  Q V        |         |         |         |
        4+20      0.0190       0.08  Q V        |         |         |         |
        4+25      0.0196       0.09  Q V        |         |         |         |
        4+30      0.0202       0.09  Q V        |         |         |         |
        4+35      0.0209       0.09  Q V        |         |         |         |
        4+40      0.0215       0.09  Q  V       |         |         |         |
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4+45      0.0222      0.09   Q   V         |         |         |         |
4+50      0.0228      0.10   Q   V         |         |         |         |
4+55      0.0235      0.10   Q   V         |         |         |         |
5+ 0      0.0242      0.10   Q   V         |         |         |         |
5+ 5      0.0249      0.10   Q   V         |         |         |         |
5+10      0.0256      0.09   Q   V         |         |         |         |
5+15      0.0262      0.09   Q   V         |         |         |         |
5+20      0.0268      0.09   Q   V         |         |         |         |
5+25      0.0275      0.09   Q   V         |         |         |         |
5+30      0.0281      0.09   Q   V         |         |         |         |
5+35      0.0288      0.10   Q    V        |         |         |         |
5+40      0.0295      0.10   Q    V        |         |         |         |
5+45      0.0302      0.11   Q    V        |         |         |         |
5+50      0.0309      0.11   Q    V        |         |         |         |
5+55      0.0317      0.11   Q    V        |         |         |         |
6+ 0      0.0324      0.11   Q    V        |         |         |         |
6+ 5      0.0332      0.11   Q    V        |         |         |         |
6+10      0.0340      0.12   Q    V        |         |         |         |
6+15      0.0348      0.12   Q    V        |         |         |         |
6+20      0.0356      0.12   Q      V      |         |         |         |
6+25      0.0364      0.12   Q      V      |         |         |         |
6+30      0.0373      0.12   Q      V      |         |         |         |
6+35      0.0381      0.12   Q     V       |         |         |         |
6+40      0.0390      0.13   Q     V       |         |         |         |
6+45      0.0399      0.13   Q     V       |         |         |         |
6+50      0.0409      0.13   Q     V       |         |         |         |
6+55      0.0418      0.13   Q     V       |         |         |         |
7+ 0      0.0427      0.14   Q       V     |         |         |         |
7+ 5      0.0437      0.14   Q       V     |         |         |         |
7+10      0.0446      0.14   Q       V     |         |         |         |
7+15      0.0455      0.14   Q       V     |         |         |         |
7+20      0.0465      0.14   Q       V     |         |         |         |
7+25      0.0475      0.14   Q       V     |         |         |         |
7+30      0.0485      0.15   Q       V     |         |         |         |
7+35      0.0495      0.15   Q       V     |         |         |         |
7+40      0.0506      0.16   Q         V   |         |         |         |
7+45      0.0517      0.16   Q         V   |         |         |         |
7+50      0.0528      0.16   Q         V   |         |         |         |
7+55      0.0540      0.17   Q         V   |         |         |         |
8+ 0      0.0551      0.17   Q         V   |         |         |         |
8+ 5      0.0564      0.18   Q         V   |         |         |         |
8+10      0.0577      0.19   Q          V  |         |         |         |
8+15      0.0590      0.19   Q          V  |         |         |         |
8+20      0.0604      0.20   Q          V  |         |         |         |
8+25      0.0617      0.20   Q          V  |         |         |         |
8+30      0.0631      0.20   Q          V  |         |         |         |
8+35      0.0645      0.20   Q           V|         |         |         |
8+40      0.0660      0.21   Q           V|         |         |         |
8+45      0.0674      0.21   Q           V|         |         |         |
8+50      0.0689      0.22   Q           V|         |         |         |
8+55      0.0705      0.22   Q           V|         |         |         |
9+ 0      0.0720      0.23   Q            V        |         |         |
9+ 5      0.0736      0.23   Q            V        |         |         |
9+10      0.0753      0.24   Q            V        |         |         |
9+15      0.0770      0.25   Q            V        |         |         |
9+20      0.0788      0.25   |Q            |V        |         |         |
9+25      0.0806      0.26   |Q            |V        |         |         |
9+30      0.0824      0.27   |Q            |V        |         |         |
9+35      0.0843      0.27   |Q            |V        |         |         |
9+40      0.0862      0.28   |Q            | V       |         |         |
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 9+45    0.0881    0.28   |Q      | V       |          |          |
 9+50    0.0901    0.28   |Q      | V       |          |          |
 9+55    0.0921    0.29   |Q      | V       |          |          |
10+ 0    0.0941    0.29   |Q      |  V      |          |          |
10+ 5    0.0960    0.28   |Q      |  V      |          |          |
10+10    0.0978    0.25   Q      |  V      |          |          |
10+15    0.0994    0.23   Q      | V       |          |          |
10+20    0.1009    0.23   Q      |   V     |          |          |
10+25    0.1025    0.22   Q      |   V     |          |          |
10+30    0.1040    0.22   Q      |   V     |          |          |
10+35    0.1055    0.23   Q      |   V     |          |          |
10+40    0.1073    0.25   |Q     |    V    |          |          |
10+45    0.1091    0.26   |Q     |    V    |          |          |
10+50    0.1109    0.26   |Q     |    V    |          |          |
10+55    0.1127    0.27   |Q     |    V    |          |          |
11+ 0    0.1145    0.27   |Q     |     V   |          |          |
11+ 5    0.1164    0.27   |Q     |     V   |          |          |
11+10    0.1182    0.26   |Q     |     V   |          |          |
11+15    0.1200    0.26   |Q     |     V   |          |          |
11+20    0.1218    0.26   |Q     |      V  |          |          |
11+25    0.1236    0.26   |Q     |      V  |          |          |
11+30    0.1254    0.26   |Q     |      V  |          |          |
11+35    0.1272    0.26   |Q     |      V  |          |          |
11+40    0.1289    0.25   Q     |       V |          |          |
11+45    0.1306    0.24   Q     |       V |          |          |
11+50    0.1322    0.24   Q     |       V |          |          |
11+55    0.1339    0.25   Q     |       V |          |          |
12+ 0    0.1356    0.25   Q     |        V|          |          |
12+ 5    0.1374    0.26   |Q    |        V|          |          |
12+10    0.1395    0.30   |Q    |        V|          |          |
12+15    0.1416    0.31   |Q    |        V|          |          |
12+20    0.1439    0.32   |Q    |         V|         |          |
12+25    0.1462    0.33   |Q    |         V|         |          |
12+30    0.1485    0.34   |Q    |         V|         |          |
12+35    0.1509    0.35   |Q    |         |V         |          |
12+40    0.1533    0.36   |Q    |         |V         |          |
12+45    0.1559    0.37   |Q    |         |V         |          |
12+50    0.1584    0.37   |Q    |         | V        |          |
12+55    0.1611    0.38   |Q    |         | V        |          |
13+ 0    0.1637    0.39   |Q    |         |  V       |          |
13+ 5    0.1665    0.40   |Q    |         |  V       |          |
13+10    0.1695    0.43   |Q    |         |  V       |          |
13+15    0.1725    0.44   |Q    |         |   V      |          |
13+20    0.1756    0.45   |Q    |         |   V      |          |
13+25    0.1787    0.45   |Q    |         |    V     |          |
13+30    0.1818    0.46   |Q    |         |    V     |          |
13+35    0.1848    0.44   |Q    |         |     V    |          |
13+40    0.1875    0.38   |Q    |         |     V    |          |
13+45    0.1899    0.36   |Q    |         |     V    |          |
13+50    0.1924    0.35   |Q    |         |      V   |          |
13+55    0.1947    0.34   |Q    |         |      V   |          |
14+ 0    0.1970    0.34   |Q    |         |      V   |          |
14+ 5    0.1994    0.34   |Q    |         |       V  |          |
14+10    0.2019    0.36   |Q    |         |       V  |          |
14+15    0.2044    0.36   |Q    |         |       V  |          |
14+20    0.2069    0.36   |Q    |         |        V |          |
14+25    0.2094    0.36   |Q    |         |        V|          |
14+30    0.2118    0.36   |Q    |         |        V|          |
14+35    0.2143    0.36   |Q    |         |         V        |
14+40    0.2167    0.36   |Q    |         |         V        |
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14+45    0.2192    0.36   |Q         |         |              V            |
14+50    0.2216    0.35   |Q         |         |             |V            |
14+55    0.2240    0.35   |Q         |         |             |V            |
15+ 0    0.2264    0.35   |Q         |         |             |V            |
15+ 5    0.2288    0.35   |Q         |         |              V            |
15+10    0.2312    0.34   |Q         |         |              V            |
15+15    0.2335    0.34   |Q         |         |              V            |
15+20    0.2358    0.33   |Q         |         |               V           |
15+25    0.2380    0.33   |Q         |         |               V           |
15+30    0.2403    0.32   |Q         |         |               V           |
15+35    0.2424    0.31   |Q         |         |                V          |
15+40    0.2444    0.29   |Q         |         |                V          |
15+45    0.2464    0.28   |Q         |         |                V          |
15+50    0.2483    0.28   |Q         |         |                V          |
15+55    0.2502    0.27   |Q         |         |                 V         |
16+ 0    0.2521    0.27   |Q         |         |                 V         |
16+ 5    0.2537    0.24   Q          |         |                 V         |
16+10    0.2548    0.16   Q          |         |                 V         |
16+15    0.2557    0.13   Q          |         |                 V         |
16+20    0.2564    0.11   Q          |         |                  V        |
16+25    0.2571    0.10   Q          |         |                  V        |
16+30    0.2577    0.09   Q          |         |                  V        |
16+35    0.2582    0.08   Q          |         |                  V        |
16+40    0.2587    0.07   Q          |         |                  V        |
16+45    0.2591    0.06   Q          |         |                  V        |
16+50    0.2595    0.06   Q          |         |                  V        |
16+55    0.2599    0.05   Q          |         |                  V        |
17+ 0    0.2602    0.05   Q          |         |                  V        |
17+ 5    0.2605    0.05   Q          |         |                  V        |
17+10    0.2609    0.06   Q          |         |                  V        |
17+15    0.2614    0.06   Q          |         |                  V        |
17+20    0.2618    0.06   Q          |         |                  V        |
17+25    0.2622    0.06   Q          |         |                  V        |
17+30    0.2627    0.07   Q          |         |                  V        |
17+35    0.2631    0.07   Q          |         |                   V       |
17+40    0.2636    0.07   Q          |         |                   V       |
17+45    0.2640    0.07   Q          |         |                   V       |
17+50    0.2645    0.07   Q          |         |                   V       |
17+55    0.2649    0.06   Q          |         |                   V       |
18+ 0    0.2653    0.06   Q          |         |                   V       |
18+ 5    0.2657    0.06   Q          |         |                   V       |
18+10    0.2661    0.06   Q          |         |                   V       |
18+15    0.2665    0.06   Q          |         |                   V       |
18+20    0.2669    0.06   Q          |         |                   V       |
18+25    0.2673    0.06   Q          |         |                   V       |
18+30    0.2677    0.06   Q          |         |                   V       |
18+35    0.2680    0.05   Q          |         |                   V       |
18+40    0.2684    0.05   Q          |         |                   V       |
18+45    0.2687    0.05   Q          |         |                   V       |
18+50    0.2690    0.04   Q          |         |                   V       |
18+55    0.2692    0.04   Q          |         |                   V       |
19+ 0    0.2695    0.03   Q          |         |                   V       |
19+ 5    0.2697    0.03   Q          |         |                   V       |
19+10    0.2700    0.04   Q          |         |                   V       |
19+15    0.2703    0.04   Q          |         |                    V      |
19+20    0.2706    0.04   Q          |         |                    V      |
19+25    0.2709    0.05   Q          |         |                    V      |
19+30    0.2712    0.05   Q          |         |                    V      |
19+35    0.2716    0.05   Q          |         |                    V      |
19+40    0.2719    0.04   Q          |         |                    V      |
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19+45     0.2722     0.04   Q          |          |          |                    V |
19+50     0.2724     0.04   Q          |          |          |                    V |
19+55     0.2727     0.03   Q          |          |          |                    V |
20+ 0     0.2729     0.03   Q          |          |          |                    V |
20+ 5     0.2731     0.03   Q          |          |          |                    V |
20+10     0.2734     0.04   Q          |          |          |                    V |
20+15     0.2737     0.04   Q          |          |          |                    V |
20+20     0.2739     0.04   Q          |          |          |                    V |
20+25     0.2742     0.04   Q          |          |          |                    V |
20+30     0.2745     0.04   Q          |          |          |                    V |
20+35     0.2748     0.04   Q          |          |          |                    V |
20+40     0.2751     0.04   Q          |          |          |                    V |
20+45     0.2753     0.04   Q          |          |          |                    V |
20+50     0.2756     0.04   Q          |          |          |                    V |
20+55     0.2758     0.03   Q          |          |          |                    V |
21+ 0     0.2761     0.03   Q          |          |          |                    V |
21+ 5     0.2763     0.03   Q          |          |          |                    V |
21+10     0.2765     0.04   Q          |          |          |                    V |
21+15     0.2768     0.04   Q          |          |          |                    V |
21+20     0.2771     0.04   Q          |          |          |                    V |
21+25     0.2773     0.03   Q          |          |          |                   V |
21+30     0.2775     0.03   Q          |          |          |                   V|
21+35     0.2777     0.03   Q          |          |          |                   V|
21+40     0.2780     0.04   Q          |          |          |                   V|
21+45     0.2782     0.04   Q          |          |          |                   V|
21+50     0.2785     0.04   Q          |          |          |                   V|
21+55     0.2787     0.03   Q          |          |          |                   V|
22+ 0     0.2789     0.03   Q          |          |          |                   V|
22+ 5     0.2792     0.03   Q          |          |          |                   V|
22+10     0.2794     0.04   Q          |          |          |                   V|
22+15     0.2797     0.04   Q          |          |          |                   V|
22+20     0.2799     0.04   Q          |          |          |                   V|
22+25     0.2801     0.03   Q          |          |          |                   V|
22+30     0.2804     0.03   Q          |          |          |                   V|
22+35     0.2806     0.03   Q          |          |          |                   V|
22+40     0.2808     0.03   Q          |          |          |                   V|
22+45     0.2810     0.03   Q          |          |          |                   V|
22+50     0.2812     0.03   Q          |          |          |                   V|
22+55     0.2814     0.03   Q          |          |          |                   V|
23+ 0     0.2815     0.03   Q          |          |          |                   V|
23+ 5     0.2817     0.03   Q          |          |          |                   V|
23+10     0.2819     0.03   Q          |          |          |                   V|
23+15     0.2821     0.03   Q          |          |          |                   V|
23+20     0.2823     0.03   Q          |          |          |                   V|
23+25     0.2825     0.03   Q          |          |          |                   V|
23+30     0.2827     0.03   Q          |          |          |                   V|
23+35     0.2829     0.03   Q          |          |          |                   V|
23+40     0.2831     0.03   Q          |          |          |                   V|
23+45     0.2833     0.03   Q          |          |          |                   V|
23+50     0.2835     0.03   Q          |          |          |                   V|
23+55     0.2836     0.03   Q          |          |          |                   V|
24+ 0     0.2838     0.03   Q          |          |          |                   V|
24+ 5     0.2840     0.02   Q          |          |          |                   V|
24+10     0.2841     0.01   Q          |          |          |                   V|
24+15     0.2841     0.01   Q          |          |          |                   V|
24+20     0.2842     0.01   Q          |          |          |                   V|
24+25     0.2842     0.01   Q          |          |          |                   V|
24+30     0.2843     0.00   Q          |          |          |                   V|
24+35     0.2843     0.00   Q          |          |          |                   V|
24+40     0.2843     0.00   Q          |          |          |                   V|
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24+45      0.2843      0.00  Q           |           |           |           V|
24+50      0.2843      0.00  Q           |           |           |           V|
24+55      0.2843      0.00  Q           |           |           |           V|
25+ 0      0.2843      0.00  Q           |           |           |           V|
25+ 5      0.2843      0.00  Q           |           |           |           V|
-----------------------------------------------------------------------------
```

10-YEAR, 24-HOUR STORM EVENT

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

         Copyright (c) CIVILCADD/CIVILDESIGN, 1989 – 2014, Version 9.0
              Study date  02/16/23 File: ara2410.out


     +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
     ----------------------------------------------------------------------

     Riverside County Synthetic Unit Hydrology Method
     RCFC & WCD Manual date – April 1978


     Program License Serial Number 6279

     ----------------------------------------------------------------------
      English (in–lb) Input Units Used
      English Rainfall Data (Inches) Input Values Used

      English Units used in output format




     ----------------------------------------------------------------------
     302.01.21
     AREA A
     10 YR STORM
     PRE PROJECT
     ----------------------------------------------------------------------
     Drainage Area =      12.23(Ac.)  =       0.019 Sq. Mi.
     Drainage Area for Depth–Area Areal Adjustment =      12.23(Ac.)  =       0.019
Sq. Mi.
     Length along longest watercourse =     1105.90(Ft.)
     Length along longest watercourse measured to centroid =      610.60(Ft.)
     Length along longest watercourse =      0.209 Mi.
     Length along longest watercourse measured to centroid =      0.116 Mi.
     Difference in elevation =       9.50(Ft.)
     Slope along watercourse =     45.3567 Ft./Mi.
     Average Manning's 'N' = 0.040
     Lag time =    0.113 Hr.
     Lag time =     6.79 Min.
     25% of lag time =     1.70 Min.
     40% of lag time =     2.71 Min.
     Unit time =     5.00 Min.
     Duration of storm = 24 Hour(s)
     User Entered Base Flow =     0.00(CFS)

     2 YEAR Area rainfall data:


     Area(Ac.)[1]       Rainfall(In)[2]       Weighting[1*2]
          12.23             2.79                    34.12


     100 YEAR Area rainfall data:


     Area(Ac.)[1]       Rainfall(In)[2]       Weighting[1*2]
          12.23             7.72                    94.42
```

```
          STORM EVENT (YEAR) =    10.00
          Area Averaged 2-Year Rainfall =     2.790(In)
          Area Averaged 100-Year Rainfall =    7.720(In)


          Point rain (area averaged) =     4.818(In)
          Areal adjustment factor =  100.00 %
          Adjusted average point rain =    4.818(In)


          Sub-Area Data:
          Area(Ac.)           Runoff Index   Impervious %
             12.230              46.00            0.000
           Total Area Entered =      12.23(Ac.)


          RI    RI    Infil. Rate Impervious   Adj. Infil. Rate  Area%      F
          AMC2 AMC-2    (In/Hr)     (Dec.%)       (In/Hr)        (Dec.)    (In/Hr)
          46.0  46.0     0.611      0.000          0.611         1.000      0.611
                                                               Sum (F) =    0.611
          Area averaged mean soil loss (F) (In/Hr) =   0.611
          Minimum soil loss rate ((In/Hr)) =   0.306
          (for 24 hour storm duration)
          Soil low loss rate (decimal) =    0.900
          ----------------------------------------------------------------------

                     U n i t   H y d r o g r a p h
                        MOUNTAIN S-Curve
          ----------------------------------------------------------------------
                       Unit Hydrograph Data
          ----------------------------------------------------------------------
          Unit time period   Time % of lag   Distribution   Unit Hydrograph
               (hrs)                          Graph %            (CFS)
          ----------------------------------------------------------------------
              1   0.083         73.674          15.042            1.854
              2   0.167        147.347          36.939            4.553
              3   0.250        221.021          14.894            1.836
              4   0.333        294.694           8.503            1.048
              5   0.417        368.368           5.644            0.696
              6   0.500        442.041           3.929            0.484
              7   0.583        515.715           3.090            0.381
              8   0.667        589.388           2.520            0.311
              9   0.750        663.062           2.116            0.261
             10   0.833        736.736           1.784            0.220
             11   0.917        810.409           1.461            0.180
             12   1.000        884.083           1.329            0.164
             13   1.083        957.756           1.326            0.163
             14   1.167       1031.430           1.423            0.175
                                           Sum = 100.000   Sum=    12.326
          ----------------------------------------------------------------------


     The following loss rate calculations reflect use of the minimum calculated loss
     rate subtracted from the Storm Rain to produce the maximum Effective Rain value

     Unit Time   Pattern   Storm Rain     Loss rate(In./Hr)      Effective
         (Hr.)   Percent   (In/Hr)       Max  |   Low           (In/Hr)
      1   0.08    0.07      0.039      (  1.083)    0.035          0.004
      2   0.17    0.07      0.039      (  1.079)    0.035          0.004
      3   0.25    0.07      0.039      (  1.075)    0.035          0.004
      4   0.33    0.10      0.058      (  1.071)    0.052          0.006
      5   0.42    0.10      0.058      (  1.067)    0.052          0.006
```

6	0.50	0.10	0.058	(1.063)	0.052	0.006
7	0.58	0.10	0.058	(1.058)	0.052	0.006
8	0.67	0.10	0.058	(1.054)	0.052	0.006
9	0.75	0.10	0.058	(1.050)	0.052	0.006
10	0.83	0.13	0.077	(1.046)	0.069	0.008
11	0.92	0.13	0.077	(1.042)	0.069	0.008
12	1.00	0.13	0.077	(1.038)	0.069	0.008
13	1.08	0.10	0.058	(1.034)	0.052	0.006
14	1.17	0.10	0.058	(1.030)	0.052	0.006
15	1.25	0.10	0.058	(1.026)	0.052	0.006
16	1.33	0.10	0.058	(1.021)	0.052	0.006
17	1.42	0.10	0.058	(1.017)	0.052	0.006
18	1.50	0.10	0.058	(1.013)	0.052	0.006
19	1.58	0.10	0.058	(1.009)	0.052	0.006
20	1.67	0.10	0.058	(1.005)	0.052	0.006
21	1.75	0.10	0.058	(1.001)	0.052	0.006
22	1.83	0.13	0.077	(0.997)	0.069	0.008
23	1.92	0.13	0.077	(0.993)	0.069	0.008
24	2.00	0.13	0.077	(0.989)	0.069	0.008
25	2.08	0.13	0.077	(0.985)	0.069	0.008
26	2.17	0.13	0.077	(0.981)	0.069	0.008
27	2.25	0.13	0.077	(0.977)	0.069	0.008
28	2.33	0.13	0.077	(0.973)	0.069	0.008
29	2.42	0.13	0.077	(0.969)	0.069	0.008
30	2.50	0.13	0.077	(0.965)	0.069	0.008
31	2.58	0.17	0.096	(0.961)	0.087	0.010
32	2.67	0.17	0.096	(0.957)	0.087	0.010
33	2.75	0.17	0.096	(0.953)	0.087	0.010
34	2.83	0.17	0.096	(0.950)	0.087	0.010
35	2.92	0.17	0.096	(0.946)	0.087	0.010
36	3.00	0.17	0.096	(0.942)	0.087	0.010
37	3.08	0.17	0.096	(0.938)	0.087	0.010
38	3.17	0.17	0.096	(0.934)	0.087	0.010
39	3.25	0.17	0.096	(0.930)	0.087	0.010
40	3.33	0.17	0.096	(0.926)	0.087	0.010
41	3.42	0.17	0.096	(0.922)	0.087	0.010
42	3.50	0.17	0.096	(0.918)	0.087	0.010
43	3.58	0.17	0.096	(0.915)	0.087	0.010
44	3.67	0.17	0.096	(0.911)	0.087	0.010
45	3.75	0.17	0.096	(0.907)	0.087	0.010
46	3.83	0.20	0.116	(0.903)	0.104	0.012
47	3.92	0.20	0.116	(0.899)	0.104	0.012
48	4.00	0.20	0.116	(0.895)	0.104	0.012
49	4.08	0.20	0.116	(0.892)	0.104	0.012
50	4.17	0.20	0.116	(0.888)	0.104	0.012
51	4.25	0.20	0.116	(0.884)	0.104	0.012
52	4.33	0.23	0.135	(0.880)	0.121	0.013
53	4.42	0.23	0.135	(0.877)	0.121	0.013
54	4.50	0.23	0.135	(0.873)	0.121	0.013
55	4.58	0.23	0.135	(0.869)	0.121	0.013
56	4.67	0.23	0.135	(0.865)	0.121	0.013
57	4.75	0.23	0.135	(0.862)	0.121	0.013
58	4.83	0.27	0.154	(0.858)	0.139	0.015
59	4.92	0.27	0.154	(0.854)	0.139	0.015
60	5.00	0.27	0.154	(0.850)	0.139	0.015
61	5.08	0.20	0.116	(0.847)	0.104	0.012
62	5.17	0.20	0.116	(0.843)	0.104	0.012
63	5.25	0.20	0.116	(0.839)	0.104	0.012
64	5.33	0.23	0.135	(0.836)	0.121	0.013
65	5.42	0.23	0.135	(0.832)	0.121	0.013

66	5.50	0.23	0.135	(0.828)	0.121	0.013
67	5.58	0.27	0.154	(0.825)	0.139	0.015
68	5.67	0.27	0.154	(0.821)	0.139	0.015
69	5.75	0.27	0.154	(0.818)	0.139	0.015
70	5.83	0.27	0.154	(0.814)	0.139	0.015
71	5.92	0.27	0.154	(0.810)	0.139	0.015
72	6.00	0.27	0.154	(0.807)	0.139	0.015
73	6.08	0.30	0.173	(0.803)	0.156	0.017
74	6.17	0.30	0.173	(0.800)	0.156	0.017
75	6.25	0.30	0.173	(0.796)	0.156	0.017
76	6.33	0.30	0.173	(0.792)	0.156	0.017
77	6.42	0.30	0.173	(0.789)	0.156	0.017
78	6.50	0.30	0.173	(0.785)	0.156	0.017
79	6.58	0.33	0.193	(0.782)	0.173	0.019
80	6.67	0.33	0.193	(0.778)	0.173	0.019
81	6.75	0.33	0.193	(0.775)	0.173	0.019
82	6.83	0.33	0.193	(0.771)	0.173	0.019
83	6.92	0.33	0.193	(0.768)	0.173	0.019
84	7.00	0.33	0.193	(0.764)	0.173	0.019
85	7.08	0.33	0.193	(0.761)	0.173	0.019
86	7.17	0.33	0.193	(0.757)	0.173	0.019
87	7.25	0.33	0.193	(0.754)	0.173	0.019
88	7.33	0.37	0.212	(0.751)	0.191	0.021
89	7.42	0.37	0.212	(0.747)	0.191	0.021
90	7.50	0.37	0.212	(0.744)	0.191	0.021
91	7.58	0.40	0.231	(0.740)	0.208	0.023
92	7.67	0.40	0.231	(0.737)	0.208	0.023
93	7.75	0.40	0.231	(0.733)	0.208	0.023
94	7.83	0.43	0.251	(0.730)	0.225	0.025
95	7.92	0.43	0.251	(0.727)	0.225	0.025
96	8.00	0.43	0.251	(0.723)	0.225	0.025
97	8.08	0.50	0.289	(0.720)	0.260	0.029
98	8.17	0.50	0.289	(0.717)	0.260	0.029
99	8.25	0.50	0.289	(0.713)	0.260	0.029
100	8.33	0.50	0.289	(0.710)	0.260	0.029
101	8.42	0.50	0.289	(0.707)	0.260	0.029
102	8.50	0.50	0.289	(0.703)	0.260	0.029
103	8.58	0.53	0.308	(0.700)	0.278	0.031
104	8.67	0.53	0.308	(0.697)	0.278	0.031
105	8.75	0.53	0.308	(0.693)	0.278	0.031
106	8.83	0.57	0.328	(0.690)	0.295	0.033
107	8.92	0.57	0.328	(0.687)	0.295	0.033
108	9.00	0.57	0.328	(0.684)	0.295	0.033
109	9.08	0.63	0.366	(0.680)	0.330	0.037
110	9.17	0.63	0.366	(0.677)	0.330	0.037
111	9.25	0.63	0.366	(0.674)	0.330	0.037
112	9.33	0.67	0.385	(0.671)	0.347	0.039
113	9.42	0.67	0.385	(0.668)	0.347	0.039
114	9.50	0.67	0.385	(0.664)	0.347	0.039
115	9.58	0.70	0.405	(0.661)	0.364	0.040
116	9.67	0.70	0.405	(0.658)	0.364	0.040
117	9.75	0.70	0.405	(0.655)	0.364	0.040
118	9.83	0.73	0.424	(0.652)	0.382	0.042
119	9.92	0.73	0.424	(0.649)	0.382	0.042
120	10.00	0.73	0.424	(0.645)	0.382	0.042
121	10.08	0.50	0.289	(0.642)	0.260	0.029
122	10.17	0.50	0.289	(0.639)	0.260	0.029
123	10.25	0.50	0.289	(0.636)	0.260	0.029
124	10.33	0.50	0.289	(0.633)	0.260	0.029
125	10.42	0.50	0.289	(0.630)	0.260	0.029

126	10.50	0.50	0.289	(0.627)	0.260	0.029
127	10.58	0.67	0.385	(0.624)	0.347	0.039
128	10.67	0.67	0.385	(0.621)	0.347	0.039
129	10.75	0.67	0.385	(0.618)	0.347	0.039
130	10.83	0.67	0.385	(0.615)	0.347	0.039
131	10.92	0.67	0.385	(0.612)	0.347	0.039
132	11.00	0.67	0.385	(0.609)	0.347	0.039
133	11.08	0.63	0.366	(0.606)	0.330	0.037
134	11.17	0.63	0.366	(0.603)	0.330	0.037
135	11.25	0.63	0.366	(0.600)	0.330	0.037
136	11.33	0.63	0.366	(0.597)	0.330	0.037
137	11.42	0.63	0.366	(0.594)	0.330	0.037
138	11.50	0.63	0.366	(0.591)	0.330	0.037
139	11.58	0.57	0.328	(0.588)	0.295	0.033
140	11.67	0.57	0.328	(0.585)	0.295	0.033
141	11.75	0.57	0.328	(0.582)	0.295	0.033
142	11.83	0.60	0.347	(0.579)	0.312	0.035
143	11.92	0.60	0.347	(0.576)	0.312	0.035
144	12.00	0.60	0.347	(0.573)	0.312	0.035
145	12.08	0.83	0.482	(0.571)	0.434	0.048
146	12.17	0.83	0.482	(0.568)	0.434	0.048
147	12.25	0.83	0.482	(0.565)	0.434	0.048
148	12.33	0.87	0.501	(0.562)	0.451	0.050
149	12.42	0.87	0.501	(0.559)	0.451	0.050
150	12.50	0.87	0.501	(0.556)	0.451	0.050
151	12.58	0.93	0.540	(0.554)	0.486	0.054
152	12.67	0.93	0.540	(0.551)	0.486	0.054
153	12.75	0.93	0.540	(0.548)	0.486	0.054
154	12.83	0.97	0.559	(0.545)	0.503	0.056
155	12.92	0.97	0.559	(0.542)	0.503	0.056
156	13.00	0.97	0.559	(0.540)	0.503	0.056
157	13.08	1.13	0.655	0.537	(0.590)	0.118
158	13.17	1.13	0.655	0.534	(0.590)	0.121
159	13.25	1.13	0.655	0.532	(0.590)	0.124
160	13.33	1.13	0.655	0.529	(0.590)	0.126
161	13.42	1.13	0.655	0.526	(0.590)	0.129
162	13.50	1.13	0.655	0.524	(0.590)	0.132
163	13.58	0.77	0.443	(0.521)	0.399	0.044
164	13.67	0.77	0.443	(0.518)	0.399	0.044
165	13.75	0.77	0.443	(0.516)	0.399	0.044
166	13.83	0.77	0.443	(0.513)	0.399	0.044
167	13.92	0.77	0.443	(0.510)	0.399	0.044
168	14.00	0.77	0.443	(0.508)	0.399	0.044
169	14.08	0.90	0.520	(0.505)	0.468	0.052
170	14.17	0.90	0.520	(0.503)	0.468	0.052
171	14.25	0.90	0.520	(0.500)	0.468	0.052
172	14.33	0.87	0.501	(0.497)	0.451	0.050
173	14.42	0.87	0.501	(0.495)	0.451	0.050
174	14.50	0.87	0.501	(0.492)	0.451	0.050
175	14.58	0.87	0.501	(0.490)	0.451	0.050
176	14.67	0.87	0.501	(0.487)	0.451	0.050
177	14.75	0.87	0.501	(0.485)	0.451	0.050
178	14.83	0.83	0.482	(0.482)	0.434	0.048
179	14.92	0.83	0.482	(0.480)	0.434	0.048
180	15.00	0.83	0.482	(0.477)	0.434	0.048
181	15.08	0.80	0.463	(0.475)	0.416	0.046
182	15.17	0.80	0.463	(0.472)	0.416	0.046
183	15.25	0.80	0.463	(0.470)	0.416	0.046
184	15.33	0.77	0.443	(0.468)	0.399	0.044
185	15.42	0.77	0.443	(0.465)	0.399	0.044

186	15.50	0.77	0.443	(	0.463)	0.399	0.044
187	15.58	0.63	0.366	(	0.460)	0.330	0.037
188	15.67	0.63	0.366	(	0.458)	0.330	0.037
189	15.75	0.63	0.366	(	0.456)	0.330	0.037
190	15.83	0.63	0.366	(	0.453)	0.330	0.037
191	15.92	0.63	0.366	(	0.451)	0.330	0.037
192	16.00	0.63	0.366	(	0.449)	0.330	0.037
193	16.08	0.13	0.077	(	0.447)	0.069	0.008
194	16.17	0.13	0.077	(	0.444)	0.069	0.008
195	16.25	0.13	0.077	(	0.442)	0.069	0.008
196	16.33	0.13	0.077	(	0.440)	0.069	0.008
197	16.42	0.13	0.077	(	0.437)	0.069	0.008
198	16.50	0.13	0.077	(	0.435)	0.069	0.008
199	16.58	0.10	0.058	(	0.433)	0.052	0.006
200	16.67	0.10	0.058	(	0.431)	0.052	0.006
201	16.75	0.10	0.058	(	0.429)	0.052	0.006
202	16.83	0.10	0.058	(	0.426)	0.052	0.006
203	16.92	0.10	0.058	(	0.424)	0.052	0.006
204	17.00	0.10	0.058	(	0.422)	0.052	0.006
205	17.08	0.17	0.096	(	0.420)	0.087	0.010
206	17.17	0.17	0.096	(	0.418)	0.087	0.010
207	17.25	0.17	0.096	(	0.416)	0.087	0.010
208	17.33	0.17	0.096	(	0.414)	0.087	0.010
209	17.42	0.17	0.096	(	0.412)	0.087	0.010
210	17.50	0.17	0.096	(	0.410)	0.087	0.010
211	17.58	0.17	0.096	(	0.408)	0.087	0.010
212	17.67	0.17	0.096	(	0.406)	0.087	0.010
213	17.75	0.17	0.096	(	0.404)	0.087	0.010
214	17.83	0.13	0.077	(	0.402)	0.069	0.008
215	17.92	0.13	0.077	(	0.400)	0.069	0.008
216	18.00	0.13	0.077	(	0.398)	0.069	0.008
217	18.08	0.13	0.077	(	0.396)	0.069	0.008
218	18.17	0.13	0.077	(	0.394)	0.069	0.008
219	18.25	0.13	0.077	(	0.392)	0.069	0.008
220	18.33	0.13	0.077	(	0.390)	0.069	0.008
221	18.42	0.13	0.077	(	0.388)	0.069	0.008
222	18.50	0.13	0.077	(	0.386)	0.069	0.008
223	18.58	0.10	0.058	(	0.384)	0.052	0.006
224	18.67	0.10	0.058	(	0.382)	0.052	0.006
225	18.75	0.10	0.058	(	0.380)	0.052	0.006
226	18.83	0.07	0.039	(	0.379)	0.035	0.004
227	18.92	0.07	0.039	(	0.377)	0.035	0.004
228	19.00	0.07	0.039	(	0.375)	0.035	0.004
229	19.08	0.10	0.058	(	0.373)	0.052	0.006
230	19.17	0.10	0.058	(	0.372)	0.052	0.006
231	19.25	0.10	0.058	(	0.370)	0.052	0.006
232	19.33	0.13	0.077	(	0.368)	0.069	0.008
233	19.42	0.13	0.077	(	0.366)	0.069	0.008
234	19.50	0.13	0.077	(	0.365)	0.069	0.008
235	19.58	0.10	0.058	(	0.363)	0.052	0.006
236	19.67	0.10	0.058	(	0.361)	0.052	0.006
237	19.75	0.10	0.058	(	0.360)	0.052	0.006
238	19.83	0.07	0.039	(	0.358)	0.035	0.004
239	19.92	0.07	0.039	(	0.356)	0.035	0.004
240	20.00	0.07	0.039	(	0.355)	0.035	0.004
241	20.08	0.10	0.058	(	0.353)	0.052	0.006
242	20.17	0.10	0.058	(	0.352)	0.052	0.006
243	20.25	0.10	0.058	(	0.350)	0.052	0.006
244	20.33	0.10	0.058	(	0.349)	0.052	0.006
245	20.42	0.10	0.058	(	0.347)	0.052	0.006

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246  20.50     0.10       0.058      (  0.346)         0.052       0.006
247  20.58     0.10       0.058      (  0.344)         0.052       0.006
248  20.67     0.10       0.058      (  0.343)         0.052       0.006
249  20.75     0.10       0.058      (  0.341)         0.052       0.006
250  20.83     0.07       0.039      (  0.340)         0.035       0.004
251  20.92     0.07       0.039      (  0.339)         0.035       0.004
252  21.00     0.07       0.039      (  0.337)         0.035       0.004
253  21.08     0.10       0.058      (  0.336)         0.052       0.006
254  21.17     0.10       0.058      (  0.335)         0.052       0.006
255  21.25     0.10       0.058      (  0.333)         0.052       0.006
256  21.33     0.07       0.039      (  0.332)         0.035       0.004
257  21.42     0.07       0.039      (  0.331)         0.035       0.004
258  21.50     0.07       0.039      (  0.330)         0.035       0.004
259  21.58     0.10       0.058      (  0.328)         0.052       0.006
260  21.67     0.10       0.058      (  0.327)         0.052       0.006
261  21.75     0.10       0.058      (  0.326)         0.052       0.006
262  21.83     0.07       0.039      (  0.325)         0.035       0.004
263  21.92     0.07       0.039      (  0.324)         0.035       0.004
264  22.00     0.07       0.039      (  0.323)         0.035       0.004
265  22.08     0.10       0.058      (  0.322)         0.052       0.006
266  22.17     0.10       0.058      (  0.321)         0.052       0.006
267  22.25     0.10       0.058      (  0.320)         0.052       0.006
268  22.33     0.07       0.039      (  0.319)         0.035       0.004
269  22.42     0.07       0.039      (  0.318)         0.035       0.004
270  22.50     0.07       0.039      (  0.317)         0.035       0.004
271  22.58     0.07       0.039      (  0.316)         0.035       0.004
272  22.67     0.07       0.039      (  0.315)         0.035       0.004
273  22.75     0.07       0.039      (  0.314)         0.035       0.004
274  22.83     0.07       0.039      (  0.313)         0.035       0.004
275  22.92     0.07       0.039      (  0.312)         0.035       0.004
276  23.00     0.07       0.039      (  0.312)         0.035       0.004
277  23.08     0.07       0.039      (  0.311)         0.035       0.004
278  23.17     0.07       0.039      (  0.310)         0.035       0.004
279  23.25     0.07       0.039      (  0.310)         0.035       0.004
280  23.33     0.07       0.039      (  0.309)         0.035       0.004
281  23.42     0.07       0.039      (  0.308)         0.035       0.004
282  23.50     0.07       0.039      (  0.308)         0.035       0.004
283  23.58     0.07       0.039      (  0.307)         0.035       0.004
284  23.67     0.07       0.039      (  0.307)         0.035       0.004
285  23.75     0.07       0.039      (  0.306)         0.035       0.004
286  23.83     0.07       0.039      (  0.306)         0.035       0.004
287  23.92     0.07       0.039      (  0.306)         0.035       0.004
288  24.00     0.07       0.039      (  0.306)         0.035       0.004
               (Loss Rate Not Used)
    Sum =     100.0                                    Sum =       6.1
   Flood volume = Effective rainfall      0.51(In)
    times area       12.2(Ac.)/[(In)/(Ft.)] =         0.5(Ac.Ft)
   Total soil loss =       4.31(In)
   Total soil loss =       4.389(Ac.Ft)
   Total rainfall =        4.82(In)
   Flood volume =         22710.9 Cubic Feet
   Total soil loss =       191189.4 Cubic Feet
   ------------------------------------------------------------------
    Peak flow rate of this hydrograph =       1.436(CFS)
   ------------------------------------------------------------------
   ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                    24 - H O U R    S T O R M
                 R u n o f f    H y d r o g r a p h
   ------------------------------------------------------------------
               Hydrograph in   5   Minute intervals ((CFS))
```

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        ---------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)   0       2.5      5.0      7.5     10.0
        ---------------------------------------------------------------
   0+ 5     0.0000       0.01   Q        |        |        |        |
   0+10     0.0002       0.02   Q        |        |        |        |
   0+15     0.0004       0.03   Q        |        |        |        |
   0+20     0.0007       0.04   Q        |        |        |        |
   0+25     0.0011       0.05   Q        |        |        |        |
   0+30     0.0014       0.06   Q        |        |        |        |
   0+35     0.0019       0.06   Q        |        |        |        |
   0+40     0.0023       0.06   Q        |        |        |        |
   0+45     0.0027       0.06   Q        |        |        |        |
   0+50     0.0032       0.07   Q        |        |        |        |
   0+55     0.0038       0.08   Q        |        |        |        |
   1+ 0     0.0043       0.08   Q        |        |        |        |
   1+ 5     0.0049       0.08   Q        |        |        |        |
   1+10     0.0054       0.08   Q        |        |        |        |
   1+15     0.0060       0.07   Q        |        |        |        |
   1+20     0.0065       0.07   Q        |        |        |        |
   1+25     0.0070       0.07   Q        |        |        |        |
   1+30     0.0075       0.07   Q        |        |        |        |
   1+35     0.0080       0.07   Q        |        |        |        |
   1+40     0.0085       0.07   Q        |        |        |        |
   1+45     0.0090       0.07   Q        |        |        |        |
   1+50     0.0095       0.08   Q        |        |        |        |
   1+55     0.0101       0.08   Q        |        |        |        |
   2+ 0     0.0107       0.09   Q        |        |        |        |
   2+ 5     0.0113       0.09   Q        |        |        |        |
   2+10     0.0119       0.09   Q        |        |        |        |
   2+15     0.0126       0.09   Q        |        |        |        |
   2+20     0.0132       0.09   QV       |        |        |        |
   2+25     0.0138       0.09   QV       |        |        |        |
   2+30     0.0145       0.09   QV       |        |        |        |
   2+35     0.0151       0.10   QV       |        |        |        |
   2+40     0.0159       0.11   QV       |        |        |        |
   2+45     0.0166       0.11   QV       |        |        |        |
   2+50     0.0174       0.11   QV       |        |        |        |
   2+55     0.0182       0.11   QV       |        |        |        |
   3+ 0     0.0190       0.12   QV       |        |        |        |
   3+ 5     0.0198       0.12   QV       |        |        |        |
   3+10     0.0206       0.12   QV       |        |        |        |
   3+15     0.0214       0.12   QV       |        |        |        |
   3+20     0.0222       0.12   QV       |        |        |        |
   3+25     0.0230       0.12   QV       |        |        |        |
   3+30     0.0238       0.12   QV       |        |        |        |
   3+35     0.0247       0.12   QV       |        |        |        |
   3+40     0.0255       0.12   QV       |        |        |        |
   3+45     0.0263       0.12   Q V      |        |        |        |
   3+50     0.0271       0.12   Q V      |        |        |        |
   3+55     0.0280       0.13   Q V      |        |        |        |
   4+ 0     0.0290       0.13   Q V      |        |        |        |
   4+ 5     0.0299       0.14   Q V      |        |        |        |
   4+10     0.0309       0.14   Q V      |        |        |        |
   4+15     0.0318       0.14   Q V      |        |        |        |
   4+20     0.0328       0.14   Q V      |        |        |        |
   4+25     0.0339       0.15   Q V      |        |        |        |
   4+30     0.0349       0.16   Q V      |        |        |        |
   4+35     0.0360       0.16   Q V      |        |        |        |
   4+40     0.0371       0.16   Q V      |        |        |        |
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4+45       0.0383       0.16   Q V             |              |              |              |
4+50       0.0394       0.17   Q   V           |              |              |              |
4+55       0.0406       0.18   Q   V           |              |              |              |
5+ 0       0.0419       0.18   Q   V           |              |              |              |
5+ 5       0.0431       0.18   Q   V           |              |              |              |
5+10       0.0442       0.16   Q   V           |              |              |              |
5+15       0.0452       0.15   Q   V           |              |              |              |
5+20       0.0463       0.15   Q   V           |              |              |              |
5+25       0.0474       0.16   Q   V           |              |              |              |
5+30       0.0485       0.16   Q   V           |              |              |              |
5+35       0.0497       0.17   Q   V           |              |              |              |
5+40       0.0509       0.18   Q   V           |              |              |              |
5+45       0.0522       0.18   Q    V          |              |              |              |
5+50       0.0534       0.18   Q    V          |              |              |              |
5+55       0.0547       0.19   Q    V          |              |              |              |
6+ 0       0.0560       0.19   Q    V          |              |              |              |
6+ 5       0.0573       0.19   Q    V          |              |              |              |
6+10       0.0587       0.20   Q    V          |              |              |              |
6+15       0.0601       0.20   Q    V          |              |              |              |
6+20       0.0615       0.21   Q    V          |              |              |              |
6+25       0.0629       0.21   Q    V          |              |              |              |
6+30       0.0644       0.21   Q    V          |              |              |              |
6+35       0.0659       0.21   Q     V         |              |              |              |
6+40       0.0674       0.22   Q     V         |              |              |              |
6+45       0.0690       0.23   Q     V         |              |              |              |
6+50       0.0706       0.23   Q     V         |              |              |              |
6+55       0.0722       0.23   Q     V         |              |              |              |
7+ 0       0.0738       0.23   Q     V         |              |              |              |
7+ 5       0.0754       0.23   Q     V         |              |              |              |
7+10       0.0770       0.24   Q     V         |              |              |              |
7+15       0.0786       0.24   Q      V        |              |              |              |
7+20       0.0803       0.24   Q      V        |              |              |              |
7+25       0.0820       0.25   Q      V        |              |              |              |
7+30       0.0837       0.25   |Q     V        |              |              |              |
7+35       0.0855       0.26   |Q     V        |              |              |              |
7+40       0.0874       0.27   |Q     V        |              |              |              |
7+45       0.0893       0.27   |Q     V        |              |              |              |
7+50       0.0912       0.28   |Q     V        |              |              |              |
7+55       0.0932       0.29   |Q       V      |              |              |              |
8+ 0       0.0952       0.30   |Q       V      |              |              |              |
8+ 5       0.0973       0.31   |Q       V      |              |              |              |
8+10       0.0996       0.33   |Q       V      |              |              |              |
8+15       0.1019       0.33   |Q       V      |              |              |              |
8+20       0.1042       0.34   |Q       V      |              |              |              |
8+25       0.1066       0.34   |Q        V     |              |              |              |
8+30       0.1090       0.35   |Q        V     |              |              |              |
8+35       0.1114       0.35   |Q         V    |              |              |              |
8+40       0.1139       0.36   |Q         V    |              |              |              |
8+45       0.1165       0.37   |Q         V    |              |              |              |
8+50       0.1190       0.38   |Q          V   |              |              |              |
8+55       0.1217       0.39   |Q          V   |              |              |              |
9+ 0       0.1244       0.39   |Q           V  |              |              |              |
9+ 5       0.1272       0.40   |Q           V  |              |              |              |
9+10       0.1301       0.42   |Q           V| |              |              |              |
9+15       0.1330       0.43   |Q            V |              |              |              |
9+20       0.1361       0.44   |Q            V |              |              |              |
9+25       0.1392       0.45   |Q            V |              |              |              |
9+30       0.1423       0.46   |Q            V |              |              |              |
9+35       0.1455       0.47   |Q            |V|              |              |              |
9+40       0.1488       0.48   |Q            |V|              |              |              |
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 9+45    0.1522    0.48  |Q         |V        |         |         |
 9+50    0.1555    0.49  |Q         |V        |         |         |
 9+55    0.1590    0.50  | Q        |  V      |         |         |
10+ 0    0.1625    0.51  | Q        |  V      |         |         |
10+ 5    0.1659    0.49  |Q         |  V      |         |         |
10+10    0.1688    0.43  |Q         |  V      |         |         |
10+15    0.1716    0.41  |Q         |   V     |         |         |
10+20    0.1743    0.39  |Q         |   V     |         |         |
10+25    0.1770    0.38  |Q         |   V     |         |         |
10+30    0.1796    0.38  |Q         |   V     |         |         |
10+35    0.1823    0.39  |Q         |   V     |         |         |
10+40    0.1853    0.43  |Q         |    V    |         |         |
10+45    0.1883    0.45  |Q         |    V    |         |         |
10+50    0.1915    0.45  |Q         |    V    |         |         |
10+55    0.1946    0.46  |Q         |    V    |         |         |
11+ 0    0.1978    0.46  |Q         |     V   |         |         |
11+ 5    0.2010    0.46  |Q         |     V   |         |         |
11+10    0.2041    0.45  |Q         |     V   |         |         |
11+15    0.2072    0.45  |Q         |     V   |         |         |
11+20    0.2103    0.45  |Q         |      V  |         |         |
11+25    0.2134    0.45  |Q         |      V  |         |         |
11+30    0.2165    0.45  |Q         |      V  |         |         |
11+35    0.2196    0.45  |Q         |      V  |         |         |
11+40    0.2226    0.43  |Q         |       V |         |         |
11+45    0.2255    0.42  |Q         |       V |         |         |
11+50    0.2284    0.42  |Q         |       V |         |         |
11+55    0.2313    0.43  |Q         |       V |         |         |
12+ 0    0.2342    0.43  |Q         |       V |         |         |
12+ 5    0.2374    0.45  |Q         |        V|         |         |
12+10    0.2409    0.51  | Q        |        V|         |         |
12+15    0.2446    0.54  | Q        |        V|         |         |
12+20    0.2484    0.56  | Q        |         V         |         |
12+25    0.2524    0.57  | Q        |         V         |         |
12+30    0.2564    0.58  | Q        |         V         |         |
12+35    0.2605    0.60  | Q        |         V|         |         |
12+40    0.2648    0.62  | Q        |          V        |         |
12+45    0.2692    0.63  | Q        |          V        |         |
12+50    0.2736    0.64  | Q        |          V        |         |
12+55    0.2782    0.66  | Q        |           V       |         |
13+ 0    0.2828    0.67  | Q        |           V       |         |
13+ 5    0.2882    0.79  |  Q       |            V      |         |
13+10    0.2957    1.08  |    Q     |            V      |         |
13+15    0.3041    1.22  |     Q    |             V     |         |
13+20    0.3131    1.31  |      Q   |              V    |         |
13+25    0.3226    1.38  |       Q  |              V    |         |
13+30    0.3325    1.44  |       Q  |               V   |         |
13+35    0.3416    1.32  |       Q  |                V  |         |
13+40    0.3482    0.96  |   Q      |                V  |         |
13+45    0.3538    0.82  |   Q      |                 V |         |
13+50    0.3590    0.75  | Q        |                 V |         |
13+55    0.3638    0.70  | Q        |                 V |         |
14+ 0    0.3685    0.68  | Q        |                  V|         |
14+ 5    0.3731    0.67  | Q        |                  V|         |
14+10    0.3778    0.69  | Q        |                  V|         |
14+15    0.3825    0.68  | Q        |                   V         |
14+20    0.3872    0.67  | Q        |                   V         |
14+25    0.3917    0.65  | Q        |                    V        |
14+30    0.3961    0.64  | Q        |                    V        |
14+35    0.4004    0.63  | Q        |                    V        |
14+40    0.4046    0.61  |  Q       |                     |V       |
```

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14+45      0.4089      0.61   | Q        |        |        |V        |
14+50      0.4131      0.61   | Q        |        |        |V        |
14+55      0.4172      0.60   | Q        |        |        | V       |
15+ 0      0.4214      0.60   | Q        |        |        | V       |
15+ 5      0.4255      0.60   | Q        |        |        | V       |
15+10      0.4295      0.59   | Q        |        |        | V       |
15+15      0.4335      0.58   | Q        |        |        |  V      |
15+20      0.4375      0.58   | Q        |        |        |  V      |
15+25      0.4414      0.56   | Q        |        |        |  V      |
15+30      0.4453      0.56   | Q        |        |        |   V     |
15+35      0.4490      0.54   | Q        |        |        |   V     |
15+40      0.4525      0.50   | Q        |        |        |   V     |
15+45      0.4558      0.49   |Q         |        |        |   V     |
15+50      0.4591      0.48   |Q         |        |        |    V    |
15+55      0.4624      0.47   |Q         |        |        |    V    |
16+ 0      0.4656      0.47   |Q         |        |        |    V    |
16+ 5      0.4684      0.41   |Q         |        |        |    V    |
16+10      0.4703      0.28   |Q         |        |        |     V   |
16+15      0.4719      0.22   Q          |        |        |     V   |
16+20      0.4732      0.19   Q          |        |        |     V   |
16+25      0.4743      0.17   Q          |        |        |     V   |
16+30      0.4754      0.15   Q          |        |        |     V   |
16+35      0.4763      0.14   Q          |        |        |     V   |
16+40      0.4771      0.12   Q          |        |        |     V   |
16+45      0.4778      0.11   Q          |        |        |     V   |
16+50      0.4785      0.10   Q          |        |        |     V   |
16+55      0.4791      0.09   Q          |        |        |     V   |
17+ 0      0.4797      0.08   Q          |        |        |     V   |
17+ 5      0.4803      0.09   Q          |        |        |     V   |
17+10      0.4810      0.10   Q          |        |        |     V   |
17+15      0.4817      0.10   Q          |        |        |     V   |
17+20      0.4824      0.11   Q          |        |        |      V  |
17+25      0.4832      0.11   Q          |        |        |      V  |
17+30      0.4840      0.11   Q          |        |        |      V  |
17+35      0.4847      0.11   Q          |        |        |      V  |
17+40      0.4855      0.11   Q          |        |        |      V  |
17+45      0.4863      0.12   Q          |        |        |      V  |
17+50      0.4871      0.11   Q          |        |        |      V  |
17+55      0.4878      0.10   Q          |        |        |      V  |
18+ 0      0.4885      0.10   Q          |        |        |      V  |
18+ 5      0.4892      0.10   Q          |        |        |      V  |
18+10      0.4899      0.10   Q          |        |        |      V  |
18+15      0.4906      0.10   Q          |        |        |      V  |
18+20      0.4913      0.10   Q          |        |        |      V  |
18+25      0.4919      0.10   Q          |        |        |      V  |
18+30      0.4926      0.10   Q          |        |        |      V  |
18+35      0.4932      0.09   Q          |        |        |      V  |
18+40      0.4938      0.08   Q          |        |        |      V  |
18+45      0.4944      0.08   Q          |        |        |      V  |
18+50      0.4949      0.07   Q          |        |        |      V  |
18+55      0.4953      0.06   Q          |        |        |      V  |
19+ 0      0.4957      0.06   Q          |        |        |       V |
19+ 5      0.4961      0.06   Q          |        |        |       V |
19+10      0.4966      0.07   Q          |        |        |       V |
19+15      0.4971      0.07   Q          |        |        |       V |
19+20      0.4976      0.07   Q          |        |        |       V |
19+25      0.4981      0.08   Q          |        |        |       V |
19+30      0.4987      0.09   Q          |        |        |       V |
19+35      0.4993      0.08   Q          |        |        |       V |
19+40      0.4998      0.08   Q          |        |        |       V |
```

```
19+45      0.5003      0.07    Q        |           |           |                    V |
19+50      0.5008      0.07    Q        |           |           |                    V |
19+55      0.5012      0.06    Q        |           |           |                    V |
20+ 0      0.5016      0.06    Q        |           |           |                    V |
20+ 5      0.5020      0.06    Q        |           |           |                    V |
20+10      0.5025      0.07    Q        |           |           |                    V |
20+15      0.5029      0.07    Q        |           |           |                    V |
20+20      0.5034      0.07    Q        |           |           |                    V |
20+25      0.5039      0.07    Q        |           |           |                    V |
20+30      0.5044      0.07    Q        |           |           |                    V |
20+35      0.5049      0.07    Q        |           |           |                    V |
20+40      0.5054      0.07    Q        |           |           |                    V |
20+45      0.5058      0.07    Q        |           |           |                    V |
20+50      0.5063      0.07    Q        |           |           |                    V |
20+55      0.5067      0.06    Q        |           |           |                    V |
21+ 0      0.5071      0.05    Q        |           |           |                    V |
21+ 5      0.5075      0.06    Q        |           |           |                    V |
21+10      0.5079      0.06    Q        |           |           |                    V|
21+15      0.5084      0.07    Q        |           |           |                     V |
21+20      0.5088      0.06    Q        |           |           |                     V |
21+25      0.5092      0.06    Q        |           |           |                     V |
21+30      0.5096      0.05    Q        |           |           |                     V|
21+35      0.5100      0.06    Q        |           |           |                     V |
21+40      0.5104      0.06    Q        |           |           |                     V |
21+45      0.5108      0.07    Q        |           |           |                     V |
21+50      0.5113      0.06    Q        |           |           |                     V |
21+55      0.5117      0.06    Q        |           |           |                     V |
22+ 0      0.5120      0.05    Q        |           |           |                     V |
22+ 5      0.5124      0.06    Q        |           |           |                     V |
22+10      0.5128      0.06    Q        |           |           |                     V |
22+15      0.5133      0.07    Q        |           |           |                     V |
22+20      0.5137      0.06    Q        |           |           |                     V |
22+25      0.5141      0.06    Q        |           |           |                     V |
22+30      0.5145      0.05    Q        |           |           |                     V |
22+35      0.5148      0.05    Q        |           |           |                     V |
22+40      0.5152      0.05    Q        |           |           |                     V |
22+45      0.5155      0.05    Q        |           |           |                     V|
22+50      0.5159      0.05    Q        |           |           |                     V |
22+55      0.5162      0.05    Q        |           |           |                     V |
23+ 0      0.5165      0.05    Q        |           |           |                     V |
23+ 5      0.5169      0.05    Q        |           |           |                     V |
23+10      0.5172      0.05    Q        |           |           |                     V |
23+15      0.5175      0.05    Q        |           |           |                     V |
23+20      0.5179      0.05    Q        |           |           |                     V |
23+25      0.5182      0.05    Q        |           |           |                     V |
23+30      0.5185      0.05    Q        |           |           |                     V |
23+35      0.5189      0.05    Q        |           |           |                     V |
23+40      0.5192      0.05    Q        |           |           |                     V |
23+45      0.5195      0.05    Q        |           |           |                     V |
23+50      0.5198      0.05    Q        |           |           |                     V |
23+55      0.5202      0.05    Q        |           |           |                     V|
24+ 0      0.5205      0.05    Q        |           |           |                     V |
24+ 5      0.5208      0.04    Q        |           |           |                     V |
24+10      0.5209      0.02    Q        |           |           |                     V |
24+15      0.5210      0.02    Q        |           |           |                     V |
24+20      0.5211      0.01    Q        |           |           |                     V |
24+25      0.5212      0.01    Q        |           |           |                     V |
24+30      0.5212      0.01    Q        |           |           |                     V |
24+35      0.5213      0.01    Q        |           |           |                     V |
24+40      0.5213      0.00    Q        |           |           |                     V|
```

```
24+45      0.5213      0.00   Q          |           |           |           V|
24+50      0.5213      0.00   Q          |           |           |           V|
24+55      0.5214      0.00   Q          |           |           |           V|
25+ 0      0.5214      0.00   Q          |           |           |           V|
25+ 5      0.5214      0.00   Q          |           |           |            V
-----------------------------------------------------------------------
```

APPENDIX C: POST-PROJECT UNIT HYDROGRAPH METHOD HYDROLOGY

APPENDIX C.1:   UNIT HYDROGRAPH ANALYSIS, AREAS "A"

2-Year, 24-Hour Storm Event

```
                Unit   Hydrograph   Analysis

           Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2014, Version 9.0
                  Study date  02/16/23 File: ara242.out


     +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
     ---------------------------------------------------------------------

     Riverside County Synthetic Unit Hydrology Method
     RCFC & WCD Manual date - April 1978


     Program License Serial Number 6279


     ---------------------------------------------------------------------
      English (in-lb) Input Units Used
      English Rainfall Data (Inches) Input Values Used

      English Units used in output format



     ---------------------------------------------------------------------
     302.01.21
     AREA A
     2 YR STORM
     POST PROJECT
     ---------------------------------------------------------------------
     Drainage Area =      12.23(Ac.)  =       0.019 Sq. Mi.
     Drainage Area for Depth-Area Areal Adjustment =      12.23(Ac.)  =        0.019
Sq. Mi.
     Length along longest watercourse =    1105.90(Ft.)
     Length along longest watercourse measured to centroid =      610.60(Ft.)
     Length along longest watercourse =       0.209 Mi.
     Length along longest watercourse measured to centroid =      0.116 Mi.
     Difference in elevation =        9.50(Ft.)
     Slope along watercourse =     45.3567 Ft./Mi.
     Average Manning's 'N' = 0.025
     Lag time =     0.071 Hr.
     Lag time =      4.24 Min.
     25% of lag time =      1.06 Min.
     40% of lag time =      1.70 Min.
     Unit time =      5.00 Min.
     Duration of storm = 24 Hour(s)
     User Entered Base Flow =      0.00(CFS)

     2 YEAR Area rainfall data:


     Area(Ac.)[1]        Rainfall(In)[2]        Weighting[1*2]
          12.23              2.79                    34.12


     100 YEAR Area rainfall data:


     Area(Ac.)[1]        Rainfall(In)[2]        Weighting[1*2]
          12.23              7.72                    94.42
```

```
        STORM EVENT (YEAR) =     2.00
        Area Averaged 2-Year Rainfall =     2.790(In)
        Area Averaged 100-Year Rainfall =     7.720(In)

        Point rain (area averaged) =     2.790(In)
        Areal adjustment factor =  100.00 %
        Adjusted average point rain =     2.790(In)

        Sub-Area Data:
        Area(Ac.)          Runoff Index   Impervious %
           12.230             33.60           0.350
         Total Area Entered =      12.23(Ac.)


        RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%      F
        AMC2 AMC-2    (In/Hr)    (Dec.%)       (In/Hr)       (Dec.)    (In/Hr)
        33.6  33.6    0.728      0.350          0.498         1.000      0.498
                                                            Sum (F) =   0.498
        Area averaged mean soil loss (F) (In/Hr) =  0.498
        Minimum soil loss rate ((In/Hr)) =  0.249
        (for 24 hour storm duration)
        Soil low loss rate (decimal) =   0.620
        ------------------------------------------------------------------------

                    U n i t   H y d r o g r a p h
                      MOUNTAIN S-Curve
        ------------------------------------------------------------------------
                      Unit Hydrograph Data
        ------------------------------------------------------------------------
        Unit time period   Time % of lag   Distribution   Unit Hydrograph
             (hrs)                           Graph %            (CFS)
        ------------------------------------------------------------------------
           1   0.083         117.878          27.331           3.369
           2   0.167         235.755          38.091           4.695
           3   0.250         353.633          12.913           1.592
           4   0.333         471.511           6.898           0.850
           5   0.417         589.388           4.601           0.567
           6   0.500         707.266           3.392           0.418
           7   0.583         825.144           2.550           0.314
           8   0.667         943.021           2.137           0.263
           9   0.750        1060.899           2.087           0.257
                                        Sum = 100.000   Sum=     12.326
        ----------------------------------------------------------------------


     The following loss rate calculations reflect use of the minimum calculated loss
     rate subtracted from the Storm Rain to produce the maximum Effective Rain value

     Unit Time   Pattern   Storm Rain     Loss rate(In./Hr)      Effective
          (Hr.)   Percent   (In/Hr)        Max  |  Low           (In/Hr)
       1   0.08     0.07      0.022      (  0.884)     0.014        0.008
       2   0.17     0.07      0.022      (  0.880)     0.014        0.008
       3   0.25     0.07      0.022      (  0.877)     0.014        0.008
       4   0.33     0.10      0.033      (  0.873)     0.021        0.013
       5   0.42     0.10      0.033      (  0.870)     0.021        0.013
       6   0.50     0.10      0.033      (  0.867)     0.021        0.013
       7   0.58     0.10      0.033      (  0.863)     0.021        0.013
       8   0.67     0.10      0.033      (  0.860)     0.021        0.013
       9   0.75     0.10      0.033      (  0.856)     0.021        0.013
      10   0.83     0.13      0.045      (  0.853)     0.028        0.017
```

11	0.92	0.13	0.045	(	0.850)	0.028	0.017
12	1.00	0.13	0.045	(	0.846)	0.028	0.017
13	1.08	0.10	0.033	(	0.843)	0.021	0.013
14	1.17	0.10	0.033	(	0.840)	0.021	0.013
15	1.25	0.10	0.033	(	0.836)	0.021	0.013
16	1.33	0.10	0.033	(	0.833)	0.021	0.013
17	1.42	0.10	0.033	(	0.830)	0.021	0.013
18	1.50	0.10	0.033	(	0.826)	0.021	0.013
19	1.58	0.10	0.033	(	0.823)	0.021	0.013
20	1.67	0.10	0.033	(	0.820)	0.021	0.013
21	1.75	0.10	0.033	(	0.816)	0.021	0.013
22	1.83	0.13	0.045	(	0.813)	0.028	0.017
23	1.92	0.13	0.045	(	0.810)	0.028	0.017
24	2.00	0.13	0.045	(	0.807)	0.028	0.017
25	2.08	0.13	0.045	(	0.803)	0.028	0.017
26	2.17	0.13	0.045	(	0.800)	0.028	0.017
27	2.25	0.13	0.045	(	0.797)	0.028	0.017
28	2.33	0.13	0.045	(	0.794)	0.028	0.017
29	2.42	0.13	0.045	(	0.790)	0.028	0.017
30	2.50	0.13	0.045	(	0.787)	0.028	0.017
31	2.58	0.17	0.056	(	0.784)	0.035	0.021
32	2.67	0.17	0.056	(	0.781)	0.035	0.021
33	2.75	0.17	0.056	(	0.778)	0.035	0.021
34	2.83	0.17	0.056	(	0.774)	0.035	0.021
35	2.92	0.17	0.056	(	0.771)	0.035	0.021
36	3.00	0.17	0.056	(	0.768)	0.035	0.021
37	3.08	0.17	0.056	(	0.765)	0.035	0.021
38	3.17	0.17	0.056	(	0.762)	0.035	0.021
39	3.25	0.17	0.056	(	0.758)	0.035	0.021
40	3.33	0.17	0.056	(	0.755)	0.035	0.021
41	3.42	0.17	0.056	(	0.752)	0.035	0.021
42	3.50	0.17	0.056	(	0.749)	0.035	0.021
43	3.58	0.17	0.056	(	0.746)	0.035	0.021
44	3.67	0.17	0.056	(	0.743)	0.035	0.021
45	3.75	0.17	0.056	(	0.740)	0.035	0.021
46	3.83	0.20	0.067	(	0.736)	0.042	0.025
47	3.92	0.20	0.067	(	0.733)	0.042	0.025
48	4.00	0.20	0.067	(	0.730)	0.042	0.025
49	4.08	0.20	0.067	(	0.727)	0.042	0.025
50	4.17	0.20	0.067	(	0.724)	0.042	0.025
51	4.25	0.20	0.067	(	0.721)	0.042	0.025
52	4.33	0.23	0.078	(	0.718)	0.048	0.030
53	4.42	0.23	0.078	(	0.715)	0.048	0.030
54	4.50	0.23	0.078	(	0.712)	0.048	0.030
55	4.58	0.23	0.078	(	0.709)	0.048	0.030
56	4.67	0.23	0.078	(	0.706)	0.048	0.030
57	4.75	0.23	0.078	(	0.703)	0.048	0.030
58	4.83	0.27	0.089	(	0.700)	0.055	0.034
59	4.92	0.27	0.089	(	0.697)	0.055	0.034
60	5.00	0.27	0.089	(	0.694)	0.055	0.034
61	5.08	0.20	0.067	(	0.691)	0.042	0.025
62	5.17	0.20	0.067	(	0.688)	0.042	0.025
63	5.25	0.20	0.067	(	0.685)	0.042	0.025
64	5.33	0.23	0.078	(	0.682)	0.048	0.030
65	5.42	0.23	0.078	(	0.679)	0.048	0.030
66	5.50	0.23	0.078	(	0.676)	0.048	0.030
67	5.58	0.27	0.089	(	0.673)	0.055	0.034
68	5.67	0.27	0.089	(	0.670)	0.055	0.034
69	5.75	0.27	0.089	(	0.667)	0.055	0.034
70	5.83	0.27	0.089	(	0.664)	0.055	0.034

71	5.92	0.27	0.089	(0.661)	0.055	0.034
72	6.00	0.27	0.089	(0.658)	0.055	0.034
73	6.08	0.30	0.100	(0.655)	0.062	0.038
74	6.17	0.30	0.100	(0.652)	0.062	0.038
75	6.25	0.30	0.100	(0.649)	0.062	0.038
76	6.33	0.30	0.100	(0.646)	0.062	0.038
77	6.42	0.30	0.100	(0.643)	0.062	0.038
78	6.50	0.30	0.100	(0.640)	0.062	0.038
79	6.58	0.33	0.112	(0.638)	0.069	0.042
80	6.67	0.33	0.112	(0.635)	0.069	0.042
81	6.75	0.33	0.112	(0.632)	0.069	0.042
82	6.83	0.33	0.112	(0.629)	0.069	0.042
83	6.92	0.33	0.112	(0.626)	0.069	0.042
84	7.00	0.33	0.112	(0.623)	0.069	0.042
85	7.08	0.33	0.112	(0.620)	0.069	0.042
86	7.17	0.33	0.112	(0.618)	0.069	0.042
87	7.25	0.33	0.112	(0.615)	0.069	0.042
88	7.33	0.37	0.123	(0.612)	0.076	0.047
89	7.42	0.37	0.123	(0.609)	0.076	0.047
90	7.50	0.37	0.123	(0.606)	0.076	0.047
91	7.58	0.40	0.134	(0.604)	0.083	0.051
92	7.67	0.40	0.134	(0.601)	0.083	0.051
93	7.75	0.40	0.134	(0.598)	0.083	0.051
94	7.83	0.43	0.145	(0.595)	0.090	0.055
95	7.92	0.43	0.145	(0.593)	0.090	0.055
96	8.00	0.43	0.145	(0.590)	0.090	0.055
97	8.08	0.50	0.167	(0.587)	0.104	0.064
98	8.17	0.50	0.167	(0.584)	0.104	0.064
99	8.25	0.50	0.167	(0.582)	0.104	0.064
100	8.33	0.50	0.167	(0.579)	0.104	0.064
101	8.42	0.50	0.167	(0.576)	0.104	0.064
102	8.50	0.50	0.167	(0.574)	0.104	0.064
103	8.58	0.53	0.179	(0.571)	0.111	0.068
104	8.67	0.53	0.179	(0.568)	0.111	0.068
105	8.75	0.53	0.179	(0.565)	0.111	0.068
106	8.83	0.57	0.190	(0.563)	0.118	0.072
107	8.92	0.57	0.190	(0.560)	0.118	0.072
108	9.00	0.57	0.190	(0.557)	0.118	0.072
109	9.08	0.63	0.212	(0.555)	0.131	0.081
110	9.17	0.63	0.212	(0.552)	0.131	0.081
111	9.25	0.63	0.212	(0.550)	0.131	0.081
112	9.33	0.67	0.223	(0.547)	0.138	0.085
113	9.42	0.67	0.223	(0.544)	0.138	0.085
114	9.50	0.67	0.223	(0.542)	0.138	0.085
115	9.58	0.70	0.234	(0.539)	0.145	0.089
116	9.67	0.70	0.234	(0.537)	0.145	0.089
117	9.75	0.70	0.234	(0.534)	0.145	0.089
118	9.83	0.73	0.246	(0.531)	0.152	0.093
119	9.92	0.73	0.246	(0.529)	0.152	0.093
120	10.00	0.73	0.246	(0.526)	0.152	0.093
121	10.08	0.50	0.167	(0.524)	0.104	0.064
122	10.17	0.50	0.167	(0.521)	0.104	0.064
123	10.25	0.50	0.167	(0.519)	0.104	0.064
124	10.33	0.50	0.167	(0.516)	0.104	0.064
125	10.42	0.50	0.167	(0.514)	0.104	0.064
126	10.50	0.50	0.167	(0.511)	0.104	0.064
127	10.58	0.67	0.223	(0.509)	0.138	0.085
128	10.67	0.67	0.223	(0.506)	0.138	0.085
129	10.75	0.67	0.223	(0.504)	0.138	0.085
130	10.83	0.67	0.223	(0.501)	0.138	0.085

131	10.92	0.67	0.223	(0.499)	0.138	0.085
132	11.00	0.67	0.223	(0.496)	0.138	0.085
133	11.08	0.63	0.212	(0.494)	0.131	0.081
134	11.17	0.63	0.212	(0.491)	0.131	0.081
135	11.25	0.63	0.212	(0.489)	0.131	0.081
136	11.33	0.63	0.212	(0.487)	0.131	0.081
137	11.42	0.63	0.212	(0.484)	0.131	0.081
138	11.50	0.63	0.212	(0.482)	0.131	0.081
139	11.58	0.57	0.190	(0.479)	0.118	0.072
140	11.67	0.57	0.190	(0.477)	0.118	0.072
141	11.75	0.57	0.190	(0.475)	0.118	0.072
142	11.83	0.60	0.201	(0.472)	0.125	0.076
143	11.92	0.60	0.201	(0.470)	0.125	0.076
144	12.00	0.60	0.201	(0.468)	0.125	0.076
145	12.08	0.83	0.279	(0.465)	0.173	0.106
146	12.17	0.83	0.279	(0.463)	0.173	0.106
147	12.25	0.83	0.279	(0.461)	0.173	0.106
148	12.33	0.87	0.290	(0.458)	0.180	0.110
149	12.42	0.87	0.290	(0.456)	0.180	0.110
150	12.50	0.87	0.290	(0.454)	0.180	0.110
151	12.58	0.93	0.312	(0.451)	0.194	0.119
152	12.67	0.93	0.312	(0.449)	0.194	0.119
153	12.75	0.93	0.312	(0.447)	0.194	0.119
154	12.83	0.97	0.324	(0.445)	0.201	0.123
155	12.92	0.97	0.324	(0.442)	0.201	0.123
156	13.00	0.97	0.324	(0.440)	0.201	0.123
157	13.08	1.13	0.379	(0.438)	0.235	0.144
158	13.17	1.13	0.379	(0.436)	0.235	0.144
159	13.25	1.13	0.379	(0.433)	0.235	0.144
160	13.33	1.13	0.379	(0.431)	0.235	0.144
161	13.42	1.13	0.379	(0.429)	0.235	0.144
162	13.50	1.13	0.379	(0.427)	0.235	0.144
163	13.58	0.77	0.257	(0.425)	0.159	0.098
164	13.67	0.77	0.257	(0.423)	0.159	0.098
165	13.75	0.77	0.257	(0.420)	0.159	0.098
166	13.83	0.77	0.257	(0.418)	0.159	0.098
167	13.92	0.77	0.257	(0.416)	0.159	0.098
168	14.00	0.77	0.257	(0.414)	0.159	0.098
169	14.08	0.90	0.301	(0.412)	0.187	0.114
170	14.17	0.90	0.301	(0.410)	0.187	0.114
171	14.25	0.90	0.301	(0.408)	0.187	0.114
172	14.33	0.87	0.290	(0.406)	0.180	0.110
173	14.42	0.87	0.290	(0.404)	0.180	0.110
174	14.50	0.87	0.290	(0.401)	0.180	0.110
175	14.58	0.87	0.290	(0.399)	0.180	0.110
176	14.67	0.87	0.290	(0.397)	0.180	0.110
177	14.75	0.87	0.290	(0.395)	0.180	0.110
178	14.83	0.83	0.279	(0.393)	0.173	0.106
179	14.92	0.83	0.279	(0.391)	0.173	0.106
180	15.00	0.83	0.279	(0.389)	0.173	0.106
181	15.08	0.80	0.268	(0.387)	0.166	0.102
182	15.17	0.80	0.268	(0.385)	0.166	0.102
183	15.25	0.80	0.268	(0.383)	0.166	0.102
184	15.33	0.77	0.257	(0.381)	0.159	0.098
185	15.42	0.77	0.257	(0.379)	0.159	0.098
186	15.50	0.77	0.257	(0.377)	0.159	0.098
187	15.58	0.63	0.212	(0.376)	0.131	0.081
188	15.67	0.63	0.212	(0.374)	0.131	0.081
189	15.75	0.63	0.212	(0.372)	0.131	0.081
190	15.83	0.63	0.212	(0.370)	0.131	0.081

191	15.92	0.63	0.212	(0.368)	0.131	0.081
192	16.00	0.63	0.212	(0.366)	0.131	0.081
193	16.08	0.13	0.045	(0.364)	0.028	0.017
194	16.17	0.13	0.045	(0.362)	0.028	0.017
195	16.25	0.13	0.045	(0.360)	0.028	0.017
196	16.33	0.13	0.045	(0.359)	0.028	0.017
197	16.42	0.13	0.045	(0.357)	0.028	0.017
198	16.50	0.13	0.045	(0.355)	0.028	0.017
199	16.58	0.10	0.033	(0.353)	0.021	0.013
200	16.67	0.10	0.033	(0.351)	0.021	0.013
201	16.75	0.10	0.033	(0.350)	0.021	0.013
202	16.83	0.10	0.033	(0.348)	0.021	0.013
203	16.92	0.10	0.033	(0.346)	0.021	0.013
204	17.00	0.10	0.033	(0.344)	0.021	0.013
205	17.08	0.17	0.056	(0.343)	0.035	0.021
206	17.17	0.17	0.056	(0.341)	0.035	0.021
207	17.25	0.17	0.056	(0.339)	0.035	0.021
208	17.33	0.17	0.056	(0.337)	0.035	0.021
209	17.42	0.17	0.056	(0.336)	0.035	0.021
210	17.50	0.17	0.056	(0.334)	0.035	0.021
211	17.58	0.17	0.056	(0.332)	0.035	0.021
212	17.67	0.17	0.056	(0.331)	0.035	0.021
213	17.75	0.17	0.056	(0.329)	0.035	0.021
214	17.83	0.13	0.045	(0.327)	0.028	0.017
215	17.92	0.13	0.045	(0.326)	0.028	0.017
216	18.00	0.13	0.045	(0.324)	0.028	0.017
217	18.08	0.13	0.045	(0.323)	0.028	0.017
218	18.17	0.13	0.045	(0.321)	0.028	0.017
219	18.25	0.13	0.045	(0.319)	0.028	0.017
220	18.33	0.13	0.045	(0.318)	0.028	0.017
221	18.42	0.13	0.045	(0.316)	0.028	0.017
222	18.50	0.13	0.045	(0.315)	0.028	0.017
223	18.58	0.10	0.033	(0.313)	0.021	0.013
224	18.67	0.10	0.033	(0.312)	0.021	0.013
225	18.75	0.10	0.033	(0.310)	0.021	0.013
226	18.83	0.07	0.022	(0.309)	0.014	0.008
227	18.92	0.07	0.022	(0.307)	0.014	0.008
228	19.00	0.07	0.022	(0.306)	0.014	0.008
229	19.08	0.10	0.033	(0.304)	0.021	0.013
230	19.17	0.10	0.033	(0.303)	0.021	0.013
231	19.25	0.10	0.033	(0.302)	0.021	0.013
232	19.33	0.13	0.045	(0.300)	0.028	0.017
233	19.42	0.13	0.045	(0.299)	0.028	0.017
234	19.50	0.13	0.045	(0.297)	0.028	0.017
235	19.58	0.10	0.033	(0.296)	0.021	0.013
236	19.67	0.10	0.033	(0.295)	0.021	0.013
237	19.75	0.10	0.033	(0.293)	0.021	0.013
238	19.83	0.07	0.022	(0.292)	0.014	0.008
239	19.92	0.07	0.022	(0.291)	0.014	0.008
240	20.00	0.07	0.022	(0.289)	0.014	0.008
241	20.08	0.10	0.033	(0.288)	0.021	0.013
242	20.17	0.10	0.033	(0.287)	0.021	0.013
243	20.25	0.10	0.033	(0.286)	0.021	0.013
244	20.33	0.10	0.033	(0.284)	0.021	0.013
245	20.42	0.10	0.033	(0.283)	0.021	0.013
246	20.50	0.10	0.033	(0.282)	0.021	0.013
247	20.58	0.10	0.033	(0.281)	0.021	0.013
248	20.67	0.10	0.033	(0.280)	0.021	0.013
249	20.75	0.10	0.033	(0.278)	0.021	0.013
250	20.83	0.07	0.022	(0.277)	0.014	0.008

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251  20.92      0.07      0.022       (  0.276)        0.014         0.008
252  21.00      0.07      0.022       (  0.275)        0.014         0.008
253  21.08      0.10      0.033       (  0.274)        0.021         0.013
254  21.17      0.10      0.033       (  0.273)        0.021         0.013
255  21.25      0.10      0.033       (  0.272)        0.021         0.013
256  21.33      0.07      0.022       (  0.271)        0.014         0.008
257  21.42      0.07      0.022       (  0.270)        0.014         0.008
258  21.50      0.07      0.022       (  0.269)        0.014         0.008
259  21.58      0.10      0.033       (  0.268)        0.021         0.013
260  21.67      0.10      0.033       (  0.267)        0.021         0.013
261  21.75      0.10      0.033       (  0.266)        0.021         0.013
262  21.83      0.07      0.022       (  0.265)        0.014         0.008
263  21.92      0.07      0.022       (  0.264)        0.014         0.008
264  22.00      0.07      0.022       (  0.263)        0.014         0.008
265  22.08      0.10      0.033       (  0.262)        0.021         0.013
266  22.17      0.10      0.033       (  0.261)        0.021         0.013
267  22.25      0.10      0.033       (  0.261)        0.021         0.013
268  22.33      0.07      0.022       (  0.260)        0.014         0.008
269  22.42      0.07      0.022       (  0.259)        0.014         0.008
270  22.50      0.07      0.022       (  0.258)        0.014         0.008
271  22.58      0.07      0.022       (  0.257)        0.014         0.008
272  22.67      0.07      0.022       (  0.257)        0.014         0.008
273  22.75      0.07      0.022       (  0.256)        0.014         0.008
274  22.83      0.07      0.022       (  0.255)        0.014         0.008
275  22.92      0.07      0.022       (  0.255)        0.014         0.008
276  23.00      0.07      0.022       (  0.254)        0.014         0.008
277  23.08      0.07      0.022       (  0.254)        0.014         0.008
278  23.17      0.07      0.022       (  0.253)        0.014         0.008
279  23.25      0.07      0.022       (  0.252)        0.014         0.008
280  23.33      0.07      0.022       (  0.252)        0.014         0.008
281  23.42      0.07      0.022       (  0.251)        0.014         0.008
282  23.50      0.07      0.022       (  0.251)        0.014         0.008
283  23.58      0.07      0.022       (  0.251)        0.014         0.008
284  23.67      0.07      0.022       (  0.250)        0.014         0.008
285  23.75      0.07      0.022       (  0.250)        0.014         0.008
286  23.83      0.07      0.022       (  0.250)        0.014         0.008
287  23.92      0.07      0.022       (  0.249)        0.014         0.008
288  24.00      0.07      0.022       (  0.249)        0.014         0.008
             (Loss Rate Not Used)
    Sum =      100.0                                 Sum =     12.7
     Flood volume = Effective rainfall       1.06(In)
      times area        12.2(Ac.)/[(In)/(Ft.)] =        1.1(Ac.Ft)
     Total soil loss =       1.73(In)
     Total soil loss =      1.763(Ac.Ft)
     Total rainfall =       2.79(In)
     Flood volume =        47066.3 Cubic Feet
     Total soil loss =        76792.5 Cubic Feet
     ----------------------------------------------------------------
      Peak flow rate of this hydrograph =      1.760(CFS)
     ----------------------------------------------------------------
     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                    24 - H O U R    S T O R M
                  R u n o f f     H y d r o g r a p h
     ----------------------------------------------------------------
              Hydrograph in    5   Minute intervals ((CFS))


     ----------------------------------------------------------------
   Time(h+m) Volume Ac.Ft    Q(CFS)   0        2.5       5.0       7.5      10.0
   ----------------------------------------------------------------
     0+ 5        0.0002       0.03  Q         |         |         |         |
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0+10	0.0007	0.07	Q				
0+15	0.0012	0.08	Q				
0+20	0.0019	0.10	Q				
0+25	0.0028	0.13	Q				
0+30	0.0038	0.14	Q				
0+35	0.0048	0.14	Q				
0+40	0.0058	0.15	Q				
0+45	0.0069	0.15	Q				
0+50	0.0080	0.17	Q				
0+55	0.0093	0.19	Q				
1+ 0	0.0107	0.20	Q				
1+ 5	0.0120	0.19	Q				
1+10	0.0132	0.17	Q				
1+15	0.0143	0.16	Q				
1+20	0.0154	0.16	Q				
1+25	0.0165	0.16	Q				
1+30	0.0176	0.16	Q				
1+35	0.0187	0.16	Q				
1+40	0.0198	0.16	Q				
1+45	0.0209	0.16	Q				
1+50	0.0221	0.17	Q				
1+55	0.0234	0.19	Q				
2+ 0	0.0247	0.20	Q				
2+ 5	0.0261	0.20	Q				
2+10	0.0275	0.20	QV				
2+15	0.0290	0.21	QV				
2+20	0.0304	0.21	QV				
2+25	0.0318	0.21	QV				
2+30	0.0333	0.21	QV				
2+35	0.0348	0.22	QV				
2+40	0.0365	0.24	QV				
2+45	0.0382	0.25	Q				
2+50	0.0399	0.25	Q				
2+55	0.0417	0.26	Q				
3+ 0	0.0435	0.26	Q				
3+ 5	0.0453	0.26	Q				
3+10	0.0471	0.26	Q				
3+15	0.0489	0.26	Q				
3+20	0.0507	0.26	Q				
3+25	0.0525	0.26	Q				
3+30	0.0543	0.26	QV				
3+35	0.0561	0.26	QV				
3+40	0.0579	0.26	QV				
3+45	0.0597	0.26	QV				
3+50	0.0616	0.28	QV				
3+55	0.0636	0.30	QV				
4+ 0	0.0657	0.30	QV				
4+ 5	0.0678	0.31	QV				
4+10	0.0699	0.31	QV				
4+15	0.0721	0.31	QV				
4+20	0.0743	0.33	QV				
4+25	0.0767	0.35	QV				
4+30	0.0791	0.35	QV				
4+35	0.0816	0.36	Q V				
4+40	0.0841	0.36	Q V				
4+45	0.0866	0.36	Q V				
4+50	0.0892	0.38	Q V				
4+55	0.0919	0.40	Q V				
5+ 0	0.0947	0.41	Q V				
5+ 5	0.0974	0.38	Q V				

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 5+10    0.0997    0.34   |Q V               |          |          |          |
 5+15    0.1020    0.33   |Q V               |          |          |          |
 5+20    0.1044    0.34   |Q V               |          |          |          |
 5+25    0.1068    0.36   |Q V               |          |          |          |
 5+30    0.1093    0.36   |Q  V              |          |          |          |
 5+35    0.1119    0.38   |Q  V              |          |          |          |
 5+40    0.1147    0.40   |Q  V              |          |          |          |
 5+45    0.1174    0.40   |Q  V              |          |          |          |
 5+50    0.1203    0.41   |Q  V              |          |          |          |
 5+55    0.1231    0.41   |Q  V              |          |          |          |
 6+ 0    0.1260    0.41   |Q  V              |          |          |          |
 6+ 5    0.1289    0.43   |Q  V              |          |          |          |
 6+10    0.1320    0.45   |Q  V              |          |          |          |
 6+15    0.1352    0.46   |Q   V             |          |          |          |
 6+20    0.1384    0.46   |Q   V             |          |          |          |
 6+25    0.1416    0.47   |Q   V             |          |          |          |
 6+30    0.1448    0.47   |Q   V             |          |          |          |
 6+35    0.1481    0.48   |Q   V             |          |          |          |
 6+40    0.1516    0.50   | Q   V            |          |          |          |
 6+45    0.1551    0.51   | Q   V            |          |          |          |
 6+50    0.1587    0.52   | Q   V            |          |          |          |
 6+55    0.1622    0.52   | Q    V           |          |          |          |
 7+ 0    0.1658    0.52   | Q    V           |          |          |          |
 7+ 5    0.1694    0.52   | Q    V           |          |          |          |
 7+10    0.1730    0.52   | Q    V           |          |          |          |
 7+15    0.1766    0.52   | Q    V           |          |          |          |
 7+20    0.1803    0.54   | Q    V           |          |          |          |
 7+25    0.1841    0.56   | Q    V           |          |          |          |
 7+30    0.1880    0.56   | Q    V           |          |          |          |
 7+35    0.1920    0.58   | Q     V          |          |          |          |
 7+40    0.1962    0.60   | Q     V          |          |          |          |
 7+45    0.2004    0.61   | Q     V          |          |          |          |
 7+50    0.2048    0.63   | Q     V          |          |          |          |
 7+55    0.2093    0.66   | Q     V          |          |          |          |
 8+ 0    0.2138    0.66   | Q     V          |          |          |          |
 8+ 5    0.2187    0.70   | Q      V         |          |          |          |
 8+10    0.2238    0.74   | Q      V         |          |          |          |
 8+15    0.2290    0.76   |  Q      V        |          |          |          |
 8+20    0.2343    0.77   |  Q      V        |          |          |          |
 8+25    0.2396    0.77   |  Q      V        |          |          |          |
 8+30    0.2449    0.78   |  Q       V       |          |          |          |
 8+35    0.2504    0.79   |  Q       V       |          |          |          |
 8+40    0.2560    0.82   |  Q       V       |          |          |          |
 8+45    0.2617    0.83   |  Q       V       |          |          |          |
 8+50    0.2675    0.84   |  Q       V       |          |          |          |
 8+55    0.2735    0.87   |  Q        V      |          |          |          |
 9+ 0    0.2795    0.87   |  Q        V      |          |          |          |
 9+ 5    0.2858    0.91   |  Q        V      |          |          |          |
 9+10    0.2923    0.95   |  Q        V      |          |          |          |
 9+15    0.2990    0.97   |  Q       |V      |          |          |          |
 9+20    0.3058    0.99   |  Q       |V      |          |          |          |
 9+25    0.3128    1.02   |   Q      |V      |          |          |          |
 9+30    0.3199    1.03   |   Q      |V      |          |          |          |
 9+35    0.3271    1.05   |   Q      | V     |          |          |          |
 9+40    0.3345    1.07   |   Q      | V     |          |          |          |
 9+45    0.3419    1.08   |   Q      | V     |          |          |          |
 9+50    0.3495    1.10   |   Q      | V     |          |          |          |
 9+55    0.3573    1.13   |   Q      |  V    |          |          |          |
10+ 0    0.3651    1.14   |   Q      |  V    |          |          |          |
10+ 5    0.3723    1.04   |   Q      |   V   |          |          |          |
```

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10+10    0.3785    0.90   |  Q       |    V      |          |          |
10+15    0.3844    0.86   |  Q       |    V      |          |          |
10+20    0.3902    0.84   |  Q       |    V      |          |          |
10+25    0.3958    0.82   |  Q       |    V      |          |          |
10+30    0.4014    0.81   |  Q       |    V      |          |          |
10+35    0.4074    0.87   |  Q       |     V     |          |          |
10+40    0.4140    0.96   |  Q       |     V     |          |          |
10+45    0.4209    0.99   |  Q       |     V     |          |          |
10+50    0.4278    1.01   |   Q      |     V     |          |          |
10+55    0.4348    1.02   |   Q      |      V    |          |          |
11+ 0    0.4419    1.03   |   Q      |      V    |          |          |
11+ 5    0.4489    1.02   |   Q      |      V    |          |          |
11+10    0.4559    1.01   |   Q      |      V    |          |          |
11+15    0.4628    1.00   |   Q      |       V   |          |          |
11+20    0.4697    1.00   |   Q      |       V   |          |          |
11+25    0.4766    1.00   |  Q       |       V   |          |          |
11+30    0.4834    1.00   |  Q       |       V   |          |          |
11+35    0.4901    0.97   |  Q       |        V  |          |          |
11+40    0.4965    0.93   |  Q       |        V  |          |          |
11+45    0.5027    0.91   |  Q       |        V  |          |          |
11+50    0.5091    0.92   |  Q       |        V  |          |          |
11+55    0.5155    0.93   |  Q       |         V|           |          |
12+ 0    0.5220    0.94   |  Q       |         V|           |          |
12+ 5    0.5291    1.04   |   Q      |         V|           |          |
12+10    0.5372    1.18   |   Q      |         V|           |          |
12+15    0.5456    1.22   |   Q      |          V|          |          |
12+20    0.5544    1.27   |    Q     |          V|          |          |
12+25    0.5633    1.30   |    Q     |          V|          |          |
12+30    0.5725    1.32   |    Q     |          |V          |          |
12+35    0.5819    1.37   |    Q     |          |V          |          |
12+40    0.5916    1.42   |    Q     |          |V          |          |
12+45    0.6015    1.44   |    Q     |          | V         |          |
12+50    0.6116    1.46   |    Q     |          | V         |          |
12+55    0.6218    1.49   |    Q     |          |  V        |          |
13+ 0    0.6321    1.50   |    Q     |          |  V        |          |
13+ 5    0.6430    1.58   |     Q    |          |  V        |          |
13+10    0.6545    1.68   |     Q    |          |   V       |          |
13+15    0.6664    1.72   |     Q    |          |   V       |          |
13+20    0.6783    1.74   |     Q    |          |    V      |          |
13+25    0.6904    1.75   |      Q   |          |    V      |          |
13+30    0.7025    1.76   |      Q   |          |     V     |          |
13+35    0.7136    1.61   |     Q    |          |     V     |          |
13+40    0.7232    1.40   |    Q     |          |     V     |          |
13+45    0.7324    1.33   |    Q     |          |      V    |          |
13+50    0.7412    1.29   |    Q     |          |      V    |          |
13+55    0.7499    1.26   |    Q     |          |      V    |          |
14+ 0    0.7585    1.24   |   Q      |          |       V   |          |
14+ 5    0.7673    1.28   |    Q     |          |       V   |          |
14+10    0.7766    1.35   |    Q     |          |       V   |          |
14+15    0.7860    1.37   |    Q     |          |        V  |          |
14+20    0.7955    1.37   |    Q     |          |         V|           |
14+25    0.8048    1.36   |    Q     |          |         V|           |
14+30    0.8141    1.36   |    Q     |          |          V           |
14+35    0.8235    1.36   |    Q     |          |          V           |
14+40    0.8329    1.36   |    Q     |          |          V           |
14+45    0.8423    1.36   |    Q     |          |          |V          |
14+50    0.8515    1.35   |    Q     |          |          |V          |
14+55    0.8607    1.33   |    Q     |          |          |V          |
15+ 0    0.8698    1.32   |    Q     |          |          | V         |
15+ 5    0.8787    1.30   |    Q     |          |          | V         |
```

```
15+10    0.8875    1.28   |      Q       |        |        |    V       |
15+15    0.8963    1.27   |        Q     |        |        |     V      |
15+20    0.9049    1.25   |        Q     |        |        |     V      |
15+25    0.9133    1.23   |      Q       |        |        |     V      |
15+30    0.9217    1.22   |     Q        |        |        |      V     |
15+35    0.9297    1.16   |     Q        |        |        |      V     |
15+40    0.9371    1.07   |     Q        |        |        |      V     |
15+45    0.9442    1.04   |    Q         |        |        |      V     |
15+50    0.9513    1.03   |    Q         |        |        |       V    |
15+55    0.9583    1.02   |    Q         |        |        |       V    |
16+ 0    0.9653    1.01   |    Q         |        |        |       V    |
16+ 5    0.9707    0.79   |   Q          |        |        |       V    |
16+10    0.9740    0.48   |Q             |        |        |        V   |
16+15    0.9766    0.38   |Q             |        |        |        V   |
16+20    0.9789    0.33   |Q             |        |        |        V   |
16+25    0.9809    0.29   |Q             |        |        |        V   |
16+30    0.9827    0.26   |Q             |        |        |        V   |
16+35    0.9842    0.23   Q              |        |        |        V   |
16+40    0.9856    0.19   Q              |        |        |        V   |
16+45    0.9867    0.17   Q              |        |        |        V   |
16+50    0.9878    0.16   Q              |        |        |        V   |
16+55    0.9890    0.16   Q              |        |        |        V   |
17+ 0    0.9901    0.16   Q              |        |        |        V   |
17+ 5    0.9914    0.19   Q              |        |        |        V   |
17+10    0.9929    0.23   Q              |        |        |        V   |
17+15    0.9946    0.24   Q              |        |        |        V   |
17+20    0.9963    0.25   Q              |        |        |        V   |
17+25    0.9980    0.25   |Q             |        |        |        V   |
17+30    0.9997    0.25   |Q             |        |        |         V  |
17+35    1.0015    0.26   |Q             |        |        |         V  |
17+40    1.0033    0.26   |Q             |        |        |         V  |
17+45    1.0051    0.26   |Q             |        |        |         V  |
17+50    1.0068    0.25   Q              |        |        |         V  |
17+55    1.0084    0.23   Q              |        |        |         V  |
18+ 0    1.0099    0.22   Q              |        |        |         V  |
18+ 5    1.0114    0.22   Q              |        |        |         V  |
18+10    1.0129    0.21   Q              |        |        |         V  |
18+15    1.0143    0.21   Q              |        |        |         V  |
18+20    1.0158    0.21   Q              |        |        |         V  |
18+25    1.0172    0.21   Q              |        |        |         V  |
18+30    1.0187    0.21   Q              |        |        |         V  |
18+35    1.0200    0.19   Q              |        |        |         V  |
18+40    1.0212    0.17   Q              |        |        |         V  |
18+45    1.0224    0.17   Q              |        |        |         V  |
18+50    1.0234    0.15   Q              |        |        |         V  |
18+55    1.0243    0.13   Q              |        |        |         V  |
19+ 0    1.0251    0.12   Q              |        |        |         V  |
19+ 5    1.0260    0.13   Q              |        |        |         V  |
19+10    1.0270    0.15   Q              |        |        |          V |
19+15    1.0280    0.15   Q              |        |        |          V |
19+20    1.0292    0.17   Q              |        |        |          V |
19+25    1.0304    0.19   Q              |        |        |          V |
19+30    1.0318    0.19   Q              |        |        |          V |
19+35    1.0331    0.18   Q              |        |        |          V |
19+40    1.0342    0.17   Q              |        |        |          V |
19+45    1.0354    0.16   Q              |        |        |          V |
19+50    1.0364    0.15   Q              |        |        |          V |
19+55    1.0373    0.13   Q              |        |        |          V |
20+ 0    1.0381    0.12   Q              |        |        |          V |
20+ 5    1.0390    0.13   Q              |        |        |          V |
```

```
20+10      1.0400      0.15   Q        |          |          |           V |
20+15      1.0410      0.15   Q        |          |          |           V |
20+20      1.0420      0.15   Q        |          |          |           V |
20+25      1.0431      0.15   Q        |          |          |           V |
20+30      1.0441      0.15   Q        |          |          |           V |
20+35      1.0452      0.15   Q        |          |          |           V |
20+40      1.0463      0.16   Q        |          |          |           V |
20+45      1.0474      0.16   Q        |          |          |           V |
20+50      1.0483      0.14   Q        |          |          |           V |
20+55      1.0492      0.12   Q        |          |          |           V |
21+ 0      1.0500      0.12   Q        |          |          |           V |
21+ 5      1.0509      0.13   Q        |          |          |           V |
21+10      1.0518      0.14   Q        |          |          |           V |
21+15      1.0529      0.15   Q        |          |          |           V|
21+20      1.0538      0.14   Q        |          |          |            V|
21+25      1.0546      0.12   Q        |          |          |            V|
21+30      1.0554      0.11   Q        |          |          |            V|
21+35      1.0563      0.12   Q        |          |          |            V|
21+40      1.0572      0.14   Q        |          |          |            V|
21+45      1.0583      0.15   Q        |          |          |            V|
21+50      1.0592      0.14   Q        |          |          |            V|
21+55      1.0600      0.12   Q        |          |          |            V|
22+ 0      1.0608      0.11   Q        |          |          |            V|
22+ 5      1.0617      0.12   Q        |          |          |            V|
22+10      1.0627      0.14   Q        |          |          |            V|
22+15      1.0637      0.15   Q        |          |          |            V|
22+20      1.0646      0.14   Q        |          |          |            V|
22+25      1.0654      0.12   Q        |          |          |            V|
22+30      1.0662      0.11   Q        |          |          |            V|
22+35      1.0670      0.11   Q        |          |          |            V|
22+40      1.0677      0.11   Q        |          |          |            V|
22+45      1.0685      0.11   Q        |          |          |            V|
22+50      1.0692      0.11   Q        |          |          |            V|
22+55      1.0699      0.11   Q        |          |          |            V|
23+ 0      1.0706      0.10   Q        |          |          |            V|
23+ 5      1.0714      0.10   Q        |          |          |            V|
23+10      1.0721      0.10   Q        |          |          |            V|
23+15      1.0728      0.10   Q        |          |          |            V|
23+20      1.0735      0.10   Q        |          |          |            V|
23+25      1.0742      0.10   Q        |          |          |            V|
23+30      1.0750      0.10   Q        |          |          |            V|
23+35      1.0757      0.10   Q        |          |          |            V|
23+40      1.0764      0.10   Q        |          |          |            V|
23+45      1.0771      0.10   Q        |          |          |            V|
23+50      1.0779      0.10   Q        |          |          |            V|
23+55      1.0786      0.10   Q        |          |          |            V|
24+ 0      1.0793      0.10   Q        |          |          |            V|
24+ 5      1.0798      0.08   Q        |          |          |            V|
24+10      1.0801      0.04   Q        |          |          |            V|
24+15      1.0802      0.02   Q        |          |          |            V|
24+20      1.0803      0.02   Q        |          |          |            V|
24+25      1.0804      0.01   Q        |          |          |            V|
24+30      1.0804      0.01   Q        |          |          |            V|
24+35      1.0805      0.00   Q        |          |          |            V|
24+40      1.0805      0.00   Q        |          |          |             V
------------------------------------------------------------------------------
```

10-YEAR, 24-HOUR STORM EVENT

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

           Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2014, Version 9.0
                    Study date  02/16/23 File: ara2410.out


       +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
       ----------------------------------------------------------------------

       Riverside County Synthetic Unit Hydrology Method
       RCFC & WCD Manual date - April 1978


       Program License Serial Number 6279

       ----------------------------------------------------------------------
        English (in-lb) Input Units Used
        English Rainfall Data (Inches) Input Values Used

        English Units used in output format



       ----------------------------------------------------------------------
       302.01.21
       AREA A
       10 YR STORM
       POST PROJECT
       ----------------------------------------------------------------------
       Drainage Area =      12.23(Ac.)  =       0.019 Sq. Mi.
       Drainage Area for Depth-Area Areal Adjustment =      12.23(Ac.)  =       0.019
Sq. Mi.
       Length along longest watercourse =    1105.90(Ft.)
       Length along longest watercourse measured to centroid =     610.60(Ft.)
       Length along longest watercourse =      0.209 Mi.
       Length along longest watercourse measured to centroid =      0.116 Mi.
       Difference in elevation =       9.50(Ft.)
       Slope along watercourse =     45.3567 Ft./Mi.
       Average Manning's 'N' = 0.025
       Lag time =    0.071 Hr.
       Lag time =     4.24 Min.
       25% of lag time =      1.06 Min.
       40% of lag time =      1.70 Min.
       Unit time =     5.00 Min.
       Duration of storm = 24 Hour(s)
       User Entered Base Flow =     0.00(CFS)

       2 YEAR Area rainfall data:


       Area(Ac.)[1]        Rainfall(In)[2]        Weighting[1*2]
           12.23               2.79                    34.12


       100 YEAR Area rainfall data:


       Area(Ac.)[1]        Rainfall(In)[2]        Weighting[1*2]
           12.23               7.72                    94.42
```

```
      STORM EVENT (YEAR) =    10.00
      Area Averaged 2-Year Rainfall =    2.790(In)
      Area Averaged 100-Year Rainfall =    7.720(In)

      Point rain (area averaged) =    4.818(In)
      Areal adjustment factor =  100.00 %
      Adjusted average point rain =    4.818(In)

      Sub-Area Data:
      Area(Ac.)           Runoff Index   Impervious %
         12.230              33.60            0.350
       Total Area Entered =      12.23(Ac.)


      RI    RI    Infil. Rate Impervious   Adj. Infil. Rate  Area%      F
      AMC2 AMC-2    (In/Hr)     (Dec.%)        (In/Hr)       (Dec.)    (In/Hr)
      33.6 33.6     0.728       0.350          0.498         1.000     0.498
                                                            Sum (F) =   0.498
      Area averaged mean soil loss (F) (In/Hr) =   0.498
      Minimum soil loss rate ((In/Hr)) =   0.249
      (for 24 hour storm duration)
      Soil low loss rate (decimal) =    0.620
      ------------------------------------------------------------------------

              U n i t   H y d r o g r a p h
                 MOUNTAIN S-Curve
      ------------------------------------------------------------------------
              Unit Hydrograph Data
      ------------------------------------------------------------------------
      Unit time period    Time % of lag    Distribution    Unit Hydrograph
          (hrs)                             Graph %             (CFS)
      ------------------------------------------------------------------------
         1   0.083          117.878          27.331             3.369
         2   0.167          235.755          38.091             4.695
         3   0.250          353.633          12.913             1.592
         4   0.333          471.511           6.898             0.850
         5   0.417          589.388           4.601             0.567
         6   0.500          707.266           3.392             0.418
         7   0.583          825.144           2.550             0.314
         8   0.667          943.021           2.137             0.263
         9   0.750         1060.899           2.087             0.257
                                     Sum = 100.000    Sum=      12.326
      ------------------------------------------------------------------------


   The following loss rate calculations reflect use of the minimum calculated loss
   rate subtracted from the Storm Rain to produce the maximum Effective Rain value

   Unit Time    Pattern    Storm Rain     Loss rate(In./Hr)      Effective
       (Hr.)    Percent    (In/Hr)        Max   |  Low           (In/Hr)
    1    0.08     0.07       0.039       ( 0.884)     0.024        0.015
    2    0.17     0.07       0.039       ( 0.880)     0.024        0.015
    3    0.25     0.07       0.039       ( 0.877)     0.024        0.015
    4    0.33     0.10       0.058       ( 0.873)     0.036        0.022
    5    0.42     0.10       0.058       ( 0.870)     0.036        0.022
    6    0.50     0.10       0.058       ( 0.867)     0.036        0.022
    7    0.58     0.10       0.058       ( 0.863)     0.036        0.022
    8    0.67     0.10       0.058       ( 0.860)     0.036        0.022
    9    0.75     0.10       0.058       ( 0.856)     0.036        0.022
   10    0.83     0.13       0.077       ( 0.853)     0.048        0.029
```

11	0.92	0.13	0.077	(	0.850)	0.048	0.029
12	1.00	0.13	0.077	(	0.846)	0.048	0.029
13	1.08	0.10	0.058	(	0.843)	0.036	0.022
14	1.17	0.10	0.058	(	0.840)	0.036	0.022
15	1.25	0.10	0.058	(	0.836)	0.036	0.022
16	1.33	0.10	0.058	(	0.833)	0.036	0.022
17	1.42	0.10	0.058	(	0.830)	0.036	0.022
18	1.50	0.10	0.058	(	0.826)	0.036	0.022
19	1.58	0.10	0.058	(	0.823)	0.036	0.022
20	1.67	0.10	0.058	(	0.820)	0.036	0.022
21	1.75	0.10	0.058	(	0.816)	0.036	0.022
22	1.83	0.13	0.077	(	0.813)	0.048	0.029
23	1.92	0.13	0.077	(	0.810)	0.048	0.029
24	2.00	0.13	0.077	(	0.807)	0.048	0.029
25	2.08	0.13	0.077	(	0.803)	0.048	0.029
26	2.17	0.13	0.077	(	0.800)	0.048	0.029
27	2.25	0.13	0.077	(	0.797)	0.048	0.029
28	2.33	0.13	0.077	(	0.794)	0.048	0.029
29	2.42	0.13	0.077	(	0.790)	0.048	0.029
30	2.50	0.13	0.077	(	0.787)	0.048	0.029
31	2.58	0.17	0.096	(	0.784)	0.060	0.037
32	2.67	0.17	0.096	(	0.781)	0.060	0.037
33	2.75	0.17	0.096	(	0.778)	0.060	0.037
34	2.83	0.17	0.096	(	0.774)	0.060	0.037
35	2.92	0.17	0.096	(	0.771)	0.060	0.037
36	3.00	0.17	0.096	(	0.768)	0.060	0.037
37	3.08	0.17	0.096	(	0.765)	0.060	0.037
38	3.17	0.17	0.096	(	0.762)	0.060	0.037
39	3.25	0.17	0.096	(	0.758)	0.060	0.037
40	3.33	0.17	0.096	(	0.755)	0.060	0.037
41	3.42	0.17	0.096	(	0.752)	0.060	0.037
42	3.50	0.17	0.096	(	0.749)	0.060	0.037
43	3.58	0.17	0.096	(	0.746)	0.060	0.037
44	3.67	0.17	0.096	(	0.743)	0.060	0.037
45	3.75	0.17	0.096	(	0.740)	0.060	0.037
46	3.83	0.20	0.116	(	0.736)	0.072	0.044
47	3.92	0.20	0.116	(	0.733)	0.072	0.044
48	4.00	0.20	0.116	(	0.730)	0.072	0.044
49	4.08	0.20	0.116	(	0.727)	0.072	0.044
50	4.17	0.20	0.116	(	0.724)	0.072	0.044
51	4.25	0.20	0.116	(	0.721)	0.072	0.044
52	4.33	0.23	0.135	(	0.718)	0.084	0.051
53	4.42	0.23	0.135	(	0.715)	0.084	0.051
54	4.50	0.23	0.135	(	0.712)	0.084	0.051
55	4.58	0.23	0.135	(	0.709)	0.084	0.051
56	4.67	0.23	0.135	(	0.706)	0.084	0.051
57	4.75	0.23	0.135	(	0.703)	0.084	0.051
58	4.83	0.27	0.154	(	0.700)	0.096	0.059
59	4.92	0.27	0.154	(	0.697)	0.096	0.059
60	5.00	0.27	0.154	(	0.694)	0.096	0.059
61	5.08	0.20	0.116	(	0.691)	0.072	0.044
62	5.17	0.20	0.116	(	0.688)	0.072	0.044
63	5.25	0.20	0.116	(	0.685)	0.072	0.044
64	5.33	0.23	0.135	(	0.682)	0.084	0.051
65	5.42	0.23	0.135	(	0.679)	0.084	0.051
66	5.50	0.23	0.135	(	0.676)	0.084	0.051
67	5.58	0.27	0.154	(	0.673)	0.096	0.059
68	5.67	0.27	0.154	(	0.670)	0.096	0.059
69	5.75	0.27	0.154	(	0.667)	0.096	0.059
70	5.83	0.27	0.154	(	0.664)	0.096	0.059

71	5.92	0.27	0.154	(0.661)	0.096	0.059
72	6.00	0.27	0.154	(0.658)	0.096	0.059
73	6.08	0.30	0.173	(0.655)	0.108	0.066
74	6.17	0.30	0.173	(0.652)	0.108	0.066
75	6.25	0.30	0.173	(0.649)	0.108	0.066
76	6.33	0.30	0.173	(0.646)	0.108	0.066
77	6.42	0.30	0.173	(0.643)	0.108	0.066
78	6.50	0.30	0.173	(0.640)	0.108	0.066
79	6.58	0.33	0.193	(0.638)	0.119	0.073
80	6.67	0.33	0.193	(0.635)	0.119	0.073
81	6.75	0.33	0.193	(0.632)	0.119	0.073
82	6.83	0.33	0.193	(0.629)	0.119	0.073
83	6.92	0.33	0.193	(0.626)	0.119	0.073
84	7.00	0.33	0.193	(0.623)	0.119	0.073
85	7.08	0.33	0.193	(0.620)	0.119	0.073
86	7.17	0.33	0.193	(0.618)	0.119	0.073
87	7.25	0.33	0.193	(0.615)	0.119	0.073
88	7.33	0.37	0.212	(0.612)	0.131	0.081
89	7.42	0.37	0.212	(0.609)	0.131	0.081
90	7.50	0.37	0.212	(0.606)	0.131	0.081
91	7.58	0.40	0.231	(0.604)	0.143	0.088
92	7.67	0.40	0.231	(0.601)	0.143	0.088
93	7.75	0.40	0.231	(0.598)	0.143	0.088
94	7.83	0.43	0.251	(0.595)	0.155	0.095
95	7.92	0.43	0.251	(0.593)	0.155	0.095
96	8.00	0.43	0.251	(0.590)	0.155	0.095
97	8.08	0.50	0.289	(0.587)	0.179	0.110
98	8.17	0.50	0.289	(0.584)	0.179	0.110
99	8.25	0.50	0.289	(0.582)	0.179	0.110
100	8.33	0.50	0.289	(0.579)	0.179	0.110
101	8.42	0.50	0.289	(0.576)	0.179	0.110
102	8.50	0.50	0.289	(0.574)	0.179	0.110
103	8.58	0.53	0.308	(0.571)	0.191	0.117
104	8.67	0.53	0.308	(0.568)	0.191	0.117
105	8.75	0.53	0.308	(0.565)	0.191	0.117
106	8.83	0.57	0.328	(0.563)	0.203	0.125
107	8.92	0.57	0.328	(0.560)	0.203	0.125
108	9.00	0.57	0.328	(0.557)	0.203	0.125
109	9.08	0.63	0.366	(0.555)	0.227	0.139
110	9.17	0.63	0.366	(0.552)	0.227	0.139
111	9.25	0.63	0.366	(0.550)	0.227	0.139
112	9.33	0.67	0.385	(0.547)	0.239	0.146
113	9.42	0.67	0.385	(0.544)	0.239	0.146
114	9.50	0.67	0.385	(0.542)	0.239	0.146
115	9.58	0.70	0.405	(0.539)	0.251	0.154
116	9.67	0.70	0.405	(0.537)	0.251	0.154
117	9.75	0.70	0.405	(0.534)	0.251	0.154
118	9.83	0.73	0.424	(0.531)	0.263	0.161
119	9.92	0.73	0.424	(0.529)	0.263	0.161
120	10.00	0.73	0.424	(0.526)	0.263	0.161
121	10.08	0.50	0.289	(0.524)	0.179	0.110
122	10.17	0.50	0.289	(0.521)	0.179	0.110
123	10.25	0.50	0.289	(0.519)	0.179	0.110
124	10.33	0.50	0.289	(0.516)	0.179	0.110
125	10.42	0.50	0.289	(0.514)	0.179	0.110
126	10.50	0.50	0.289	(0.511)	0.179	0.110
127	10.58	0.67	0.385	(0.509)	0.239	0.146
128	10.67	0.67	0.385	(0.506)	0.239	0.146
129	10.75	0.67	0.385	(0.504)	0.239	0.146
130	10.83	0.67	0.385	(0.501)	0.239	0.146

131	10.92	0.67	0.385	(	0.499)	0.239	0.146
132	11.00	0.67	0.385	(	0.496)	0.239	0.146
133	11.08	0.63	0.366	(	0.494)	0.227	0.139
134	11.17	0.63	0.366	(	0.491)	0.227	0.139
135	11.25	0.63	0.366	(	0.489)	0.227	0.139
136	11.33	0.63	0.366	(	0.487)	0.227	0.139
137	11.42	0.63	0.366	(	0.484)	0.227	0.139
138	11.50	0.63	0.366	(	0.482)	0.227	0.139
139	11.58	0.57	0.328	(	0.479)	0.203	0.125
140	11.67	0.57	0.328	(	0.477)	0.203	0.125
141	11.75	0.57	0.328	(	0.475)	0.203	0.125
142	11.83	0.60	0.347	(	0.472)	0.215	0.132
143	11.92	0.60	0.347	(	0.470)	0.215	0.132
144	12.00	0.60	0.347	(	0.468)	0.215	0.132
145	12.08	0.83	0.482	(	0.465)	0.299	0.183
146	12.17	0.83	0.482	(	0.463)	0.299	0.183
147	12.25	0.83	0.482	(	0.461)	0.299	0.183
148	12.33	0.87	0.501	(	0.458)	0.311	0.190
149	12.42	0.87	0.501	(	0.456)	0.311	0.190
150	12.50	0.87	0.501	(	0.454)	0.311	0.190
151	12.58	0.93	0.540	(	0.451)	0.335	0.205
152	12.67	0.93	0.540	(	0.449)	0.335	0.205
153	12.75	0.93	0.540	(	0.447)	0.335	0.205
154	12.83	0.97	0.559	(	0.445)	0.347	0.212
155	12.92	0.97	0.559	(	0.442)	0.347	0.212
156	13.00	0.97	0.559	(	0.440)	0.347	0.212
157	13.08	1.13	0.655	(	0.438)	0.406	0.249
158	13.17	1.13	0.655	(	0.436)	0.406	0.249
159	13.25	1.13	0.655	(	0.433)	0.406	0.249
160	13.33	1.13	0.655	(	0.431)	0.406	0.249
161	13.42	1.13	0.655	(	0.429)	0.406	0.249
162	13.50	1.13	0.655	(	0.427)	0.406	0.249
163	13.58	0.77	0.443	(	0.425)	0.275	0.168
164	13.67	0.77	0.443	(	0.423)	0.275	0.168
165	13.75	0.77	0.443	(	0.420)	0.275	0.168
166	13.83	0.77	0.443	(	0.418)	0.275	0.168
167	13.92	0.77	0.443	(	0.416)	0.275	0.168
168	14.00	0.77	0.443	(	0.414)	0.275	0.168
169	14.08	0.90	0.520	(	0.412)	0.323	0.198
170	14.17	0.90	0.520	(	0.410)	0.323	0.198
171	14.25	0.90	0.520	(	0.408)	0.323	0.198
172	14.33	0.87	0.501	(	0.406)	0.311	0.190
173	14.42	0.87	0.501	(	0.404)	0.311	0.190
174	14.50	0.87	0.501	(	0.401)	0.311	0.190
175	14.58	0.87	0.501	(	0.399)	0.311	0.190
176	14.67	0.87	0.501	(	0.397)	0.311	0.190
177	14.75	0.87	0.501	(	0.395)	0.311	0.190
178	14.83	0.83	0.482	(	0.393)	0.299	0.183
179	14.92	0.83	0.482	(	0.391)	0.299	0.183
180	15.00	0.83	0.482	(	0.389)	0.299	0.183
181	15.08	0.80	0.463	(	0.387)	0.287	0.176
182	15.17	0.80	0.463	(	0.385)	0.287	0.176
183	15.25	0.80	0.463	(	0.383)	0.287	0.176
184	15.33	0.77	0.443	(	0.381)	0.275	0.168
185	15.42	0.77	0.443	(	0.379)	0.275	0.168
186	15.50	0.77	0.443	(	0.377)	0.275	0.168
187	15.58	0.63	0.366	(	0.376)	0.227	0.139
188	15.67	0.63	0.366	(	0.374)	0.227	0.139
189	15.75	0.63	0.366	(	0.372)	0.227	0.139
190	15.83	0.63	0.366	(	0.370)	0.227	0.139

191	15.92	0.63	0.366	(0.368)	0.227	0.139
192	16.00	0.63	0.366	(0.366)	0.227	0.139
193	16.08	0.13	0.077	(0.364)	0.048	0.029
194	16.17	0.13	0.077	(0.362)	0.048	0.029
195	16.25	0.13	0.077	(0.360)	0.048	0.029
196	16.33	0.13	0.077	(0.359)	0.048	0.029
197	16.42	0.13	0.077	(0.357)	0.048	0.029
198	16.50	0.13	0.077	(0.355)	0.048	0.029
199	16.58	0.10	0.058	(0.353)	0.036	0.022
200	16.67	0.10	0.058	(0.351)	0.036	0.022
201	16.75	0.10	0.058	(0.350)	0.036	0.022
202	16.83	0.10	0.058	(0.348)	0.036	0.022
203	16.92	0.10	0.058	(0.346)	0.036	0.022
204	17.00	0.10	0.058	(0.344)	0.036	0.022
205	17.08	0.17	0.096	(0.343)	0.060	0.037
206	17.17	0.17	0.096	(0.341)	0.060	0.037
207	17.25	0.17	0.096	(0.339)	0.060	0.037
208	17.33	0.17	0.096	(0.337)	0.060	0.037
209	17.42	0.17	0.096	(0.336)	0.060	0.037
210	17.50	0.17	0.096	(0.334)	0.060	0.037
211	17.58	0.17	0.096	(0.332)	0.060	0.037
212	17.67	0.17	0.096	(0.331)	0.060	0.037
213	17.75	0.17	0.096	(0.329)	0.060	0.037
214	17.83	0.13	0.077	(0.327)	0.048	0.029
215	17.92	0.13	0.077	(0.326)	0.048	0.029
216	18.00	0.13	0.077	(0.324)	0.048	0.029
217	18.08	0.13	0.077	(0.323)	0.048	0.029
218	18.17	0.13	0.077	(0.321)	0.048	0.029
219	18.25	0.13	0.077	(0.319)	0.048	0.029
220	18.33	0.13	0.077	(0.318)	0.048	0.029
221	18.42	0.13	0.077	(0.316)	0.048	0.029
222	18.50	0.13	0.077	(0.315)	0.048	0.029
223	18.58	0.10	0.058	(0.313)	0.036	0.022
224	18.67	0.10	0.058	(0.312)	0.036	0.022
225	18.75	0.10	0.058	(0.310)	0.036	0.022
226	18.83	0.07	0.039	(0.309)	0.024	0.015
227	18.92	0.07	0.039	(0.307)	0.024	0.015
228	19.00	0.07	0.039	(0.306)	0.024	0.015
229	19.08	0.10	0.058	(0.304)	0.036	0.022
230	19.17	0.10	0.058	(0.303)	0.036	0.022
231	19.25	0.10	0.058	(0.302)	0.036	0.022
232	19.33	0.13	0.077	(0.300)	0.048	0.029
233	19.42	0.13	0.077	(0.299)	0.048	0.029
234	19.50	0.13	0.077	(0.297)	0.048	0.029
235	19.58	0.10	0.058	(0.296)	0.036	0.022
236	19.67	0.10	0.058	(0.295)	0.036	0.022
237	19.75	0.10	0.058	(0.293)	0.036	0.022
238	19.83	0.07	0.039	(0.292)	0.024	0.015
239	19.92	0.07	0.039	(0.291)	0.024	0.015
240	20.00	0.07	0.039	(0.289)	0.024	0.015
241	20.08	0.10	0.058	(0.288)	0.036	0.022
242	20.17	0.10	0.058	(0.287)	0.036	0.022
243	20.25	0.10	0.058	(0.286)	0.036	0.022
244	20.33	0.10	0.058	(0.284)	0.036	0.022
245	20.42	0.10	0.058	(0.283)	0.036	0.022
246	20.50	0.10	0.058	(0.282)	0.036	0.022
247	20.58	0.10	0.058	(0.281)	0.036	0.022
248	20.67	0.10	0.058	(0.280)	0.036	0.022
249	20.75	0.10	0.058	(0.278)	0.036	0.022
250	20.83	0.07	0.039	(0.277)	0.024	0.015

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251   20.92      0.07        0.039       (   0.276)        0.024          0.015
252   21.00      0.07        0.039       (   0.275)        0.024          0.015
253   21.08      0.10        0.058       (   0.274)        0.036          0.022
254   21.17      0.10        0.058       (   0.273)        0.036          0.022
255   21.25      0.10        0.058       (   0.272)        0.036          0.022
256   21.33      0.07        0.039       (   0.271)        0.024          0.015
257   21.42      0.07        0.039       (   0.270)        0.024          0.015
258   21.50      0.07        0.039       (   0.269)        0.024          0.015
259   21.58      0.10        0.058       (   0.268)        0.036          0.022
260   21.67      0.10        0.058       (   0.267)        0.036          0.022
261   21.75      0.10        0.058       (   0.266)        0.036          0.022
262   21.83      0.07        0.039       (   0.265)        0.024          0.015
263   21.92      0.07        0.039       (   0.264)        0.024          0.015
264   22.00      0.07        0.039       (   0.263)        0.024          0.015
265   22.08      0.10        0.058       (   0.262)        0.036          0.022
266   22.17      0.10        0.058       (   0.261)        0.036          0.022
267   22.25      0.10        0.058       (   0.261)        0.036          0.022
268   22.33      0.07        0.039       (   0.260)        0.024          0.015
269   22.42      0.07        0.039       (   0.259)        0.024          0.015
270   22.50      0.07        0.039       (   0.258)        0.024          0.015
271   22.58      0.07        0.039       (   0.257)        0.024          0.015
272   22.67      0.07        0.039       (   0.257)        0.024          0.015
273   22.75      0.07        0.039       (   0.256)        0.024          0.015
274   22.83      0.07        0.039       (   0.255)        0.024          0.015
275   22.92      0.07        0.039       (   0.255)        0.024          0.015
276   23.00      0.07        0.039       (   0.254)        0.024          0.015
277   23.08      0.07        0.039       (   0.254)        0.024          0.015
278   23.17      0.07        0.039       (   0.253)        0.024          0.015
279   23.25      0.07        0.039       (   0.252)        0.024          0.015
280   23.33      0.07        0.039       (   0.252)        0.024          0.015
281   23.42      0.07        0.039       (   0.251)        0.024          0.015
282   23.50      0.07        0.039       (   0.251)        0.024          0.015
283   23.58      0.07        0.039       (   0.251)        0.024          0.015
284   23.67      0.07        0.039       (   0.250)        0.024          0.015
285   23.75      0.07        0.039       (   0.250)        0.024          0.015
286   23.83      0.07        0.039       (   0.250)        0.024          0.015
287   23.92      0.07        0.039       (   0.249)        0.024          0.015
288   24.00      0.07        0.039       (   0.249)        0.024          0.015
                (Loss Rate Not Used)
     Sum =      100.0                                    Sum =     22.0
      Flood volume = Effective rainfall      1.83(In)
       times area       12.2(Ac.)/[(In)/(Ft.)] =         1.9(Ac.Ft)
      Total soil loss =       2.99(In)
      Total soil loss =      3.044(Ac.Ft)
      Total rainfall =       4.82(In)
      Flood volume =         81282.1 Cubic Feet
      Total soil loss =       132618.2 Cubic Feet
      ----------------------------------------------------------------------
       Peak flow rate of this hydrograph =      3.040(CFS)
      ----------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                      24 - H O U R    S T O R M
                  R u n o f f    H y d r o g r a p h
      ----------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))


      ----------------------------------------------------------------------
   Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
      ----------------------------------------------------------------------
     0+ 5        0.0003       0.05  Q         |         |         |         |
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0+10     0.0012     0.12  Q          |        |        |        |
0+15     0.0021     0.14  Q          |        |        |        |
0+20     0.0034     0.18  Q          |        |        |        |
0+25     0.0049     0.22  Q          |        |        |        |
0+30     0.0065     0.24  Q          |        |        |        |
0+35     0.0083     0.25  Q          |        |        |        |
0+40     0.0100     0.26  VQ         |        |        |        |
0+45     0.0119     0.26  VQ         |        |        |        |
0+50     0.0139     0.29  VQ         |        |        |        |
0+55     0.0161     0.33  VQ         |        |        |        |
1+ 0     0.0185     0.34  VQ         |        |        |        |
1+ 5     0.0207     0.32  VQ         |        |        |        |
1+10     0.0227     0.29  VQ         |        |        |        |
1+15     0.0247     0.28  VQ         |        |        |        |
1+20     0.0266     0.28  VQ         |        |        |        |
1+25     0.0285     0.28  VQ         |        |        |        |
1+30     0.0304     0.28  VQ         |        |        |        |
1+35     0.0323     0.27  VQ         |        |        |        |
1+40     0.0342     0.27  VQ         |        |        |        |
1+45     0.0361     0.27  VQ         |        |        |        |
1+50     0.0381     0.30  VQ         |        |        |        |
1+55     0.0404     0.33  VQ         |        |        |        |
2+ 0     0.0427     0.34  VQ         |        |        |        |
2+ 5     0.0451     0.35  VQ         |        |        |        |
2+10     0.0476     0.35  |Q         |        |        |        |
2+15     0.0500     0.36  |Q         |        |        |        |
2+20     0.0525     0.36  |Q         |        |        |        |
2+25     0.0549     0.36  |Q         |        |        |        |
2+30     0.0574     0.36  |Q         |        |        |        |
2+35     0.0601     0.39  |Q         |        |        |        |
2+40     0.0630     0.42  |Q         |        |        |        |
2+45     0.0660     0.43  |Q         |        |        |        |
2+50     0.0690     0.44  |Q         |        |        |        |
2+55     0.0720     0.44  |Q         |        |        |        |
3+ 0     0.0751     0.45  |Q         |        |        |        |
3+ 5     0.0782     0.45  |Q         |        |        |        |
3+10     0.0813     0.45  |Q         |        |        |        |
3+15     0.0844     0.45  |Q         |        |        |        |
3+20     0.0875     0.45  |Q         |        |        |        |
3+25     0.0906     0.45  |Q         |        |        |        |
3+30     0.0937     0.45  |QV        |        |        |        |
3+35     0.0968     0.45  |QV        |        |        |        |
3+40     0.0999     0.45  |QV        |        |        |        |
3+45     0.1030     0.45  |QV        |        |        |        |
3+50     0.1063     0.48  |QV        |        |        |        |
3+55     0.1098     0.51  | Q        |        |        |        |
4+ 0     0.1134     0.52  | Q        |        |        |        |
4+ 5     0.1171     0.53  | Q        |        |        |        |
4+10     0.1207     0.53  | Q        |        |        |        |
4+15     0.1244     0.54  | Q        |        |        |        |
4+20     0.1283     0.56  | Q        |        |        |        |
4+25     0.1324     0.60  | Q        |        |        |        |
4+30     0.1366     0.61  | Q        |        |        |        |
4+35     0.1409     0.62  | QV       |        |        |        |
4+40     0.1452     0.62  | QV       |        |        |        |
4+45     0.1495     0.63  | QV       |        |        |        |
4+50     0.1540     0.65  | QV       |        |        |        |
4+55     0.1588     0.69  | QV       |        |        |        |
5+ 0     0.1636     0.70  | QV       |        |        |        |
5+ 5     0.1681     0.66  | QV       |        |        |        |
```

```
5+10      0.1722     0.60   | QV              |        |        |        |
5+15      0.1762     0.57   | QV              |        |        |        |
5+20      0.1803     0.59   | QV              |        |        |        |
5+25      0.1845     0.62   | QV              |        |        |        |
5+30      0.1888     0.62   | Q V             |        |        |        |
5+35      0.1933     0.65   | Q V             |        |        |        |
5+40      0.1980     0.69   | Q V             |        |        |        |
5+45      0.2028     0.70   | Q V             |        |        |        |
5+50      0.2077     0.71   | Q V             |        |        |        |
5+55      0.2126     0.71   | Q V             |        |        |        |
6+ 0      0.2175     0.72   | Q V             |        |        |        |
6+ 5      0.2226     0.74   | Q V             |        |        |        |
6+10      0.2280     0.78   |  QV             |        |        |        |
6+15      0.2335     0.79   |  Q V            |        |        |        |
6+20      0.2390     0.80   |  Q V            |        |        |        |
6+25      0.2445     0.80   |  Q V            |        |        |        |
6+30      0.2501     0.81   |  Q V            |        |        |        |
6+35      0.2558     0.83   |  Q V            |        |        |        |
6+40      0.2618     0.87   |  Q V            |        |        |        |
6+45      0.2679     0.88   |  Q V            |        |        |        |
6+50      0.2740     0.89   |  Q V            |        |        |        |
6+55      0.2802     0.89   |  Q  V           |        |        |        |
7+ 0      0.2863     0.90   |  Q  V           |        |        |        |
7+ 5      0.2925     0.90   |  Q  V           |        |        |        |
7+10      0.2987     0.90   |  Q  V           |        |        |        |
7+15      0.3050     0.90   |  Q  V           |        |        |        |
7+20      0.3114     0.93   |  Q  V           |        |        |        |
7+25      0.3180     0.96   |  Q  V           |        |        |        |
7+30      0.3247     0.97   |  Q  V           |        |        |        |
7+35      0.3316     1.00   |   Q  V          |        |        |        |
7+40      0.3388     1.04   |   Q  V          |        |        |        |
7+45      0.3461     1.06   |   Q  V          |        |        |        |
7+50      0.3536     1.09   |   Q  V          |        |        |        |
7+55      0.3614     1.13   |   Q  V          |        |        |        |
8+ 0      0.3693     1.15   |   Q  V          |        |        |        |
8+ 5      0.3776     1.21   |    Q   V        |        |        |        |
8+10      0.3864     1.28   |     Q   V       |        |        |        |
8+15      0.3955     1.31   |     Q   V       |        |        |        |
8+20      0.4046     1.32   |     Q   V       |        |        |        |
8+25      0.4138     1.33   |     Q   V       |        |        |        |
8+30      0.4230     1.34   |     Q    V|     |        |        |        |
8+35      0.4325     1.37   |     Q    V|     |        |        |        |
8+40      0.4422     1.41   |     Q    V|     |        |        |        |
8+45      0.4520     1.43   |     Q    V|     |        |        |        |
8+50      0.4620     1.46   |     Q    V|     |        |        |        |
8+55      0.4723     1.49   |      Q     V    |        |        |        |
9+ 0      0.4827     1.51   |       Q     V   |        |        |        |
9+ 5      0.4935     1.57   |       Q     V   |        |        |        |
9+10      0.5048     1.64   |       Q     V   |        |        |        |
9+15      0.5163     1.67   |        Q    |V   |        |        |        |
9+20      0.5281     1.71   |        Q    |V   |        |        |        |
9+25      0.5402     1.75   |         Q   |V   |        |        |        |
9+30      0.5524     1.77   |         Q   |V   |        |        |        |
9+35      0.5649     1.81   |         Q   | V  |        |        |        |
9+40      0.5776     1.85   |         Q   | V  |        |        |        |
9+45      0.5905     1.87   |         Q   | V  |        |        |        |
9+50      0.6036     1.90   |         Q   | V  |        |        |        |
9+55      0.6170     1.94   |         Q   |  V |        |        |        |
10+ 0     0.6305     1.96   |         Q   |   V|        |        |        |
10+ 5     0.6429     1.80   |          Q  |   V|        |        |        |
```

```
10+10   0.6537   1.56   |      Q        |   V       |           |           |
10+15   0.6639   1.49   |    Q          |   V       |           |           |
10+20   0.6738   1.44   |    Q          |   V       |           |           |
10+25   0.6836   1.42   |    Q          |   V       |           |           |
10+30   0.6932   1.40   |    Q          |   V       |           |           |
10+35   0.7036   1.50   |     Q         |      V    |           |           |
10+40   0.7150   1.66   |     Q         |      V    |           |           |
10+45   0.7268   1.71   |     Q         |       V   |           |           |
10+50   0.7388   1.74   |     Q         |       V   |           |           |
10+55   0.7509   1.76   |      Q        |        V  |           |           |
11+ 0   0.7631   1.78   |      Q        |        V  |           |           |
11+ 5   0.7753   1.76   |      Q        |        V  |           |           |
11+10   0.7872   1.74   |     Q         |        V  |           |           |
11+15   0.7992   1.74   |     Q         |         V |           |           |
11+20   0.8111   1.73   |     Q         |         V |           |           |
11+25   0.8230   1.73   |     Q         |         V |           |           |
11+30   0.8349   1.72   |     Q         |         V |           |           |
11+35   0.8464   1.67   |     Q         |          V|           |           |
11+40   0.8574   1.60   |     Q         |          V|           |           |
11+45   0.8682   1.57   |     Q         |          V|           |           |
11+50   0.8791   1.59   |     Q         |          V|           |           |
11+55   0.8903   1.61   |     Q         |           V|          |           |
12+ 0   0.9014   1.62   |     Q         |           V|          |           |
12+ 5   0.9137   1.79   |      Q        |           V|          |           |
12+10   0.9278   2.03   |       Q       |           V|          |           |
12+15   0.9423   2.11   |       Q       |            V|         |           |
12+20   0.9574   2.19   |       Q       |            V|         |           |
12+25   0.9729   2.25   |        Q|     |            V          |           |
12+30   0.9886   2.29   |        Q|     |             |V        |           |
12+35   1.0048   2.36   |        Q|     |             |V        |           |
12+40   1.0217   2.44   |        Q|     |             |V        |           |
12+45   1.0388   2.48   |        Q|     |             | V       |           |
12+50   1.0562   2.52   |         Q     |             | V       |           |
12+55   1.0738   2.57   |         Q     |             |  V      |           |
13+ 0   1.0917   2.59   |         Q     |             |  V      |           |
13+ 5   1.1104   2.72   |         Q     |             |  V      |           |
13+10   1.1304   2.90   |         |Q    |             |   V     |           |
13+15   1.1508   2.97   |         |Q    |             |   V     |           |
13+20   1.1715   3.00   |          Q    |             |    V    |           |
13+25   1.1923   3.02   |          Q    |             |    V    |           |
13+30   1.2132   3.04   |          Q    |             |     V   |           |
13+35   1.2324   2.78   |         |Q    |             |     V   |           |
13+40   1.2490   2.41   |         Q     |             |     V   |           |
13+45   1.2648   2.29   |         Q     |             |      V  |           |
13+50   1.2801   2.22   |        Q      |             |      V  |           |
13+55   1.2951   2.18   |        Q      |             |      V  |           |
14+ 0   1.3099   2.14   |        Q      |             |       V |           |
14+ 5   1.3251   2.22   |        Q      |             |       V |           |
14+10   1.3412   2.33   |         Q     |             |       V |           |
14+15   1.3575   2.36   |         Q     |             |        V|           |
14+20   1.3737   2.36   |         Q     |             |        V|           |
14+25   1.3899   2.34   |         Q     |             |        V|           |
14+30   1.4060   2.34   |         Q     |             |         V          |
14+35   1.4222   2.35   |         Q     |             |         V          |
14+40   1.4383   2.35   |         Q     |             |         V          |
14+45   1.4546   2.35   |         Q     |             |          |V         |
14+50   1.4706   2.33   |         Q     |             |          |V         |
14+55   1.4864   2.29   |         Q     |             |          |V         |
15+ 0   1.5020   2.28   |         Q|    |             |          |  V       |
15+ 5   1.5175   2.25   |         Q     |             |          |  V       |
```

```
15+10    1.5327    2.21   |            Q |           |           |  V          |
15+15    1.5478    2.19   |            Q |           |           |   V         |
15+20    1.5627    2.16   |            Q |           |           |   V         |
15+25    1.5773    2.12   |            Q |           |           |   V         |
15+30    1.5918    2.10   |            Q |           |           |    V        |
15+35    1.6055    2.00   |           Q  |           |           |    V        |
15+40    1.6183    1.85   |           Q  |           |           |    V        |
15+45    1.6307    1.80   |           Q  |           |           |    V        |
15+50    1.6429    1.77   |          Q   |           |           |     V       |
15+55    1.6550    1.75   |          Q   |           |           |     V       |
16+ 0    1.6670    1.74   |         Q    |           |           |     V       |
16+ 5    1.6763    1.36   |        Q     |           |           |     V       |
16+10    1.6821    0.84   |     Q        |           |           |      V      |
16+15    1.6866    0.65   |  Q           |           |           |      V      |
16+20    1.6905    0.56   |  Q           |           |           |      V      |
16+25    1.6939    0.50   |Q             |           |           |      V      |
16+30    1.6970    0.45   |Q             |           |           |      V      |
16+35    1.6997    0.39   |Q             |           |           |      V      |
16+40    1.7020    0.33   |Q             |           |           |      V      |
16+45    1.7040    0.29   |Q             |           |           |      V      |
16+50    1.7060    0.28   |Q             |           |           |      V      |
16+55    1.7079    0.28   |Q             |           |           |      V      |
17+ 0    1.7098    0.28   |Q             |           |           |      V      |
17+ 5    1.7120    0.32   |Q             |           |           |      V      |
17+10    1.7147    0.39   |Q             |           |           |      V      |
17+15    1.7176    0.41   |Q             |           |           |      V      |
17+20    1.7205    0.42   |Q             |           |           |      V      |
17+25    1.7235    0.43   |Q             |           |           |      V      |
17+30    1.7265    0.44   |Q             |           |           |       V     |
17+35    1.7296    0.44   |Q             |           |           |       V     |
17+40    1.7327    0.45   |Q             |           |           |       V     |
17+45    1.7358    0.45   |Q             |           |           |       V     |
17+50    1.7387    0.43   |Q             |           |           |       V     |
17+55    1.7414    0.39   |Q             |           |           |       V     |
18+ 0    1.7440    0.38   |Q             |           |           |       V     |
18+ 5    1.7466    0.37   |Q             |           |           |       V     |
18+10    1.7492    0.37   |Q             |           |           |       V     |
18+15    1.7517    0.37   |Q             |           |           |       V     |
18+20    1.7542    0.37   |Q             |           |           |       V     |
18+25    1.7567    0.36   |Q             |           |           |       V     |
18+30    1.7592    0.36   |Q             |           |           |       V     |
18+35    1.7615    0.34   |Q             |           |           |       V     |
18+40    1.7636    0.30   |Q             |           |           |       V     |
18+45    1.7656    0.29   |Q             |           |           |       V     |
18+50    1.7674    0.26   |Q             |           |           |       V     |
18+55    1.7689    0.22  Q               |           |           |       V     |
19+ 0    1.7703    0.21  Q               |           |           |       V     |
19+ 5    1.7719    0.22  Q               |           |           |       V     |
19+10    1.7736    0.25   |Q             |           |           |        V    |
19+15    1.7754    0.26   |Q             |           |           |        V    |
19+20    1.7773    0.29   |Q             |           |           |        V    |
19+25    1.7796    0.32   |Q             |           |           |        V    |
19+30    1.7819    0.34   |Q             |           |           |        V    |
19+35    1.7841    0.32   |Q             |           |           |        V    |
19+40    1.7861    0.29   |Q             |           |           |        V    |
19+45    1.7880    0.28   |Q             |           |           |        V    |
19+50    1.7898    0.26   |Q             |           |           |        V    |
19+55    1.7913    0.22  Q               |           |           |        V    |
20+ 0    1.7927    0.21  Q               |           |           |        V    |
20+ 5    1.7943    0.22  Q               |           |           |        V    |
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20+10     1.7960     0.25   |Q        |        |        |              V |
20+15     1.7978     0.26   |Q        |        |        |              V |
20+20     1.7996     0.26   |Q        |        |        |              V |
20+25     1.8014     0.26   |Q        |        |        |              V |
20+30     1.8032     0.26   |Q        |        |        |              V |
20+35     1.8050     0.27   |Q        |        |        |              V |
20+40     1.8069     0.27   |Q        |        |        |              V |
20+45     1.8088     0.27   |Q        |        |        |              V |
20+50     1.8104     0.25   Q         |        |        |              V |
20+55     1.8119     0.21   Q         |        |        |              V |
21+ 0     1.8133     0.20   Q         |        |        |              V |
21+ 5     1.8148     0.22   Q         |        |        |              V |
21+10     1.8165     0.25   Q         |        |        |              V |
21+15     1.8183     0.26   |Q        |        |        |              V |
21+20     1.8199     0.24   Q         |        |        |               V |
21+25     1.8213     0.20   Q         |        |        |               V |
21+30     1.8227     0.19   Q         |        |        |               V|
21+35     1.8241     0.21   Q         |        |        |               V |
21+40     1.8258     0.25   Q         |        |        |               V |
21+45     1.8276     0.26   |Q        |        |        |               V |
21+50     1.8292     0.24   Q         |        |        |               V |
21+55     1.8306     0.20   Q         |        |        |               V |
22+ 0     1.8320     0.19   Q         |        |        |               V |
22+ 5     1.8335     0.21   Q         |        |        |               V|
22+10     1.8352     0.25   Q         |        |        |               V |
22+15     1.8369     0.26   |Q        |        |        |               V |
22+20     1.8386     0.24   Q         |        |        |               V |
22+25     1.8400     0.20   Q         |        |        |               V |
22+30     1.8413     0.19   Q         |        |        |               V |
22+35     1.8426     0.19   Q         |        |        |               V |
22+40     1.8439     0.19   Q         |        |        |               V |
22+45     1.8452     0.19   Q         |        |        |               V |
22+50     1.8465     0.18   Q         |        |        |               V |
22+55     1.8477     0.18   Q         |        |        |               V|
23+ 0     1.8490     0.18   Q         |        |        |               V |
23+ 5     1.8502     0.18   Q         |        |        |               V |
23+10     1.8515     0.18   Q         |        |        |               V|
23+15     1.8527     0.18   Q         |        |        |               V |
23+20     1.8540     0.18   Q         |        |        |               V|
23+25     1.8552     0.18   Q         |        |        |               V|
23+30     1.8564     0.18   Q         |        |        |               V |
23+35     1.8577     0.18   Q         |        |        |               V|
23+40     1.8589     0.18   Q         |        |        |               V |
23+45     1.8602     0.18   Q         |        |        |               V |
23+50     1.8614     0.18   Q         |        |        |               V |
23+55     1.8627     0.18   Q         |        |        |               V |
24+ 0     1.8639     0.18   Q         |        |        |               V |
24+ 5     1.8648     0.13   Q         |        |        |               V |
24+10     1.8652     0.06   Q         |        |        |               V |
24+15     1.8655     0.04   Q         |        |        |               V |
24+20     1.8657     0.03   Q         |        |        |               V|
24+25     1.8658     0.02   Q         |        |        |               V |
24+30     1.8659     0.01   Q         |        |        |               V |
24+35     1.8660     0.01   Q         |        |        |               V |
24+40     1.8660     0.00   Q         |        |        |               V|
-------------------------------------------------------------------------
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APPENDIX D: Bᴀꜱɪɴ Vᴏʟᴜᴍᴇ Cᴀʟᴄᴜʟᴀᴛɪᴏɴꜱ

APPENDIX D.1:   Basin 1 Volume Calculations

THE RIDGE - BASIN 1 VOLUME CALCULATION

Contour Elevation	Contour Area (sf)	Contour Area (ac)	Average Area (ac)	Incremental Volume (ac-ft) (ac-ft)	Total Basin Volume (ac-ft)
4362.0	16304.60	0.374		0	RESERVED FOR WQ
			0.386		UP TO 4362.5
4362.5	17299.05	0.397			0
			0.409		
4363.0	18293.50	0.420		0.409	0.41
			0.444		
4364.0	20359.2	0.467		0.444	0.85
			0.492		
4365.0	22504.40	0.517		0.492	1.34
			0.542		
4366.0	24728.4	0.568		0.542	1.89
			0.594		
4367.0	27031.26	0.621		0.594	2.48
			0.647		
4367	29342.5	0.674		0.647	3.13

WATER QUALITY VOLUME FOR DMA 1, 2 & DMA 4=12,200, REQUIRES BOTTOM AREA OF 9,038 SF.
BASIN 2 BOTTOM AREA IS 16,304.6 BASED ON GRADING PLAN
MITIGATION VOLUME = 1.3 AC-FT. PONDS AT 4365.0 FT

APPENDIX E: **OFFSITE RATIONAL METHOD HYDROLOGY**

APPENDIX E.1:   O<small>FFSITE</small> R<small>ATIONAL</small> M<small>ETHOD</small> A<small>NALYSIS</small>, A<small>REAS</small> "A"

```
                  Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2001 Version 6.4
      Rational Hydrology Study        Date: 10/26/21  File:ARA100.out
-------------------------------------------------------------------------
302.01.21
100-YEAR RATIONAL METHOD FOR AREA A
OFFSITE AREA
FN: ARA100.RRV
-------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********


 English (in-lb) Units used in input data file


-------------------------------------------------------------------------
TRI-8 Builders - S/N   615
-------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =  100.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation =  0.720(In.)
100 year, 1 hour precipitation =  2.100(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity =  2.100(In/Hr)
Slope of intensity duration curve = 0.5500




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** INITIAL AREA EVALUATION ****
_____
Initial area flow distance =   974.000(Ft.)
Top (of initial area) elevation =  4636.000(Ft.)
Bottom (of initial area) elevation =  4511.000(Ft.)
Difference in elevation =   125.000(Ft.)
Slope =    0.12834  s(percent)=      12.83
TC = k(0.710)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   16.788 min.
Rainfall intensity =      4.231(In/Hr) for a   100.0 year storm
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.849
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  84.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =     11.855(CFS)
Total initial stream area =        3.300(Ac.)
Pervious area fraction = 1.000
```

```
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
_____
Top of natural channel elevation =   4511.000(Ft.)
End of natural channel elevation =   4423.000(Ft.)
Length of natural channel  =   623.000(Ft.)
Estimated mean flow rate at midpoint of channel =     21.733(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =  11.52(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
     Normal channel slope =  0.1413
Corrected/adjusted channel slope =  0.1413
Travel time =    0.90 min.     TC =   17.69  min.


 Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.848
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =   84.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      4.111(In/Hr) for a   100.0 year storm
Subarea runoff =     19.166(CFS) for       5.500(Ac.)
Total runoff =     31.020(CFS)      Total area =        8.800(Ac.)


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       103.000 to Point/Station       104.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
_____
Top of natural channel elevation =   4423.000(Ft.)
End of natural channel elevation =   4401.000(Ft.)
Length of natural channel  =   558.000(Ft.)
Estimated mean flow rate at midpoint of channel =     39.480(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   7.18(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
     Normal channel slope =  0.0394
Corrected/adjusted channel slope =  0.0394
Travel time =    1.29 min.     TC =   18.98  min.


 Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.779
```

```
Decimal fraction soil group A = 0.460
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.540
RI index for soil(AMC 2)  =   68.36
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      3.954(In/Hr) for a   100.0 year storm
Subarea runoff =     14.777(CFS) for       4.800(Ac.)
Total runoff =     45.797(CFS)     Total area =      13.600(Ac.)


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       104.000 to Point/Station       105.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
_____
Top of natural channel elevation =   4401.000(Ft.)
End of natural channel elevation =   4382.000(Ft.)
Length of natural channel  = 1137.000(Ft.)
Estimated mean flow rate at midpoint of channel =    107.253(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   6.27(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
     Normal channel slope =  0.0167
Corrected/adjusted channel slope =  0.0167
Travel time =    3.02 min.     TC =   22.01  min.


 Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.713
Decimal fraction soil group A = 0.760
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.240
RI index for soil(AMC 2)  =   58.16
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      3.646(In/Hr) for a   100.0 year storm
Subarea runoff =     94.814(CFS) for      36.500(Ac.)
Total runoff =    140.611(CFS)     Total area =      50.100(Ac.)


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       105.000 to Point/Station       106.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
_____
Top of natural channel elevation =   4382.000(Ft.)
End of natural channel elevation =   4380.000(Ft.)
Length of natural channel  =  491.000(Ft.)
Estimated mean flow rate at midpoint of channel =    164.327(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.52(Ft/s)
```

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
      Normal channel slope = 0.0041
Corrected/adjusted channel slope = 0.0041
Travel time =   2.32 min.   TC =   24.33 min.

 Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.649
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 50.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Rainfall intensity =   3.450(In/Hr) for   100.0 year storm
Subarea runoff =   37.846(CFS) for   16.900(Ac.)
Total runoff =   178.457(CFS)   Total area =   67.000(Ac.)

+++
Process from Point/Station   106.000 to Point/Station   109.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
_____
Top of natural channel elevation =   4380.000(Ft.)
End of natural channel elevation =   4378.500(Ft.)
Length of natural channel =   518.000(Ft.)
Estimated mean flow rate at midpoint of channel =   206.690(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.19(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
      Normal channel slope = 0.0029
Corrected/adjusted channel slope = 0.0029
Travel time =   2.71 min.   TC =   27.04 min.

 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.622
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 46.00
Pervious area fraction = 0.950; Impervious fraction = 0.050
Rainfall intensity =   3.255(In/Hr) for   100.0 year storm
Subarea runoff =   42.954(CFS) for   21.200(Ac.)
Total runoff =   221.411(CFS)   Total area =   88.200(Ac.)

+++
Process from Point/Station   106.000 to Point/Station   109.000
**** CONFLUENCE OF MAIN STREAMS ****
_____

The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =   88.200(Ac.)
Runoff from this stream =   221.411(CFS)
Time of concentration =   27.04 min.
Rainfall intensity =   3.255(In/Hr)
Program is now starting with Main Stream No. 2

+++
Process from Point/Station   107.000 to Point/Station   108.000
**** INITIAL AREA EVALUATION ****
_____
Initial area flow distance =   554.000(Ft.)
Top (of initial area) elevation = 4389.000(Ft.)
Bottom (of initial area) elevation = 4382.000(Ft.)
Difference in elevation =   7.000(Ft.)
Slope =   0.01264 s(percent)=   1.26
TC = k(0.710)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   21.298 min.
Rainfall intensity =   3.712(In/Hr) for a   100.0 year storm
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.662
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) =   50.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff =   5.899(CFS)
Total initial stream area =   2.400(Ac.)
Pervious area fraction = 1.000

+++
Process from Point/Station   108.000 to Point/Station   109.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
_____
Top of natural channel elevation =   4382.000(Ft.)
End of natural channel elevation =   4378.500(Ft.)
Length of natural channel =   724.000(Ft.)
Estimated mean flow rate at midpoint of channel =   10.201(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.75(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
     Normal channel slope = 0.0048
Corrected/adjusted channel slope = 0.0048
Travel time =   6.91 min.   TC =   28.21 min.

 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.618
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000

```
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  46.00
Pervious area fraction =  0.950; Impervious fraction =  0.050
Rainfall intensity =     3.181(In/Hr) for a   100.0 year storm
Subarea runoff =      6.880(CFS) for      3.500(Ac.)
Total runoff =     12.779(CFS)       Total area =       5.900(Ac.)


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      109.000
**** CONFLUENCE OF MAIN STREAMS ****
_____
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =       5.900(Ac.)
Runoff from this stream =     12.779(CFS)
Time of concentration =    28.21 min.
Rainfall intensity =     3.181(In/Hr)
Summary of stream data:

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


1      221.411     27.04                 3.255
2       12.779     28.21                 3.181
Largest stream flow has longer or shorter time of concentration
Qp =    221.411 + sum of
        Qa           Tb/Ta
        12.779 *    0.959 =     12.250
Qp =    233.660

Total of 2 main streams to confluence:
Flow rates before confluence point:
    221.411       12.779
Area of streams before confluence:
      88.200        5.900


Results of confluence:
Total flow rate =    233.660(CFS)
Time of concentration =    27.039 min.
Effective stream area after confluence  =     94.100(Ac.)
End of computations, total study area =          94.10 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.987
Area averaged RI index number =  56.2
```

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2001 Version 6.4
       Rational Hydrology Study   Date: 10/26/21 File:ARA10.out
----
302.01.21
10-YEAR RATIONAL METHOD FOR AREA A
OFFSITE AREA
FN: ARA10.RRV

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

 English (in-lb) Units used in input data file

TRI-8 Builders - S/N   615

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =   10.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation = 0.720(In.)
100 year, 1 hour precipitation = 2.100(In.)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 1.288(In/Hr)
Slope of intensity duration curve = 0.5500

+++
Process from Point/Station   101.000 to Point/Station   102.000
**** INITIAL AREA EVALUATION ****
_____
Initial area flow distance =   974.000(Ft.)
Top (of initial area) elevation = 4636.000(Ft.)
Bottom (of initial area) elevation = 4511.000(Ft.)
Difference in elevation =   125.000(Ft.)
Slope =   0.12834 s(percent)=   12.83
TC = k(0.710)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   16.788 min.
Rainfall intensity =   2.595(In/Hr) for a   10.0 year storm
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.820
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 84.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff =   7.019(CFS)
Total initial stream area =   3.300(Ac.)
Pervious area fraction = 1.000

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
_____
Top of natural channel elevation =   4511.000(Ft.)
End of natural channel elevation =   4423.000(Ft.)
Length of natural channel  =   623.000(Ft.)
Estimated mean flow rate at midpoint of channel =     12.868(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =  10.02(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
     Normal channel slope =  0.1413
Corrected/adjusted channel slope =  0.1413
Travel time =    1.04 min.     TC =   17.82  min.


 Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.817
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  84.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.510(In/Hr) for a    10.0 year storm
Subarea runoff =     11.285(CFS) for        5.500(Ac.)
Total runoff =     18.304(CFS)      Total area =        8.800(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
_____
Top of natural channel elevation =   4423.000(Ft.)
End of natural channel elevation =   4401.000(Ft.)
Length of natural channel  =   558.000(Ft.)
Estimated mean flow rate at midpoint of channel =     23.296(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   6.20(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
     Normal channel slope =  0.0394
Corrected/adjusted channel slope =  0.0394
Travel time =    1.50 min.     TC =   19.32  min.


 Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.716
```

```
Decimal fraction soil group A = 0.460
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.540
RI index for soil(AMC 2)  =  68.36
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =     2.401(In/Hr) for a    10.0 year storm
Subarea runoff =      8.253(CFS) for      4.800(Ac.)
Total runoff =     26.557(CFS)      Total area =      13.600(Ac.)


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
_____
Top of natural channel elevation =   4401.000(Ft.)
End of natural channel elevation =   4382.000(Ft.)
Length of natural channel  = 1137.000(Ft.)
Estimated mean flow rate at midpoint of channel =     62.193(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   5.33(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
     Normal channel slope =  0.0167
Corrected/adjusted channel slope =  0.0167
Travel time =    3.55 min.    TC =   22.88  min.


 Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.626
Decimal fraction soil group A = 0.760
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.240
RI index for soil(AMC 2)  =  58.16
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =     2.188(In/Hr) for a    10.0 year storm
Subarea runoff =     49.980(CFS) for     36.500(Ac.)
Total runoff =     76.537(CFS)      Total area =      50.100(Ac.)


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      106.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
_____
Top of natural channel elevation =   4382.000(Ft.)
End of natural channel elevation =   4380.000(Ft.)
Length of natural channel  =  491.000(Ft.)
Estimated mean flow rate at midpoint of channel =     89.446(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   2.93(Ft/s)
```

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
      Normal channel slope = 0.0041
Corrected/adjusted channel slope = 0.0041
Travel time =   2.79 min.   TC =   25.67 min.

 Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.546
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 50.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Rainfall intensity =   2.054(In/Hr) for a   10.0 year storm
Subarea runoff =   18.944(CFS) for   16.900(Ac.)
Total runoff =   95.481(CFS)   Total area =   67.000(Ac.)

++
Process from Point/Station   106.000 to Point/Station   109.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
_____
Top of natural channel elevation =   4380.000(Ft.)
End of natural channel elevation =   4378.500(Ft.)
Length of natural channel =   518.000(Ft.)
Estimated mean flow rate at midpoint of channel =   110.587(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   2.63(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
      Normal channel slope = 0.0029
Corrected/adjusted channel slope = 0.0029
Travel time =   3.28 min.   TC =   28.95 min.

 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.516
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 46.00
Pervious area fraction = 0.950; Impervious fraction = 0.050
Rainfall intensity =   1.923(In/Hr) for a   10.0 year storm
Subarea runoff =   21.044(CFS) for   21.200(Ac.)
Total runoff =   116.526(CFS)   Total area =   88.200(Ac.)

++
Process from Point/Station   106.000 to Point/Station   109.000
**** CONFLUENCE OF MAIN STREAMS ****
_____

The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =   88.200(Ac.)
Runoff from this stream =   116.526(CFS)
Time of concentration =   28.95 min.
Rainfall intensity =   1.923(In/Hr)
Program is now starting with Main Stream No. 2

++
Process from Point/Station   107.000 to Point/Station   108.000
**** INITIAL AREA EVALUATION ****
_____
Initial area flow distance =   554.000(Ft.)
Top (of initial area) elevation = 4389.000(Ft.)
Bottom (of initial area) elevation = 4382.000(Ft.)
Difference in elevation =   7.000(Ft.)
Slope =   0.01264 s(percent)=   1.26
TC = k(0.710)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   21.298 min.
Rainfall intensity =   2.276(In/Hr) for a   10.0 year storm
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.568
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) =   50.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff =   3.101(CFS)
Total initial stream area =   2.400(Ac.)
Pervious area fraction = 1.000

++
Process from Point/Station   108.000 to Point/Station   109.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
_____
Top of natural channel elevation =   4382.000(Ft.)
End of natural channel elevation =   4378.500(Ft.)
Length of natural channel =   724.000(Ft.)
Estimated mean flow rate at midpoint of channel =   5.361(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.49(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
     Normal channel slope = 0.0048
Corrected/adjusted channel slope = 0.0048
Travel time =   8.09 min.   TC =   29.39 min.

 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.515
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000

```
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)   =   46.00
Pervious area fraction =  0.950; Impervious fraction =  0.050
Rainfall intensity =      1.907(In/Hr) for a    10.0 year storm
Subarea runoff =       3.434(CFS) for       3.500(Ac.)
Total runoff =        6.535(CFS)        Total area =        5.900(Ac.)


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       108.000 to Point/Station       109.000
**** CONFLUENCE OF MAIN STREAMS ****
_____
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =        5.900(Ac.)
Runoff from this stream =       6.535(CFS)
Time of concentration =   29.39 min.
Rainfall intensity =      1.907(In/Hr)
Summary of stream data:

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


1      116.526      28.95                1.923
2        6.535      29.39                1.907
Largest stream flow has longer or shorter time of concentration
Qp =      116.526 + sum of
        Qa            Tb/Ta
         6.535 *     0.985 =      6.437
Qp =      122.963

Total of 2 main streams to confluence:
Flow rates before confluence point:
     116.526          6.535
Area of streams before confluence:
       88.200          5.900


Results of confluence:
Total flow rate =     122.963(CFS)
Time of concentration =     28.951 min.
Effective stream area after confluence  =      94.100(Ac.)
End of computations, total study area =           94.10 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.987
Area averaged RI index number =  56.2
```

APPENDIX F: OFFSITE CROSS SECTION CALCULATIONS

APPENDIX F.1:   CROSS SECTION A CALCULATION

Worksheet for SECTION A

Project Description

Friction Method   Manning Formula
Solve For   Discharge

Input Data

Channel Slope	0.02770	ft/ft
Normal Depth	0.40	ft

Section Definitions

Station (ft)	Elevation (ft)
0+00	4378.40
0+19	4378.00
0+35	4378.00
1+02	4378.00
1+36	4378.90
1+92	4379.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 4378.40)	(1+92, 4379.00)	0.035

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Discharge	138.74	ft³/s
Elevation Range	4378.00 to 4379.00 ft	
Flow Area	40.12	ft²
Wetted Perimeter	117.19	ft
Hydraulic Radius	0.34	ft
Top Width	117.18	ft
Normal Depth	0.40	ft

Worksheet for SECTION A

Results

Critical Depth	0.41	ft
Critical Slope	0.02530	ft/ft
Velocity	3.46	ft/s
Velocity Head	0.19	ft
Specific Energy	0.59	ft
Froude Number	1.04	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.40	ft
Critical Depth	0.41	ft
Channel Slope	0.02770	ft/ft
Critical Slope	0.02530	ft/ft

Messages

Notes

Water Surface Elevation is set
at Crown Line of Apple Canyon Road

Cross Section for SECTION A

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.02770	ft/ft
Normal Depth	0.40	ft
Discharge	138.74	ft³/s

Cross Section Image
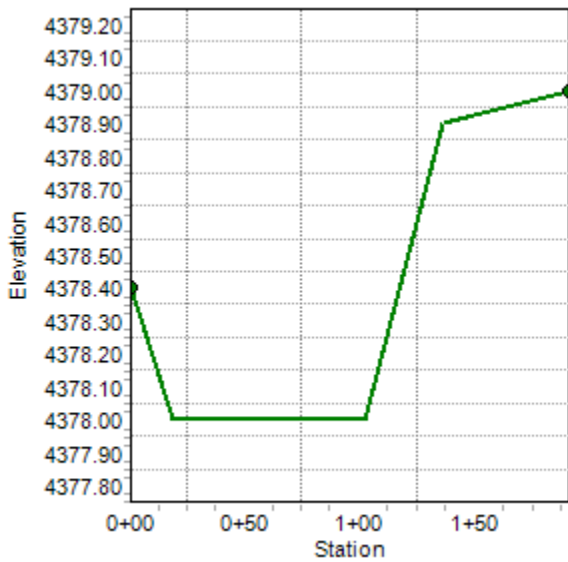
APPENDIX F.2:   C<small>ROSS</small> S<small>ECTION</small> B C<small>ALCULATION</small>

Worksheet for SECTION B

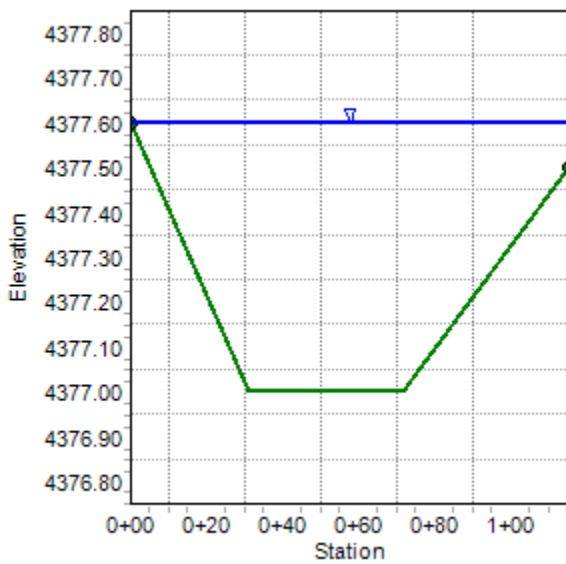## Project Description

Friction Method   Manning Formula
Solve For   Discharge

Input Data

Channel Slope   0.01000   ft/ft
Normal Depth   0.80   ft
Section Definitions

Station (ft)	Elevation (ft)
0+00	4377.80
0+19	4377.00
0+87	4377.00
1+13	4377.00
1+69	4379.00
1+82	4379.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 4377.80)	(1+82, 4379.50)	0.035

Options

Current Roughness Weighted
Method   Pavlovskii's Method
Open Channel Weighting Method Pavlovskii's Method
Closed Channel Weighting Method Pavlovskii's Method

Results

Discharge   299.08   ft³/s
Elevation Range   4377.00 to 4379.50 ft
Flow Area   91.42   ft²
Wetted Perimeter   135.16   ft
Hydraulic Radius   0.68   ft
Top Width   135.13   ft
Normal Depth   0.80   ft

Worksheet for SECTION B

Results

Critical Depth	0.64	ft
Critical Slope	0.02170	ft/ft
Velocity	3.27	ft/s
Velocity Head	0.17	ft
Specific Energy	0.97	ft
Froude Number	0.70	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.80	ft
Critical Depth	0.64	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.02170	ft/ft

Messages

Notes

Water Surface Elevation is set
at Crown Line of Apple Canyon Road

Cross Section for SECTION B

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.01000	ft/ft
Normal Depth	0.80	ft
Discharge	299.08	ft³/s

Cross Section Image
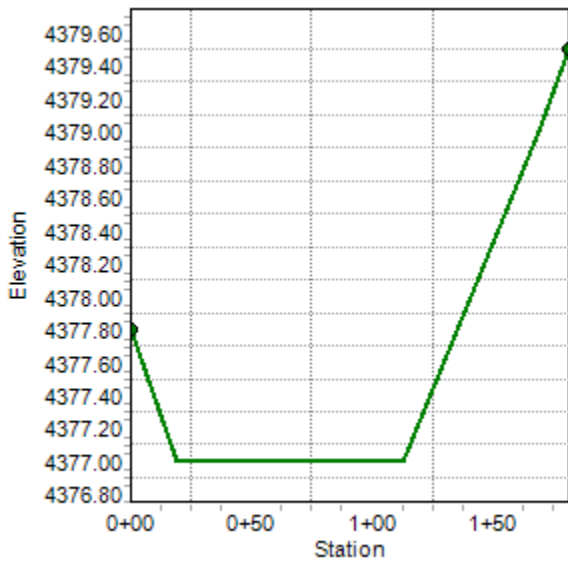
APPENDIX F.3: CROSS SECTION C CALCULATION

Worksheet for SECTION C

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.01380	ft/ft
Normal Depth	0.70	ft

Section Definitions

Station (ft)	Elevation (ft)
0+00	4377.70
0+51	4377.00
0+86	4377.00
1+17	4378.50
1+92	4379.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 4377.70)	(1+92, 4379.00)	0.035

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Discharge	143.06	ft³/s
Elevation Range	4377.00 to 4379.00 ft	
Flow Area	47.33	ft²
Wetted Perimeter	100.31	ft
Hydraulic Radius	0.47	ft
Top Width	100.29	ft
Normal Depth	0.70	ft
Critical Depth	0.61	ft

Worksheet for SECTION C

Results

Critical Slope	0.02381	ft/ft
Velocity	3.02	ft/s
Velocity Head	0.14	ft
Specific Energy	0.84	ft
Froude Number	0.78	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.70	ft
Critical Depth	0.61	ft
Channel Slope	0.01380	ft/ft
Critical Slope	0.02381	ft/ft

Messages

Notes

Water Surface Elevation is set
at Crown Line of Apple Canyon Road

Cross Section for SECTION C

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.01380	ft/ft
Normal Depth	0.70	ft
Discharge	143.06	ft³/s

Cross Section Image
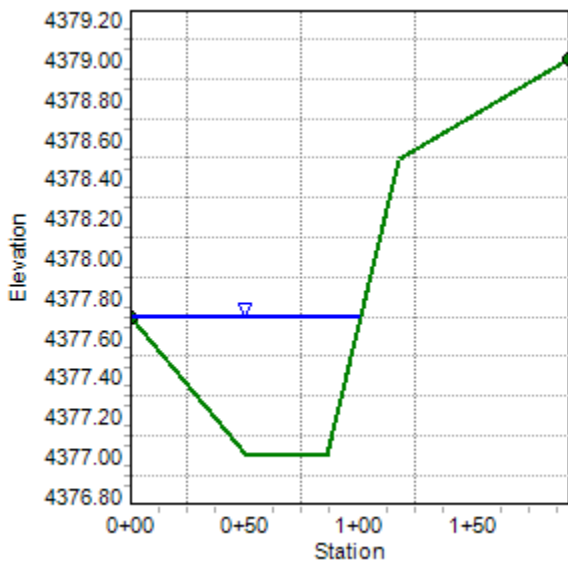
APPENDIX F.4:   C<small>ROSS</small> S<small>ECTION</small> D C<small>ALCULATION</small>

Worksheet for SECTION D

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.01380	ft/ft
Normal Depth	0.60	ft
Section Definitions		

Station (ft)	Elevation (ft)
0+00	4377.60
0+16	4377.00
0+77	4378.00
1+28	4378.00
1+97	4379.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 4377.60)	(1+97, 4379.00)	0.035

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Discharge	35.56	ft³/s
Elevation Range	4377.00 to 4379.00 ft	
Flow Area	15.92	ft²
Wetted Perimeter	53.07	ft
Hydraulic Radius	0.30	ft
Top Width	53.05	ft
Normal Depth	0.60	ft
Critical Depth	0.53	ft

Worksheet for SECTION D

Results

Critical Slope	0.02787	ft/ft
Velocity	2.23	ft/s
Velocity Head	0.08	ft
Specific Energy	0.68	ft
Froude Number	0.72	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.60	ft
Critical Depth	0.53	ft
Channel Slope	0.01380	ft/ft
Critical Slope	0.02787	ft/ft

Messages

Notes

Water Surface Elevation is set
at Crown Line of Apple Canyon Road

Bentley Systems, Inc. Haestad Methods Solution Center **Bentley FlowMaster V8i (SELECTseries 1) [08.11.01.03]**

11/17/2021 12:31:55 PM   **27 Siemons Company Drive Suite 200 W Watertown, CT 06795 USA +1-203-755-1666**   **Page   2 of   2**

Cross Section for SECTION D

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.01380	ft/ft
Normal Depth	0.60	ft
Discharge	35.56	ft³/s

Cross Section Image
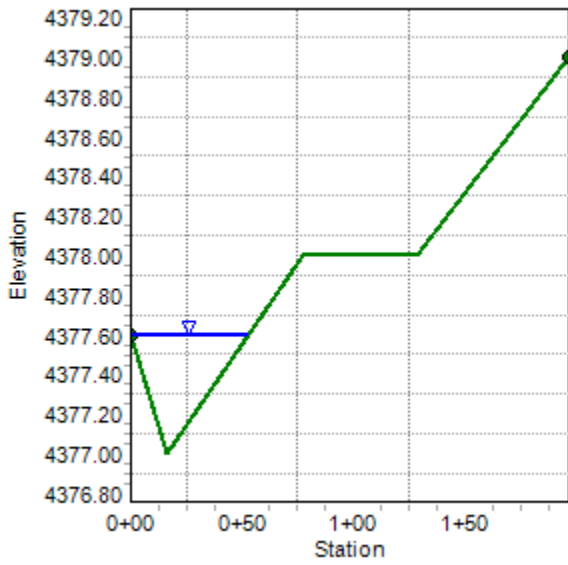
APPENDIX F.5:   C<small>ROSS</small> S<small>ECTION</small> E C<small>ALCULATION</small>

Worksheet for SECTION E

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.00400	ft/ft
Normal Depth	0.60	ft

Section Definitions

Station (ft)	Elevation (ft)
0+00	4377.60
0+31	4377.00
0+71	4377.00
1+15	4377.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 4377.60)	(1+15, 4377.50)	0.035

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Discharge	74.10	ft³/s
Elevation Range	4377.00 to 4377.60 ft	
Flow Area	48.88	ft²
Wetted Perimeter	115.19	ft
Hydraulic Radius	0.42	ft
Top Width	115.08	ft
Normal Depth	0.60	ft
Critical Depth	0.38	ft
Critical Slope	0.02760	ft/ft

Worksheet for SECTION E

Results

Velocity	1.52	ft/s
Velocity Head	0.04	ft
Specific Energy	0.64	ft
Froude Number	0.41	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.60	ft
Critical Depth	0.38	ft
Channel Slope	0.00400	ft/ft
Critical Slope	0.02760	ft/ft

Messages

Notes

Water Surface Elevation is set
at Crown Line of Apple Canyon Road

Cross Section for SECTION E

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.00400	ft/ft
Normal Depth	0.60	ft
Discharge	74.10	ft³/s

Cross Section Image

APPENDIX F.6: CROSS SECTION H CALCULATION

Worksheet for SECTION H

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.00400	ft/ft
Normal Depth	2.08	ft
Section Definitions		

Station (ft)	Elevation (ft)
0+00	4383.00
1+11	4382.00
1+84	4382.00
2+45	4381.00
3+83	4380.00
4+06	4381.00
5+21	4382.00
5+95	4383.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 4383.00)	(5+95, 4383.00)	0.035

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Discharge	873.24	ft³/s
Elevation Range	4380.00 to 4383.00 ft	
Flow Area	361.57	ft²
Wetted Perimeter	423.86	ft
Hydraulic Radius	0.85	ft

Worksheet for SECTION H

Results

Top Width	423.82	ft
Normal Depth	2.08	ft
Critical Depth	1.49	ft
Critical Slope	0.01983	ft/ft
Velocity	2.42	ft/s
Velocity Head	0.09	ft
Specific Energy	2.17	ft
Froude Number	0.46	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.08	ft
Critical Depth	1.49	ft
Channel Slope	0.00400	ft/ft
Critical Slope	0.01983	ft/ft

Messages

Notes

Water Surface Elevation is set
at Crown Line of Apple Canyon Road

Cross Section for SECTION H

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.00400	ft/ft
Normal Depth	2.08	ft
Discharge	873.24	ft³/s

Cross Section Image
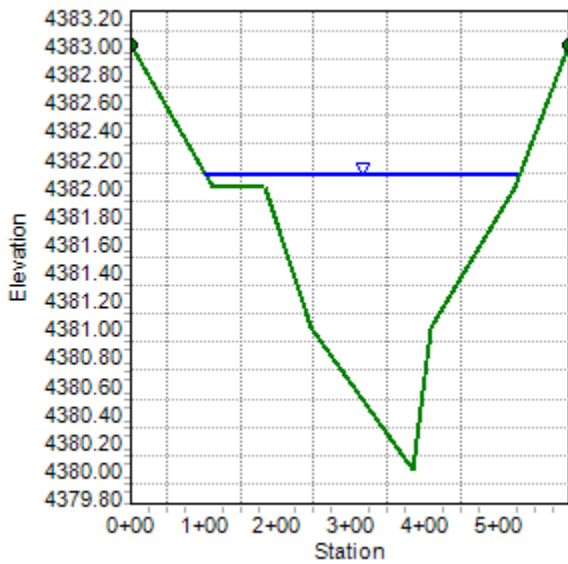
APPENDIX F.7: CROSS SECTION I CALCULATION

Worksheet for SECTION I

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.00370	ft/ft
Normal Depth	1.00	ft

Section Definitions

Station (ft)	Elevation (ft)
0+00	4381.00
1+62	4380.00
2+18	4380.00
2+86	4381.00
3+43	4382.00
4+53	4383.00
5+08	4383.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 4381.00)	(5+08, 4383.00)	0.035

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Discharge	314.03	ft³/s
Elevation Range	4380.00 to 4383.00 ft	
Flow Area	171.22	ft²
Wetted Perimeter	286.07	ft
Hydraulic Radius	0.60	ft
Top Width	286.06	ft

Results

Normal Depth	1.00	ft
Critical Depth	0.65	ft
Critical Slope	0.02392	ft/ft
Velocity	1.83	ft/s
Velocity Head	0.05	ft
Specific Energy	1.05	ft
Froude Number	0.42	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.00	ft
Critical Depth	0.65	ft
Channel Slope	0.00370	ft/ft
Critical Slope	0.02392	ft/ft

Messages

Notes

Water Surface Elevation is set
at Crown Line of Apple Canyon Road

Cross Section for SECTION I

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.00370	ft/ft
Normal Depth	1.00	ft
Discharge	314.03	ft³/s

Cross Section Image
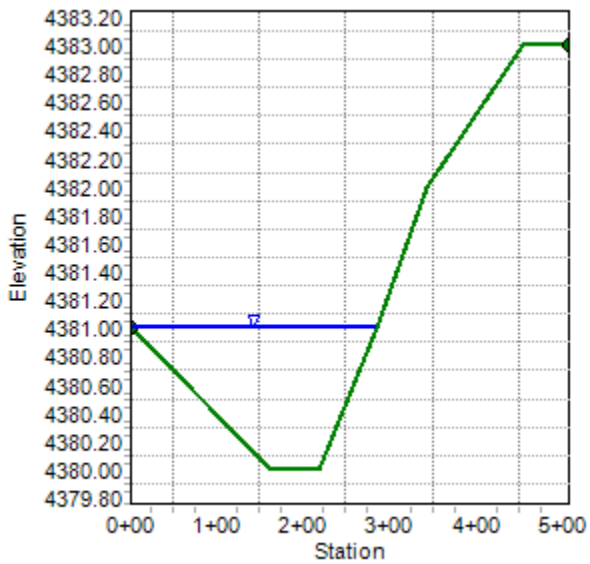
APPENDIX F.8: CROSS SECTION J CALCULATION

Worksheet for SECTION J

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.00600	ft/ft
Normal Depth	1.00	ft
Section Definitions		

Station (ft)	Elevation (ft)
0+00	4380.00
1+14	4379.00
1+35	4379.00
1+91	4380.00
3+34	4380.00
4+21	4381.00
4+61	4382.00
5+25	4382.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 4380.00)	(5+25, 4382.00)	0.035

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Discharge	235.27	ft³/s
Elevation Range	4379.00 to 4382.00 ft	
Flow Area	105.99	ft²
Wetted Perimeter	191.10	ft
Hydraulic Radius	0.55	ft

Worksheet for SECTION J

Results

Top Width	191.09	ft
Normal Depth	1.00	ft
Critical Depth	0.75	ft
Critical Slope	0.02370	ft/ft
Velocity	2.22	ft/s
Velocity Head	0.08	ft
Specific Energy	1.08	ft
Froude Number	0.53	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.00	ft
Critical Depth	0.75	ft
Channel Slope	0.00600	ft/ft
Critical Slope	0.02370	ft/ft

Messages

Notes

Water Surface Elevation is set
at Crown Line of Apple Canyon Road

Cross Section for SECTION J

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.00600	ft/ft
Normal Depth	1.00	ft
Discharge	235.27	ft³/s

Cross Section Image
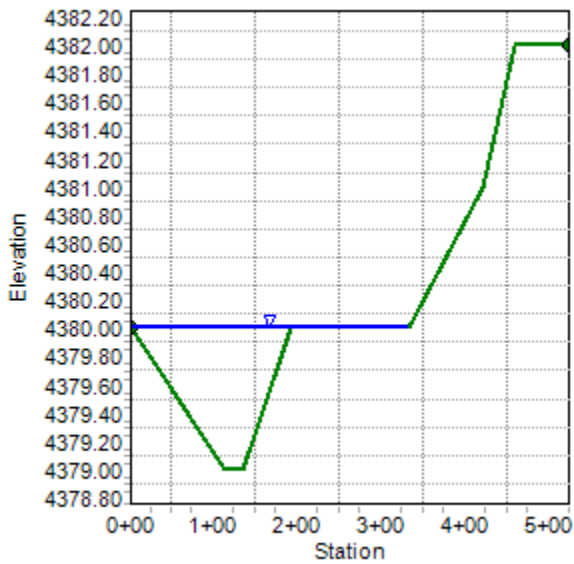
EXCERPTS

EXCERPT A: **WEBB & ASSOCIATES STUDY**

Technical Memorandum

To: Caroline Legrand – The Ridge

From: Joseph C. Caldwell, PE – Water Resources Practice Leader, Albert A. Webb Associates

Date: August 10th, 2020

Re: Preliminary Hydrology and Floodplain Analysis for The Ridge

Introduction

Albert A. Webb Associates (WEBB) has been contracted by The Ridge to provide a preliminary hydrology and hydraulics study for the Idyllwild Guest Ranch project. This technical memorandum highlights the methodology and results for a preliminary floodplain analysis and is intended to be utilized for due diligence and entitlement purposes.

The Idyllwild Guest Ranch project is the proposed guest ranch facility to be developed in Idyllwild, CA. The general site location can be seen in the attached Appendix A. The site is approximately 37 acres, borders Apple Canyon Road to the north and Highway 74 to the south. The parcel's potential floodplain is influenced by the adjacent creek, Hurkey Creek.

Hydrology

The existing 100-Year tributary flow rates were calculated utilizing RCFC&WCD's Synthetic Unit Hydrograph methodology. The associated watershed has been delineated and highlighted in Appendix B. The geometric parameters of the existing model are tabulated in Table 1. The hydrologic model was created with Civil Design v.8.1 and can be referenced in Appendix D.

Parameter	Value	Units
Drainage Area	7,115	ac
Length	37,171	ft
Length from centroid	18,322	ft
Elevation Delta ($\triangle$Z)	4,483	ft
Average Manning's Value	0.05	NA

Table 1 - Geometric Parameters

Rainfall data for the existing model was obtained from the NOAA 14 atlas and can be referenced in Appendix C. The peak runoffs from various storm events and durations are tabulated in Table 2.

Sub Area	100-Year 3 Hour		100-Year 6 Hour		100-Year 24 Hour	
	Q [cfs]	V [ac-ft]	Q [cfs]	V [ac-ft]	Q [cfs]	V [ac-ft]
Hurkey Creek Watershed	5,769	1,299	6,074	1,548	4,547	2,700

Table 2 – Hurkey Creek Unit Hydrograph Results

The 6-hour storm duration produces the largest peak flows and governs the existing hydraulic model.

Hydraulics

The existing hydraulic model for Hurkey Creek was modeled using HEC-RAS v 5.0.7. The conditions were modeled as a 2D finite volume mesh with an average Manning's value of 0.06. This Manning's value provides a conservatively high estimate for the existing floodplain. The 2D mesh was elevated utilizing aerial topography from the project site. The synthetic unit hydrograph from the 100-Year 6-Hour storm event was input at the upstream end of the model. The model was executed for a simulation period of 10 hours to allow the unit hydrograph to peak and recede across the model domain.

The existing Highway 74 bridge was not considered in the 2D model for several reasons; (a) the existing bridge does not have adequate capacity, (b) the 100-year flow is likely to top the Highway 74 road surface, (c) the conveyance associated with the Highway 74 bridge will not affect water surface elevations at the proposed development site. During final design, a more detailed analysis that includes the bridge should be prepared.

The results of the 2D model are documented in several exhibits, all found in Appendix E. The exhibits highlight the peak depth, velocities, and the 100-Year floodplain affecting the development site.

Conclusion

The proposed development is associated with a large offsite watershed that generates significant flows during a 100-Year storm event. Based on 2D RAS modeling, a portion of the parcel is expected to experience some light to moderate flooding. However, the existing flooding does not impact the locations where the proposed development is located.

Further analysis should be prepared as part of preliminary and final engineering.

Appendices

Appendix A – Project Location

Appendix B – Hurkey Creek Delineated Watershed

Appendix C – Hurkey Creek NOAA 14 Rainfall Data

Appendix D – Hurkey Creek Hydrology via Civil Design

Appendix E – 2D RAS Exhibits

APPENDIX A

Project Location

Project Location

HWY 74

APPLE CANYON RD

PROJECT LOCATION

HWY 74

Hurkey Creek Park

Hurkey Creek

Hemet Lake

Legend

— Parcel Boundary

→ Hurkey Creek

1,100 550 0 1,100 Feet

N

ALBERT A.
WEBB
ASSOCIATES
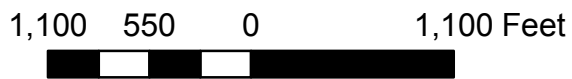
APPENDIX B

Hurkey Creek Delineated Watershed

Hurkey Creek Watershed

Z = 8608'

Total Flow Length = 37,171'

Area = 7,115 ac

Flow Length from Centroid = 18,322'

Project Location

Z = 4125'

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

╋ Centroid

▭ Drainage Area

━ Flow Length

1   0.5   0   1 Miles

N

ALBERT A.
WEBB
ASSOCIATES
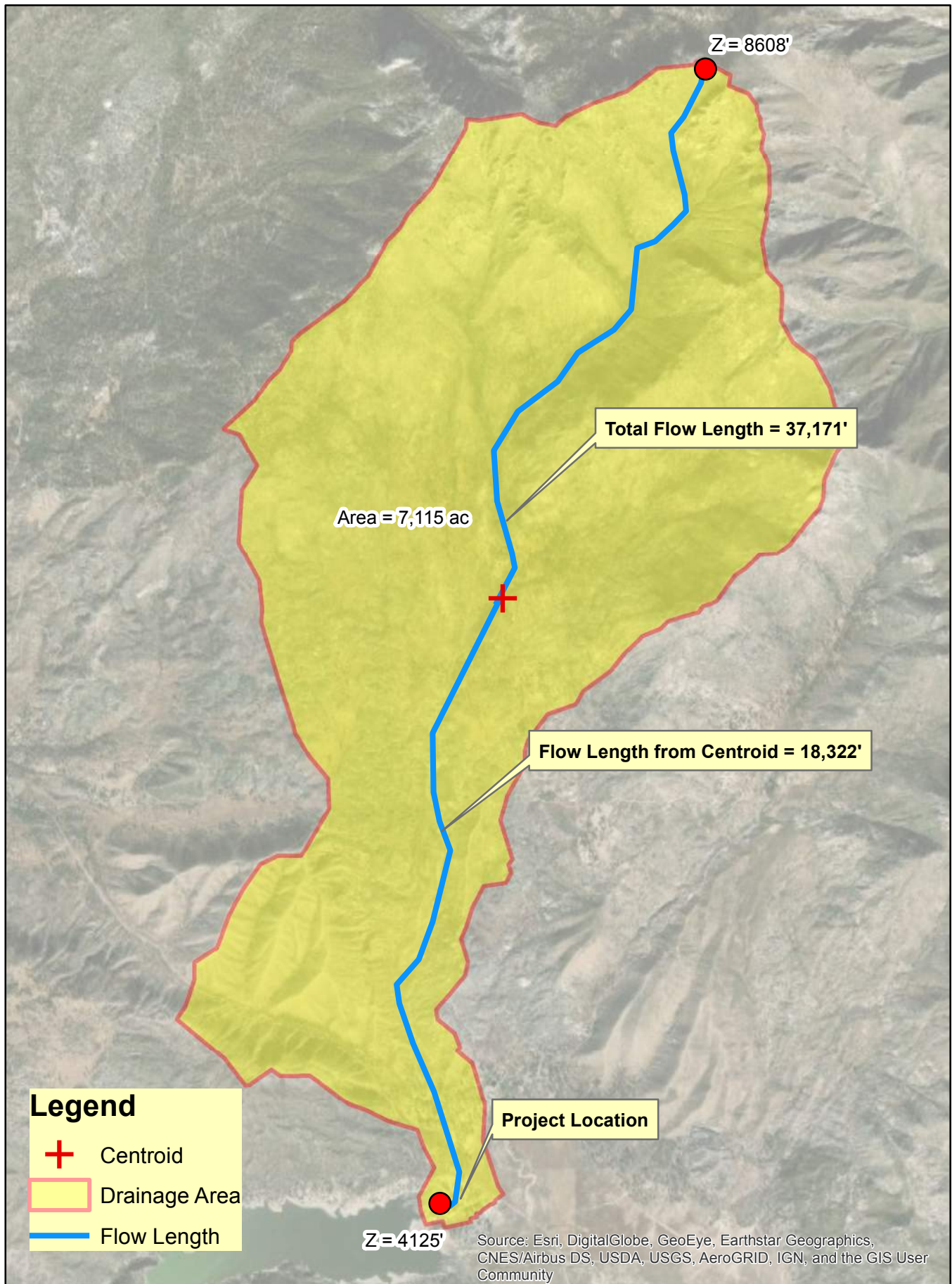
APPENDIX C

Hurkey Creek NOAA 14 Rainfall Data

NOAA Atlas 14, Volume 6, Version 2
Location name: Mountain Center, California, USA*
Latitude: 33.6753°, Longitude: -116.6793°
Elevation: 4373.1 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

Duration	PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]									
	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.163 (0.137-0.197)	0.212 (0.177-0.256)	0.282 (0.235-0.342)	0.344 (0.284-0.421)	0.437 (0.349-0.554)	0.516 (0.402-0.667)	0.602 (0.458-0.799)	0.698 (0.516-0.954)	0.841 (0.595-1.20)	0.963 (0.658-1.42)
10-min	0.234 (0.196-0.283)	0.304 (0.254-0.368)	0.404 (0.337-0.491)	0.494 (0.408-0.604)	0.627 (0.500-0.794)	0.739 (0.577-0.957)	0.863 (0.656-1.15)	1.00 (0.739-1.37)	1.21 (0.854-1.72)	1.38 (0.943-2.04)
15-min	0.283 (0.237-0.342)	0.368 (0.307-0.445)	0.489 (0.407-0.593)	0.597 (0.493-0.730)	0.758 (0.604-0.960)	0.894 (0.698-1.16)	1.04 (0.794-1.39)	1.21 (0.894-1.65)	1.46 (1.03-2.08)	1.67 (1.14-2.47)
30-min	0.412 (0.345-0.498)	0.535 (0.447-0.647)	0.712 (0.593-0.864)	0.869 (0.718-1.06)	1.10 (0.880-1.40)	1.30 (1.01-1.68)	1.52 (1.16-2.02)	1.76 (1.30-2.41)	2.12 (1.50-3.03)	2.43 (1.66-3.60)
60-min	0.556 (0.465-0.672)	0.722 (0.603-0.873)	0.961 (0.800-1.17)	1.17 (0.968-1.43)	1.49 (1.19-1.89)	1.76 (1.37-2.27)	2.05 (1.56-2.72)	2.38 (1.76-3.25)	2.86 (2.03-4.09)	3.28 (2.24-4.85)
2-hr	0.709 (0.593-0.856)	0.922 (0.770-1.12)	1.23 (1.02-1.49)	1.49 (1.23-1.82)	1.88 (1.50-2.38)	2.21 (1.72-2.86)	2.56 (1.95-3.40)	2.95 (2.18-4.04)	3.53 (2.50-5.03)	4.01 (2.74-5.93)
3-hr	0.818 (0.685-0.988)	1.07 (0.890-1.29)	1.41 (1.18-1.72)	1.72 (1.42-2.10)	2.16 (1.73-2.74)	2.53 (1.97-3.27)	2.93 (2.23-3.88)	3.36 (2.48-4.59)	3.99 (2.83-5.70)	4.52 (3.09-6.69)
6-hr	1.12 (0.937-1.35)	1.46 (1.22-1.77)	1.94 (1.62-2.35)	2.35 (1.94-2.88)	2.95 (2.35-3.73)	3.44 (2.68-4.45)	3.96 (3.02-5.26)	4.53 (3.35-6.20)	5.36 (3.79-7.65)	6.04 (4.13-8.94)
12-hr	1.52 (1.27-1.83)	1.98 (1.66-2.40)	2.64 (2.19-3.20)	3.20 (2.64-3.91)	4.01 (3.20-5.08)	4.67 (3.65-6.05)	5.39 (4.10-7.15)	6.16 (4.55-8.42)	7.28 (5.15-10.4)	8.21 (5.61-12.1)
24-hr	2.13 (1.88-2.46)	2.79 (2.47-3.22)	3.72 (3.28-4.31)	4.53 (3.96-5.28)	5.70 (4.83-6.87)	6.67 (5.54-8.21)	7.72 (6.26-9.72)	8.86 (6.99-11.5)	10.5 (7.98-14.2)	11.9 (8.73-16.6)
2-day	2.57 (2.27-2.97)	3.41 (3.02-3.94)	4.61 (4.06-5.33)	5.65 (4.94-6.59)	7.18 (6.08-8.65)	8.45 (7.01-10.4)	9.82 (7.97-12.4)	11.3 (8.95-14.7)	13.6 (10.3-18.2)	15.4 (11.3-21.4)
3-day	2.70 (2.39-3.11)	3.65 (3.22-4.22)	4.99 (4.40-5.78)	6.17 (5.39-7.20)	7.89 (6.68-9.50)	9.31 (7.73-11.4)	10.9 (8.80-13.7)	12.5 (9.90-16.2)	15.0 (11.4-20.2)	17.1 (12.5-23.8)
4-day	2.84 (2.51-3.28)	3.87 (3.42-4.47)	5.34 (4.71-6.18)	6.62 (5.79-7.73)	8.51 (7.21-10.3)	10.1 (8.37-12.4)	11.8 (9.55-14.8)	13.7 (10.8-17.7)	16.4 (12.4-22.1)	18.7 (13.7-26.0)
7-day	3.26 (2.88-3.76)	4.44 (3.92-5.13)	6.15 (5.42-7.12)	7.67 (6.70-8.95)	9.95 (8.42-12.0)	11.9 (9.86-14.6)	14.0 (11.4-17.6)	16.4 (12.9-21.2)	20.0 (15.1-26.9)	23.0 (16.9-32.0)
10-day	3.54 (3.13-4.08)	4.82 (4.25-5.56)	6.69 (5.89-7.74)	8.37 (7.32-9.77)	10.9 (9.24-13.2)	13.1 (10.9-16.1)	15.5 (12.6-19.5)	18.3 (14.4-23.6)	22.4 (17.0-30.2)	26.0 (19.1-36.1)
20-day	4.31 (3.81-4.97)	5.90 (5.21-6.81)	8.23 (7.25-9.53)	10.4 (9.05-12.1)	13.6 (11.5-16.4)	16.4 (13.6-20.2)	19.6 (15.9-24.6)	23.1 (18.3-29.9)	28.6 (21.7-38.5)	33.4 (24.5-46.5)
30-day	5.13 (4.53-5.91)	7.04 (6.22-8.13)	9.86 (8.69-11.4)	12.4 (10.8-14.5)	16.3 (13.8-19.6)	19.6 (16.3-24.1)	23.4 (19.0-29.4)	27.6 (21.8-35.7)	34.1 (25.9-45.9)	39.7 (29.1-55.2)
45-day	5.92 (5.23-6.83)	8.17 (7.22-9.44)	11.5 (10.1-13.3)	14.4 (12.6-16.8)	18.8 (15.9-22.6)	22.5 (18.7-27.7)	26.7 (21.6-33.6)	31.3 (24.7-40.5)	38.3 (29.1-51.6)	44.3 (32.5-61.7)
60-day	6.90 (6.10-7.96)	9.56 (8.45-11.0)	13.4 (11.8-15.5)	16.7 (14.6-19.5)	21.7 (18.4-26.1)	25.9 (21.5-31.8)	30.4 (24.7-38.3)	35.4 (28.0-45.8)	42.9 (32.5-57.7)	49.2 (36.1-68.4)

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

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

Please refer to NOAA Atlas 14 document for more information.

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APPENDIX D

Hurkey Creek Hydrology via Civil Design

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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        Riverside County Synthetic Unit Hydrology Method
        RCFC & WCD Manual date - April 1978

        Program License Serial Number 4010

         English (in-lb) Input Units Used
         English Rainfall Data (Inches) Input Values Used

         English Units used in output format

        Hurkey Creek Title Revision RNR Aug122020

        Drainage Area =   7115.00(Ac.) =   11.117 Sq. Mi.
        Drainage Area for Depth-Area Areal Adjustment =   7115.00(Ac.) =
11.117 Sq. Mi.
        Length along longest watercourse =   37172.00(Ft.)
        Length along longest watercourse measured to centroid =
18294.00(Ft.)
        Length along longest watercourse =   7.040 Mi.
        Length along longest watercourse measured to centroid =   3.465 Mi.
        Difference in elevation =   4483.00(Ft.)
        Slope along watercourse =   636.7761 Ft./Mi.
        Average Manning's 'N' = 0.050
        Lag time =   1.185 Hr.
        Lag time =   71.08 Min.
        25% of lag time =   17.77 Min.
        40% of lag time =   28.43 Min.
        Unit time =   15.00 Min.
        Duration of storm = 3 Hour(s)
        User Entered Base Flow =   0.00(CFS)

        2 YEAR Area rainfall data:

        Area(Ac.)[1]   Rainfall(In)[2]   Weighting[1*2]
            7115.00   1.87   13305.05

        100 YEAR Area rainfall data:

        Area(Ac.)[1]   Rainfall(In)[2]   Weighting[1*2]
            7115.00   3.21   22839.15

        STORM EVENT (YEAR) =   100.00
        Area Averaged 2-Year Rainfall =   1.870(In)
        Area Averaged 100-Year Rainfall =   3.210(In)

Page 1

```
Point rain (area averaged) =     3.210(In)
Areal adjustment factor =   96.93 %
Adjusted average point rain =     3.111(In)

Sub-Area Data:
Area(Ac.)          Runoff Index    Impervious %
  2134.000            45.00          0.000
  4981.000            83.00          0.200
 Total Area Entered =   7115.00(Ac.)


RI    RI    Infil. Rate Impervious   Adj. Infil. Rate  Area%        F
AMC2 AMC-2    (In/Hr)    (Dec.%)        (In/Hr)        (Dec.)     (In/Hr)
45.0  45.0    0.621      0.000          0.621          0.300       0.186
83.0  83.0    0.210      0.200          0.172          0.700       0.120
                                                   Sum (F) =    0.307
Area averaged mean soil loss (F) (In/Hr) =   0.307
Minimum soil loss rate ((In/Hr)) =  0.153
(for 24 hour storm duration)
Soil low loss rate (decimal) =   0.900
------------------------------------------------------------------------
                 U n i t   H y d r o g r a p h
                     MOUNTAIN S-Curve
------------------------------------------------------------------------
                 Unit Hydrograph Data
------------------------------------------------------------------------
Unit time period   Time % of lag   Distribution   Unit Hydrograph
    (hrs)                            Graph %            (CFS)
------------------------------------------------------------------------
   1    0.250         21.104          2.427           174.054
   2    0.500         42.207          7.119           510.448
   3    0.750         63.311         13.719           983.732
   4    1.000         84.415         14.964          1073.022
   5    1.250        105.519          9.772           700.718
   6    1.500        126.622          6.400           458.897
   7    1.750        147.726          4.806           344.586
   8    2.000        168.830          3.913           280.585
   9    2.250        189.933          3.255           233.380
  10    2.500        211.037          2.846           204.044
  11    2.750        232.141          2.552           182.960
  12    3.000        253.244          2.265           162.392
  13    3.250        274.348          1.978           141.837
  14    3.500        295.452          1.778           127.482
  15    3.750        316.556          1.610           115.479
  16    4.000        337.659          1.411           101.145
  17    4.250        358.763          1.265            90.721
  18    4.500        379.867          1.126            80.759
  19    4.750        400.970          1.097            78.673
  20    5.000        422.074          0.982            70.443
  21    5.250        443.178          0.886            63.557
  22    5.500        464.281          0.877            62.864
  23    5.750        485.385          0.846            60.689
  24    6.000        506.489          0.836            59.958
  25    6.250        527.593          0.716            51.327
  26    6.500        548.696          0.675            48.424
  27    6.750        569.800          0.657            47.092
  28    7.000        590.904          0.633            45.404
  29    7.250        612.007          0.619            44.418
  30    7.500        633.111          0.557            39.907
  31    7.750        654.215          0.548            39.284
  32    8.000        675.319          0.520            37.287
  33    8.250        696.422          0.506            36.318
  34    8.500        717.526          0.477            34.231
  35    8.750        738.630          0.423            30.352
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```
        36   9.000      759.733            0.418               29.943
        37   9.250      780.837            0.386               27.678
        38   9.500      801.941            0.380               27.239
        39   9.750      823.044            0.380               27.239
        40  10.000      844.148            0.380               27.239
        41  10.250      865.252            0.380               27.239
        42  10.500      886.356            0.380               27.239
        43  10.750      907.459            0.380               27.239
        44  11.000      928.563            0.380               27.239
        45  11.250      949.667            0.380               27.239
        46  11.500      970.770            0.380               27.239
        47  11.750      991.874            0.380               27.239
        48  12.000     1012.978            0.336               24.108
                                    Sum = 100.000    Sum=    7170.586
```

 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

```
 Unit Time    Pattern    Storm Rain     Loss rate(In./Hr)      Effective
      (Hr.)    Percent    (In/Hr)       Max    |   Low         (In/Hr)
   1   0.25     3.70       0.460        0.307  (  0.414)        0.154
   2   0.50     4.80       0.597        0.307  (  0.538)        0.291
   3   0.75     5.10       0.635        0.307  (  0.571)        0.328
   4   1.00     4.90       0.610        0.307  (  0.549)        0.303
   5   1.25     6.60       0.821        0.307  (  0.739)        0.515
   6   1.50     7.30       0.909        0.307  (  0.818)        0.602
   7   1.75     8.40       1.045        0.307  (  0.941)        0.739
   8   2.00     9.00       1.120        0.307  (  1.008)        0.813
   9   2.25    12.30       1.531        0.307  (  1.378)        1.224
  10   2.50    17.60       2.190        0.307  (  1.971)        1.884
  11   2.75    16.10       2.004        0.307  (  1.803)        1.697
  12   3.00     4.20       0.523        0.307  (  0.470)        0.216
                    (Loss Rate Not Used)
    Sum =      100.0                               Sum =      8.8
       Flood volume = Effective rainfall     2.19(In)
        times area    7115.0(Ac.)/[(In)/(Ft.)] =    1299.2(Ac.Ft)
       Total soil loss =       0.92(In)
       Total soil loss =    545.531(Ac.Ft)
       Total rainfall =       3.11(In)
       Flood volume =    56594475.5 Cubic Feet
       Total soil loss =   23763344.7 Cubic Feet
       ---------------------------------------------------------------
       Peak flow rate of this hydrograph =    5769.287(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  15   Minute intervals ((CFS))

            ---------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0     1450.0    2900.0    4350.0    5800.0
            ---------------------------------------------------------------
    0+15       0.5533      26.78  Q       |         |         |         |
    0+30       3.2219     129.16  Q       |         |         |         |
    0+45      10.5966     356.94  V Q     |         |         |         |
    1+ 0      24.4708     671.51  V     Q |         |         |         |
    1+15      44.8670     987.18   V       Q        |         |         |
    1+30      71.5730    1292.57   | V        Q     |         |         |
    1+45     106.3759    1684.46   |   V      |Q    |         |         |
    2+ 0     151.2174    2170.33   |     V    |    Q|         |         |
    2+15     207.6711    2732.36   |       V  |       Q |     |         |
```

Page 3

```
 2+30     280.0041   3500.92   |            V  |          |   Q      |          |
 2+45     374.1449   4556.41   |             V |        V |          |Q         |
 3+ 0     488.8097   5549.78   |             | V        |          |        Q |
 3+15     608.0099   5769.29   |             |    V     |          |        Q|
 3+30     707.5999   4820.16   |             |       V  |     Q    |          |
 3+45     779.4404   3477.08   |             |        V |   Q      |          |
 4+ 0     832.9980   2592.19   |          Q  |      V   |          |          |
 4+15     876.1986   2090.91   |        Q    |      V   |          |          |
 4+30     912.7195   1767.61   |       Q     |       V  |          |          |
 4+45     944.4297   1534.78   |     Q       |       V  |          |          |
 5+ 0     972.5204   1359.59   |    Q        |        V|          |          |
 5+15     997.5577   1211.80   |    Q        |         V|          |          |
 5+30    1019.8467   1078.79   |   Q         |          V|          |          |
 5+45    1039.8045    965.96   |   Q         |          | V        |          |
 6+ 0    1057.8327    872.56   |   Q         |          |  V       |          |
 6+15    1074.1278    788.69   |  Q          |          |   V      |          |
 6+30    1088.8751    713.77   | Q           |          |    V     |          |
 6+45    1102.3920    654.21   | Q           |          |    V     |          |
 7+ 0    1114.9750    609.02   | Q           |          |     V    |          |
 7+15    1126.7593    570.36   |  Q          |          |     V    |          |
 7+30    1137.7339    531.17   |  Q          |          |      V   |          |
 7+45    1148.1073    502.08   |  Q          |          |      V   |          |
 8+ 0    1158.0517    481.31   |  Q          |          |       V  |          |
 8+15    1167.5216    458.34   |  Q          |          |       V  |          |
 8+30    1176.4084    430.12   | Q           |          |        V |          |
 8+45    1184.6921    400.94   | Q           |          |        V |          |
 9+ 0    1192.5817    381.85   | Q           |          |        V |          |
 9+15    1200.1513    366.37   | Q           |          |        V |          |
 9+30    1207.3858    350.15   | Q           |          |         V|          |
 9+45    1214.2507    332.26   | Q           |          |         V|          |
10+ 0    1220.7602    315.06   | Q           |          |         V|          |
10+15    1226.9991    301.97   | Q           |          |         V|          |
10+30    1232.9704    289.01   |Q            |          |         V|          |
10+45    1238.6723    275.98   |Q            |          |          V|          |
11+ 0    1244.0906    262.24   |Q            |          |          V|          |
11+15    1249.2828    251.30   |Q            |          |          V|          |
11+30    1254.3440    244.96   |Q            |          |          V|          |
11+45    1259.3069    240.20   |Q            |          |          V|          |
12+ 0    1264.2342    238.48   |Q            |          |          V|          |
12+15    1269.0641    233.77   |Q            |          |          |V         |
12+30    1273.7280    225.73   |Q            |          |          |V         |
12+45    1278.2087    216.87   |Q            |          |          |V         |
13+ 0    1282.5051    207.94   |Q            |          |          |V         |
13+15    1286.5061    193.64   |Q            |          |          |V         |
13+30    1290.1593    176.81   |Q            |          |          |V         |
13+45    1293.3917    156.45   |Q            |          |          |V         |
14+ 0    1296.1395    133.00   Q             |          |          |V         |
14+15    1298.1554     97.57   Q             |          |          |V|
14+30    1299.1227     46.82   Q             |          |          |V|
14+45    1299.2304      5.21   Q             |          |          |V|
         --------------------------------------------------------------------
```

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

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Study date 08/12/20 File: hurkey6100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 4010

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

Hurkey Creek Title Revision RNR Aug122020

Drainage Area =   7115.00(Ac.) =   11.117 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =   7115.00(Ac.) =
11.117 Sq. Mi.
Length along longest watercourse =   37172.00(Ft.)
Length along longest watercourse measured to centroid =
18294.00(Ft.)
Length along longest watercourse =   7.040 Mi.
Length along longest watercourse measured to centroid =   3.465 Mi.
Difference in elevation =   4483.00(Ft.)
Slope along watercourse =   636.7761 Ft./Mi.
Average Manning's 'N' = 0.050
Lag time =   1.185 Hr.
Lag time =   71.08 Min.
25% of lag time =   17.77 Min.
40% of lag time =   28.43 Min.
Unit time =   15.00 Min.
Duration of storm = 6 Hour(s)
User Entered Base Flow =   0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]   Rainfall(In)[2]   Weighting[1*2]
     7115.00   2.65   18854.75

100 YEAR Area rainfall data:

Area(Ac.)[1]   Rainfall(In)[2]   Weighting[1*2]
     7115.00   4.51   32088.65

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall =   2.650(In)
Area Averaged 100-Year Rainfall =   4.510(In)

```
Point rain (area averaged) =     4.510(In)
Areal adjustment factor =   97.62 %
Adjusted average point rain =     4.402(In)

Sub-Area Data:
Area(Ac.)          Runoff Index    Impervious %
  2134.000             45.00          0.000
  4981.000             83.00          0.200
 Total Area Entered =   7115.00(Ac.)


RI    RI    Infil. Rate Impervious   Adj. Infil. Rate  Area%        F
AMC2 AMC-2     (In/Hr)    (Dec.%)       (In/Hr)        (Dec.)     (In/Hr)
45.0  45.0     0.621      0.000         0.621          0.300       0.186
83.0  83.0     0.210      0.200         0.172          0.700       0.120
                                                    Sum (F) =     0.307
Area averaged mean soil loss (F) (In/Hr) =   0.307
Minimum soil loss rate ((In/Hr)) =  0.153
(for 24 hour storm duration)
Soil low loss rate (decimal) =   0.900
------------------------------------------------------------------------
              U n i t   H y d r o g r a p h
                   MOUNTAIN S-Curve
------------------------------------------------------------------------
              Unit Hydrograph Data
------------------------------------------------------------------------
Unit time period   Time % of lag   Distribution   Unit Hydrograph
    (hrs)                          Graph %            (CFS)
------------------------------------------------------------------------
     1   0.250        21.104          2.427          174.054
     2   0.500        42.207          7.119          510.448
     3   0.750        63.311         13.719          983.732
     4   1.000        84.415         14.964         1073.022
     5   1.250       105.519          9.772          700.718
     6   1.500       126.622          6.400          458.897
     7   1.750       147.726          4.806          344.586
     8   2.000       168.830          3.913          280.585
     9   2.250       189.933          3.255          233.380
    10   2.500       211.037          2.846          204.044
    11   2.750       232.141          2.552          182.960
    12   3.000       253.244          2.265          162.392
    13   3.250       274.348          1.978          141.837
    14   3.500       295.452          1.778          127.482
    15   3.750       316.556          1.610          115.479
    16   4.000       337.659          1.411          101.145
    17   4.250       358.763          1.265           90.721
    18   4.500       379.867          1.126           80.759
    19   4.750       400.970          1.097           78.673
    20   5.000       422.074          0.982           70.443
    21   5.250       443.178          0.886           63.557
    22   5.500       464.281          0.877           62.864
    23   5.750       485.385          0.846           60.689
    24   6.000       506.489          0.836           59.958
    25   6.250       527.593          0.716           51.327
    26   6.500       548.696          0.675           48.424
    27   6.750       569.800          0.657           47.092
    28   7.000       590.904          0.633           45.404
    29   7.250       612.007          0.619           44.418
    30   7.500       633.111          0.557           39.907
    31   7.750       654.215          0.548           39.284
    32   8.000       675.319          0.520           37.287
    33   8.250       696.422          0.506           36.318
    34   8.500       717.526          0.477           34.231
    35   8.750       738.630          0.423           30.352
```

```
                          hurkey6100.out
        36    9.000      759.733          0.418              29.943
        37    9.250      780.837          0.386              27.678
        38    9.500      801.941          0.380              27.239
        39    9.750      823.044          0.380              27.239
        40   10.000      844.148          0.380              27.239
        41   10.250      865.252          0.380              27.239
        42   10.500      886.356          0.380              27.239
        43   10.750      907.459          0.380              27.239
        44   11.000      928.563          0.380              27.239
        45   11.250      949.667          0.380              27.239
        46   11.500      970.770          0.380              27.239
        47   11.750      991.874          0.380              27.239
        48   12.000     1012.978          0.336              24.108
                                     Sum = 100.000    Sum=    7170.586
--------------------------------------------------------------------------
```

 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

```
  Unit Time   Pattern    Storm Rain    Loss rate(In./Hr)    Effective
       (Hr.)   Percent   (In/Hr)       Max   |   Low        (In/Hr)
   1   0.25    1.70      0.299      (  0.307)      0.269        0.030
   2   0.50    1.90      0.335      (  0.307)      0.301        0.033
   3   0.75    2.10      0.370         0.307    (  0.333)       0.063
   4   1.00    2.20      0.387         0.307    (  0.349)       0.081
   5   1.25    2.40      0.423         0.307    (  0.380)       0.116
   6   1.50    2.40      0.423         0.307    (  0.380)       0.116
   7   1.75    2.40      0.423         0.307    (  0.380)       0.116
   8   2.00    2.50      0.440         0.307    (  0.396)       0.134
   9   2.25    2.60      0.458         0.307    (  0.412)       0.151
  10   2.50    2.70      0.475         0.307    (  0.428)       0.169
  11   2.75    2.80      0.493         0.307    (  0.444)       0.186
  12   3.00    3.00      0.528         0.307    (  0.475)       0.222
  13   3.25    3.20      0.564         0.307    (  0.507)       0.257
  14   3.50    3.60      0.634         0.307    (  0.571)       0.327
  15   3.75    4.30      0.757         0.307    (  0.682)       0.451
  16   4.00    4.70      0.828         0.307    (  0.745)       0.521
  17   4.25    5.40      0.951         0.307    (  0.856)       0.644
  18   4.50    6.20      1.092         0.307    (  0.983)       0.785
  19   4.75    6.90      1.215         0.307    (  1.094)       0.908
  20   5.00    7.50      1.321         0.307    (  1.189)       1.014
  21   5.25   10.60      1.867         0.307    (  1.680)       1.560
  22   5.50   14.50      2.553         0.307    (  2.298)       2.247
  23   5.75    3.40      0.599         0.307    (  0.539)       0.292
  24   6.00    1.00      0.176      (  0.307)      0.158        0.018
                    (Loss Rate Not Used)
     Sum =     100.0                          Sum =     10.4
        Flood volume = Effective rainfall      2.61(In)
         times area    7115.0(Ac.)/[(In)/(Ft.)] =    1547.5(Ac.Ft)
        Total soil loss =       1.79(In)
        Total soil loss =   1062.746(Ac.Ft)
        Total rainfall =       4.40(In)
        Flood volume =    67411263.3 Cubic Feet
        Total soil loss =    46293218.8 Cubic Feet
        -----------------------------------------------------------------
        Peak flow rate of this hydrograph =    6074.802(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  15   Minute intervals ((CFS))


                          Page 3
```

```
         -------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)   0       1525.0      3050.0      4575.0      6100.0
         -------------------------------------------------------------------
  0+15        0.1077       5.21   Q            |           |           |           |
  0+30        0.5440      21.12   Q            |           |           |           |
  0+45        1.7329      57.54   Q            |           |           |           |
  1+ 0        4.0338     111.36   Q            |           |           |           |
  1+15        7.7619     180.44   VQ           |           |           |           |
  1+30       13.2127     263.81   VQ           |           |           |           |
  1+45       20.4464     350.11   V Q          |           |           |           |
  2+ 0       29.2599     426.57   V Q          |           |           |           |
  2+15       39.3758     489.61    V Q         |           |           |           |
  2+30       50.8739     556.50    |V Q        |           |           |           |
  2+45       63.9939     635.01    |V   Q      |           |           |           |
  3+ 0       78.9585     724.29    |  V  Q     |           |           |           |
  3+15       96.0482     827.14    |  V    Q   |           |           |           |
  3+30      115.8214     957.02    |  V      Q |           |           |           |
  3+45      139.2884    1135.81    |    V       Q          |           |           |
  4+ 0      167.8321    1381.51    |      V        Q       |           |           |
  4+15      203.1467    1709.23    |        V    |Q         |           |           |
  4+30      246.6224    2104.22    |          V  |   Q      |           |           |
  4+45      299.5223    2560.36    |           V |      Q   |           |           |
  5+ 0      363.2250    3083.21    |            V|        Q |           |           |
  5+15      440.1092    3721.19    |             V        |   Q        |           |
  5+30      535.5293    4618.33    |             |    V     |     Q     |           |
  5+45      650.5010    5564.63    |             |       V  |           |   Q       |
  6+ 0      776.0135    6074.80    |             |           |    V     |        Q  |  Q
  6+15      886.7301    5358.69    |             |           | V        |     Q     |
  6+30      967.4464    3906.67    |             |           |      Q   |  V        |
  6+45     1027.2629    2895.12    |             |        Q  |       V  |           |
  7+ 0     1075.2753    2323.80    |             |      Q    |       V  |           |
  7+15     1115.8360    1963.14    |             |   Q       |        V |           |
  7+30     1150.9804    1700.99    |             |Q          |         V|           |
  7+45     1182.1203    1507.17    |          Q  |           |         V            |
  8+ 0     1209.9832    1348.56    |         Q   |           |          V           |
  8+15     1234.9042    1206.18    |        Q    |           |          |V          |
  8+30     1257.2254    1080.34    |        Q    |           |           | V         |
  8+45     1277.4279     977.80    |       Q     |           |           |  V        |
  9+ 0     1295.7806     888.27    |      Q      |           |           |   V       |
  9+15     1312.4433     806.47    |      Q      |           |           |   V       |
  9+30     1327.7336     740.05    |     Q       |           |           |    V      |
  9+45     1341.9135     686.31    |     Q       |           |           |    V      |
 10+ 0     1355.2743     646.66    |     Q       |           |           |     V     |
 10+15     1367.7167     602.21    |    Q        |           |           |     V     |
 10+30     1379.4292     566.88    |    Q        |           |           |      V    |
 10+45     1390.6514     543.16    |    Q        |           |           |      V    |
 11+ 0     1401.3608     518.33    |    Q        |           |           |       V   |
 11+15     1411.5109     491.26    |    Q        |           |           |       V   |
 11+30     1420.9540     457.05    |   Q         |           |           |       V   |
 11+45     1429.9543     435.61    |   Q         |           |           |        V  |
 12+ 0     1438.6031     418.61    |   Q         |           |           |        V  |
 12+15     1446.8886     401.02    |   Q         |           |           |         V |
 12+30     1454.7941     382.63    |   Q         |           |           |         V |
 12+45     1462.2527     361.00    |   Q         |           |           |         V |
 13+ 0     1469.3863     345.26    |   Q         |           |           |         V |
 13+15     1476.1671     328.19    |   Q         |           |           |          V|
 13+30     1482.6263     312.63    |   Q         |           |           |          V|
 13+45     1488.7323     295.53    |Q            |           |           |          V|
 14+ 0     1494.5000     279.15    |Q            |           |           |          V|
 14+15     1500.0559     268.91    |Q            |           |           |          V |
 14+30     1505.3925     258.29    |Q            |           |           |          V |
 14+45     1510.5876     251.44    |Q            |           |           |           V|
 15+ 0     1515.6521     245.12    |Q            |           |           |           V|
 15+15     1520.5673     237.90    |Q            |           |           |           V|
 15+30     1525.2903     228.59    |Q            |           |           |           V|
 15+45     1529.7550     216.09    |Q            |           |           |           V|
```

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16+ 0    1533.9184    201.51   |Q          |          |          |          V|
16+15    1537.7100    183.51   |Q          |          |          |          V|
16+30    1541.0514    161.73   |Q          |          |          |          V|
16+45    1543.8746    136.64   Q           |          |          |          V|
17+ 0    1546.0914    107.29   Q           |          |          |          V|
17+15    1547.3854     62.63   Q           |          |          |          V|
17+30    1547.5409      7.52   Q           |          |          |          V|
17+45    1547.5497      0.42   Q           |          |          |          V|
------------------------------------------------------------------------
```

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

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
Study date 08/12/20 File: hurkey24100.out

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    Riverside County Synthetic Unit Hydrology Method
    RCFC & WCD Manual date - April 1978

    Program License Serial Number 4010

     English (in-lb) Input Units Used
     English Rainfall Data (Inches) Input Values Used

     English Units used in output format

    Hurkey Creek Title Revision RNR Aug122020

    Drainage Area =   7115.00(Ac.) =   11.117 Sq. Mi.
    Drainage Area for Depth-Area Areal Adjustment =   7115.00(Ac.) =
11.117 Sq. Mi.
    Length along longest watercourse =   37172.00(Ft.)
    Length along longest watercourse measured to centroid =
18294.00(Ft.)
    Length along longest watercourse =   7.040 Mi.
    Length along longest watercourse measured to centroid =   3.465 Mi.
    Difference in elevation =   4483.00(Ft.)
    Slope along watercourse =   636.7761 Ft./Mi.
    Average Manning's 'N' = 0.050
    Lag time =   1.185 Hr.
    Lag time =   71.08 Min.
    25% of lag time =   17.77 Min.
    40% of lag time =   28.43 Min.
    Unit time =   15.00 Min.
    Duration of storm = 24 Hour(s)
    User Entered Base Flow =   0.00(CFS)

    2 YEAR Area rainfall data:

    Area(Ac.)[1]   Rainfall(In)[2]   Weighting[1*2]
       7115.00   5.63   40057.45

    100 YEAR Area rainfall data:

    Area(Ac.)[1]   Rainfall(In)[2]   Weighting[1*2]
       7115.00   9.51   67663.65

    STORM EVENT (YEAR) = 100.00
    Area Averaged 2-Year Rainfall =   5.630(In)
    Area Averaged 100-Year Rainfall =   9.510(In)

                              Page 1

```
Point rain (area averaged) =     9.510(In)
Areal adjustment factor =   98.63 %
Adjusted average point rain =     9.380(In)

Sub-Area Data:
Area(Ac.)          Runoff Index    Impervious %
  2134.000            45.00          0.000
  4981.000            83.00          0.200
 Total Area Entered =   7115.00(Ac.)


RI    RI    Infil. Rate Impervious   Adj. Infil. Rate  Area%       F
AMC2 AMC-2    (In/Hr)    (Dec.%)        (In/Hr)       (Dec.)    (In/Hr)
45.0  45.0    0.621      0.000          0.621         0.300      0.186
83.0  83.0    0.210      0.200          0.172         0.700      0.120
                                                   Sum (F) =    0.307
Area averaged mean soil loss (F) (In/Hr) =   0.307
Minimum soil loss rate ((In/Hr)) =  0.153
(for 24 hour storm duration)
Soil low loss rate (decimal) =   0.900
-----------------------------------------------------------------------
               U n i t   H y d r o g r a p h
                    MOUNTAIN S-Curve
-----------------------------------------------------------------------
                 Unit Hydrograph Data
-----------------------------------------------------------------------
Unit time period   Time % of lag   Distribution   Unit Hydrograph
    (hrs)                          Graph %           (CFS)
-----------------------------------------------------------------------
   1   0.250         21.104          2.427           174.054
   2   0.500         42.207          7.119           510.448
   3   0.750         63.311         13.719           983.732
   4   1.000         84.415         14.964          1073.022
   5   1.250        105.519          9.772           700.718
   6   1.500        126.622          6.400           458.897
   7   1.750        147.726          4.806           344.586
   8   2.000        168.830          3.913           280.585
   9   2.250        189.933          3.255           233.380
  10   2.500        211.037          2.846           204.044
  11   2.750        232.141          2.552           182.960
  12   3.000        253.244          2.265           162.392
  13   3.250        274.348          1.978           141.837
  14   3.500        295.452          1.778           127.482
  15   3.750        316.556          1.610           115.479
  16   4.000        337.659          1.411           101.145
  17   4.250        358.763          1.265            90.721
  18   4.500        379.867          1.126            80.759
  19   4.750        400.970          1.097            78.673
  20   5.000        422.074          0.982            70.443
  21   5.250        443.178          0.886            63.557
  22   5.500        464.281          0.877            62.864
  23   5.750        485.385          0.846            60.689
  24   6.000        506.489          0.836            59.958
  25   6.250        527.593          0.716            51.327
  26   6.500        548.696          0.675            48.424
  27   6.750        569.800          0.657            47.092
  28   7.000        590.904          0.633            45.404
  29   7.250        612.007          0.619            44.418
  30   7.500        633.111          0.557            39.907
  31   7.750        654.215          0.548            39.284
  32   8.000        675.319          0.520            37.287
  33   8.250        696.422          0.506            36.318
  34   8.500        717.526          0.477            34.231
  35   8.750        738.630          0.423            30.352
```

```
        36   9.000      759.733         0.418              29.943
        37   9.250      780.837         0.386              27.678
        38   9.500      801.941         0.380              27.239
        39   9.750      823.044         0.380              27.239
        40  10.000      844.148         0.380              27.239
        41  10.250      865.252         0.380              27.239
        42  10.500      886.356         0.380              27.239
        43  10.750      907.459         0.380              27.239
        44  11.000      928.563         0.380              27.239
        45  11.250      949.667         0.380              27.239
        46  11.500      970.770         0.380              27.239
        47  11.750      991.874         0.380              27.239
        48  12.000     1012.978         0.336              24.108
                                   Sum = 100.000   Sum=    7170.586
---------------------------------------------------------------------
```

 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Loss rate(In./Hr) Low	Effective (In/Hr)
1	0.25	0.20	0.075	(0.542)	0.068	0.008
2	0.50	0.30	0.113	(0.535)	0.101	0.011
3	0.75	0.30	0.113	(0.529)	0.101	0.011
4	1.00	0.40	0.150	(0.523)	0.135	0.015
5	1.25	0.30	0.113	(0.517)	0.101	0.011
6	1.50	0.30	0.113	(0.511)	0.101	0.011
7	1.75	0.30	0.113	(0.504)	0.101	0.011
8	2.00	0.40	0.150	(0.498)	0.135	0.015
9	2.25	0.40	0.150	(0.492)	0.135	0.015
10	2.50	0.40	0.150	(0.486)	0.135	0.015
11	2.75	0.50	0.188	(0.480)	0.169	0.019
12	3.00	0.50	0.188	(0.475)	0.169	0.019
13	3.25	0.50	0.188	(0.469)	0.169	0.019
14	3.50	0.50	0.188	(0.463)	0.169	0.019
15	3.75	0.50	0.188	(0.457)	0.169	0.019
16	4.00	0.60	0.225	(0.451)	0.203	0.023
17	4.25	0.60	0.225	(0.446)	0.203	0.023
18	4.50	0.70	0.263	(0.440)	0.236	0.026
19	4.75	0.70	0.263	(0.434)	0.236	0.026
20	5.00	0.80	0.300	(0.429)	0.270	0.030
21	5.25	0.60	0.225	(0.423)	0.203	0.023
22	5.50	0.70	0.263	(0.418)	0.236	0.026
23	5.75	0.80	0.300	(0.412)	0.270	0.030
24	6.00	0.80	0.300	(0.407)	0.270	0.030
25	6.25	0.90	0.338	(0.401)	0.304	0.034
26	6.50	0.90	0.338	(0.396)	0.304	0.034
27	6.75	1.00	0.375	(0.391)	0.338	0.038
28	7.00	1.00	0.375	(0.385)	0.338	0.038
29	7.25	1.00	0.375	(0.380)	0.338	0.038
30	7.50	1.10	0.413	(0.375)	0.371	0.041
31	7.75	1.20	0.450	0.370	(0.405)	0.080
32	8.00	1.30	0.488	0.365	(0.439)	0.123
33	8.25	1.50	0.563	0.360	(0.507)	0.203
34	8.50	1.50	0.563	0.355	(0.507)	0.208
35	8.75	1.60	0.600	0.350	(0.540)	0.251
36	9.00	1.70	0.638	0.345	(0.574)	0.293
37	9.25	1.90	0.713	0.340	(0.642)	0.373
38	9.50	2.00	0.750	0.335	(0.675)	0.415
39	9.75	2.10	0.788	0.330	(0.709)	0.458
40	10.00	2.20	0.825	0.325	(0.743)	0.500
41	10.25	1.50	0.563	0.321	(0.507)	0.242
42	10.50	1.50	0.563	0.316	(0.507)	0.247

Page 3

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43  10.75    2.00    0.750            0.311   (  0.675)            0.439
44  11.00    2.00    0.750            0.307   (  0.675)            0.443
45  11.25    1.90    0.713            0.302   (  0.642)            0.410
46  11.50    1.90    0.713            0.298   (  0.642)            0.415
47  11.75    1.70    0.638            0.294   (  0.574)            0.344
48  12.00    1.80    0.675            0.289   (  0.608)            0.386
49  12.25    2.50    0.938            0.285   (  0.844)            0.653
50  12.50    2.60    0.976            0.281   (  0.878)            0.695
51  12.75    2.80    1.051            0.276   (  0.946)            0.774
52  13.00    2.90    1.088            0.272   (  0.979)            0.816
53  13.25    3.40    1.276            0.268   (  1.148)            1.008
54  13.50    3.40    1.276            0.264   (  1.148)            1.012
55  13.75    2.30    0.863            0.260   (  0.777)            0.603
56  14.00    2.30    0.863            0.256   (  0.777)            0.607
57  14.25    2.70    1.013            0.252   (  0.912)            0.761
58  14.50    2.60    0.976            0.248   (  0.878)            0.727
59  14.75    2.60    0.976            0.245   (  0.878)            0.731
60  15.00    2.50    0.938            0.241   (  0.844)            0.697
61  15.25    2.40    0.900            0.237   (  0.810)            0.663
62  15.50    2.30    0.863            0.233   (  0.777)            0.629
63  15.75    1.90    0.713            0.230   (  0.642)            0.483
64  16.00    1.90    0.713            0.226   (  0.642)            0.486
65  16.25    0.40    0.150   (  0.223)            0.135            0.015
66  16.50    0.40    0.150   (  0.220)            0.135            0.015
67  16.75    0.30    0.113   (  0.216)            0.101            0.011
68  17.00    0.30    0.113   (  0.213)            0.101            0.011
69  17.25    0.50    0.188   (  0.210)            0.169            0.019
70  17.50    0.50    0.188   (  0.207)            0.169            0.019
71  17.75    0.50    0.188   (  0.203)            0.169            0.019
72  18.00    0.40    0.150   (  0.200)            0.135            0.015
73  18.25    0.40    0.150   (  0.198)            0.135            0.015
74  18.50    0.40    0.150   (  0.195)            0.135            0.015
75  18.75    0.30    0.113   (  0.192)            0.101            0.011
76  19.00    0.20    0.075   (  0.189)            0.068            0.008
77  19.25    0.30    0.113   (  0.186)            0.101            0.011
78  19.50    0.40    0.150   (  0.184)            0.135            0.015
79  19.75    0.30    0.113   (  0.181)            0.101            0.011
80  20.00    0.20    0.075   (  0.179)            0.068            0.008
81  20.25    0.30    0.113   (  0.177)            0.101            0.011
82  20.50    0.30    0.113   (  0.174)            0.101            0.011
83  20.75    0.30    0.113   (  0.172)            0.101            0.011
84  21.00    0.20    0.075   (  0.170)            0.068            0.008
85  21.25    0.30    0.113   (  0.168)            0.101            0.011
86  21.50    0.20    0.075   (  0.166)            0.068            0.008
87  21.75    0.30    0.113   (  0.164)            0.101            0.011
88  22.00    0.20    0.075   (  0.162)            0.068            0.008
89  22.25    0.30    0.113   (  0.161)            0.101            0.011
90  22.50    0.20    0.075   (  0.159)            0.068            0.008
91  22.75    0.20    0.075   (  0.158)            0.068            0.008
92  23.00    0.20    0.075   (  0.157)            0.068            0.008
93  23.25    0.20    0.075   (  0.156)            0.068            0.008
94  23.50    0.20    0.075   (  0.155)            0.068            0.008
95  23.75    0.20    0.075   (  0.154)            0.068            0.008
96  24.00    0.20    0.075   (  0.153)            0.068            0.008
                    (Loss Rate Not Used)
    Sum =     100.0                          Sum =      18.2
        Flood volume = Effective rainfall      4.55(In)
         times area     7115.0(Ac.)/[(In)/(Ft.)] =     2699.8(Ac.Ft)
       Total soil loss =      4.83(In)
       Total soil loss =  2861.767(Ac.Ft)
       Total rainfall =      9.38(In)
       Flood volume =   117602133.4 Cubic Feet
       Total soil loss =   124658555.3 Cubic Feet
       ----------------------------------------------------------------
       Peak flow rate of this hydrograph =   4547.067(CFS)
       ----------------------------------------------------------------


                              Page 4
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                    2 4 - 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  15   Minute intervals ((CFS))


         ----------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0      1150.0    2300.0    3450.0    4600.0
         ----------------------------------------------------------------
   0+15      0.0270      1.31   Q          |         |         |         |
   0+30      0.1467      5.79   Q          |         |         |         |
   0+45      0.4585     15.09   Q          |         |         |         |
   1+ 0      1.0267     27.50   Q          |         |         |         |
   1+15      1.8128     38.05   Q          |         |         |         |
   1+30      2.7612     45.90   Q          |         |         |         |
   1+45      3.8055     50.55   Q          |         |         |         |
   2+ 0      4.9047     53.20   Q          |         |         |         |
   2+15      6.0827     57.02   Q          |         |         |         |
   2+30      7.3779     62.69   Q          |         |         |         |
   2+45      8.8091     69.27   Q          |         |         |         |
   3+ 0     10.3699     75.54   Q          |         |         |         |
   3+15     12.0749     82.52   Q          |         |         |         |
   3+30     13.9190     89.26   Q          |         |         |         |
   3+45     15.8655     94.21   Q          |         |         |         |
   4+ 0     17.9022     98.58   Q          |         |         |         |
   4+15     20.0418    103.56   Q          |         |         |         |
   4+30     22.3258    110.55   Q          |         |         |         |
   4+45     24.7807    118.82   VQ         |         |         |         |
   5+ 0     27.4228    127.88   VQ         |         |         |         |
   5+15     30.2349    136.11   VQ         |         |         |         |
   5+30     33.1748    142.29   VQ         |         |         |         |
   5+45     36.1882    145.85   VQ         |         |         |         |
   6+ 0     39.2807    149.67   VQ         |         |         |         |
   6+15     42.5384    157.67   VQ         |         |         |         |
   6+30     45.9864    166.88   VQ         |         |         |         |
   6+45     49.6344    176.56   VQ         |         |         |         |
   7+ 0     53.4885    186.54   VQ         |         |         |         |
   7+15     57.5450    196.34   VQ         |         |         |         |
   7+30     61.7959    205.74   VQ         |         |         |         |
   7+45     66.3631    221.05   VQ         |         |         |         |
   8+ 0     71.6805    257.36   |VQ        |         |         |         |
   8+15     78.7068    340.07   |VQ        |         |         |         |
   8+30     88.4671    472.40   |V   Q     |         |         |         |
   8+45    101.6805    639.53   |V     Q   |         |         |         |
   9+ 0    118.4534    811.81   |V       Q |         |         |         |
   9+15    138.8603    987.69   | V        Q|        |         |         |
   9+30    163.5033   1192.72   | V        |  Q      |         |         |
   9+45    193.0465   1429.89   | V        |    Q    |         |         |
  10+ 0    227.7705   1680.64   |  V       |       Q |         |         |
  10+15    266.4743   1873.27   |  V       |         Q|        |         |
  10+30    306.8961   1956.41   |   V      |          Q|       |         |
  10+45    346.4146   1912.70   |    V     |         Q |       |         |
  11+ 0    385.0729   1871.06   |    V     |        QQ |       |         |
  11+15    426.1083   1986.11   |     V    |          Q|       |         |
  11+30    470.6279   2154.75   |     V    |          Q|       |         |
  11+45    516.9620   2242.57   |      V   |          Q|       |         |
  12+ 0    563.8939   2271.50   |      V   |          Q|       |         |
  12+15    611.8606   2321.59   |      V|  |          Q|       |         |
  12+30    663.0360   2476.89   |      V|  |           |Q      |         |
  12+45    721.0910   2809.86   |       V  |           |    Q  |         |
  13+ 0    787.5728   3217.72   |       |V |           |        Q|       |
  13+15    862.1873   3611.34   |       |V |           |         |Q      |
  13+30    945.1179   4013.84   |       |  V|          |         |  Q    |
  13+45   1035.3706   4368.23   |       |  |V          |         |     Q |
  14+ 0   1129.3183   4547.07   |       |  |  V        |         |       Q|
  14+15   1221.3372   4453.71   |       |  |       V   |         |       Q|
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                                Page 5

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14+30   1310.2516   4303.46  |              |            V|          |        Q  |
14+45   1399.7060   4329.59  |              |             V|         |        Q  |
15+ 0   1491.0764   4422.33  |              |            V |         |         Q |
15+15   1583.3682   4466.92  |              |           V  |         |         QQ|
15+30   1675.6114   4464.57  |              |          V   |         |         QQ|
15+45   1766.5694   4402.37  |              |         V    |         |         QQ|
16+ 0   1854.9730   4278.73  |              |        V     |         |        Q  |
16+15   1937.9767   4017.38  |              |       V      |       Q |           |
16+30   2012.5246   3608.12  |              |      V|Q      |         |           |
16+45   2075.3994   3043.14  |              |    Q  V       |         |           |
17+ 0   2126.4798   2472.29  |            |Q    |V          |         |           |
17+15   2169.7539   2094.46  |           Q  |    |  V       |         |           |
17+30   2207.9033   1846.43  |         Q Q  |      V        |         |           |
17+45   2242.3459   1667.02  |        Q     |       V       |         |           |
18+ 0   2273.8337   1524.01  |       Q      |        V      |         |           |
18+15   2302.7549   1399.79  |      Q       |         V     |         |           |
18+30   2329.4345   1291.29  |     |Q       |          V    |         |           |
18+45   2354.1681   1197.11  |    Q         |           V   |         |           |
19+ 0   2377.1576   1112.69  |   Q|         |            V  |         |           |
19+15   2398.5762   1036.66  |   Q|         |             V |         |           |
19+30   2418.5895    968.64  |  Q           |             V |         |           |
19+45   2437.4542    913.06  | Q|           |              V|         |           |
20+ 0   2455.3751    867.37  | Q            |              V|         |           |
20+15   2472.3595    822.05  | Q            |               V         |           |
20+30   2488.4544    778.99  | Q            |               V         |           |
20+45   2503.6978    737.78  | Q            |               V         |           |
21+ 0   2518.2008    701.95  | Q            |               V         |           |
21+15   2531.9616    666.02  |Q             |               V         |           |
21+30   2544.9288    627.61  |Q             |               V         |           |
21+45   2557.1366    590.86  |Q             |               V         |           |
22+ 0   2568.6171    555.66  |Q             |                V        |           |
22+15   2579.6191    532.50  |Q             |                V        |           |
22+30   2590.1626    510.31  |Q             |                V        |           |
22+45   2600.1726    484.48  |Q             |                V        |           |
23+ 0   2609.6755    459.94  |Q             |                V        |           |
23+15   2618.6708    435.37  |Q             |                V        |           |
23+30   2627.2328    414.40  |Q             |                V        |           |
23+45   2635.4221    396.36  |Q             |                 V       |           |
24+ 0   2643.2387    378.32  |Q             |                 V       |           |
24+15   2650.5455    353.65  |Q             |                 V       |           |
24+30   2657.2895    326.41  | Q            |                 V       |           |
24+45   2663.4037    295.93  | Q            |                 V       |           |
25+ 0   2668.8479    263.50  | Q            |                 V       |           |
25+15   2673.6071    230.35  | Q            |                 V       |           |
25+30   2677.7474    200.39  |Q             |                 V       |           |
25+45   2681.4917    181.22  |Q             |                 V       |           |
26+ 0   2684.8390    162.01  |Q             |                 V       |           |
26+15   2687.7229    139.58  |Q             |                 V       |           |
26+30   2690.1646    118.18  |Q             |                 V       |           |
26+45   2692.1684     96.98  Q              |                 V       |           |
27+ 0   2693.7577     76.92  Q              |                 V       |           |
27+15   2694.9550     57.95  Q              |                 V       |           |
27+30   2695.7900     40.41  Q              |                 V       |           |
27+45   2696.3367     26.46  Q              |                 V       |           |
28+ 0   2696.6268     14.04  Q              |                 V       |           |
28+15   2696.8969     13.07  Q              |                 V       |           |
28+30   2697.1489     12.20  Q              |                 V       |           |
28+45   2697.3857     11.46  Q              |                 V       |           |
29+ 0   2697.6077     10.75  Q              |                 V       |           |
29+15   2697.8129      9.93  Q              |                 V       |           |
29+30   2698.0010      9.11  Q              |                 V       |           |
29+45   2698.1730      8.33  Q              |                 V       |           |
30+ 0   2698.3311      7.65  Q              |                 V       |           |
30+15   2698.4765      7.04  Q              |                 V       |           |
30+30   2698.6101      6.47  Q              |                 V       |           |
30+45   2698.7341      6.00  Q              |                 V       |           |
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31+ 0    2698.8507    5.65  Q           |         |         |              V|
31+15    2698.9579    5.19  Q           |         |         |              V|
31+30    2699.0550    4.70  Q           |         |         |              V|
31+45    2699.1440    4.31  Q           |         |         |              V|
32+ 0    2699.2270    4.02  Q           |         |         |              V|
32+15    2699.3023    3.64  Q           |         |         |              V|
32+30    2699.3701    3.28  Q           |         |         |              V|
32+45    2699.4314    2.97  Q           |         |         |              V|
33+ 0    2699.4878    2.73  Q           |         |         |              V|
33+15    2699.5380    2.43  Q           |         |         |              V|
33+30    2699.5837    2.21  Q           |         |         |              V|
33+45    2699.6234    1.92  Q           |         |         |              V|
34+ 0    2699.6586    1.70  Q           |         |         |              V|
34+15    2699.6877    1.41  Q           |         |         |              V|
34+30    2699.7125    1.20  Q           |         |         |              V|
34+45    2699.7332    1.00  Q           |         |         |              V|
35+ 0    2699.7496    0.79  Q           |         |         |              V|
35+15    2699.7618    0.59  Q           |         |         |              V|
35+30    2699.7698    0.39  Q           |         |         |              V|
35+45    2699.7735    0.18  Q           |         |         |             V
       ------------------------------------------------------------------------
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APPENDIX E

2D RAS Exhibits

IN THE COUNTY OF RIVERSIDE, STATE OF CALIFORNIA
PRE-APPLICATION REVIEW
THE RIDGE
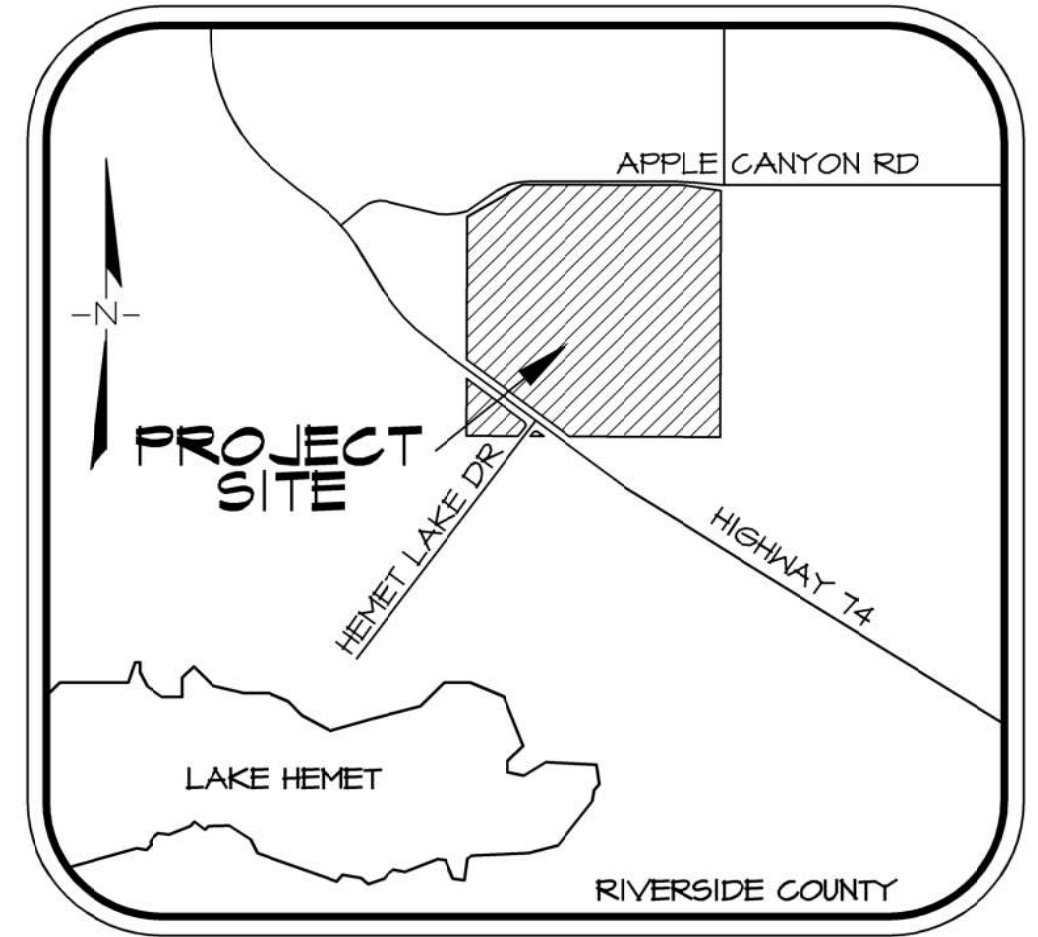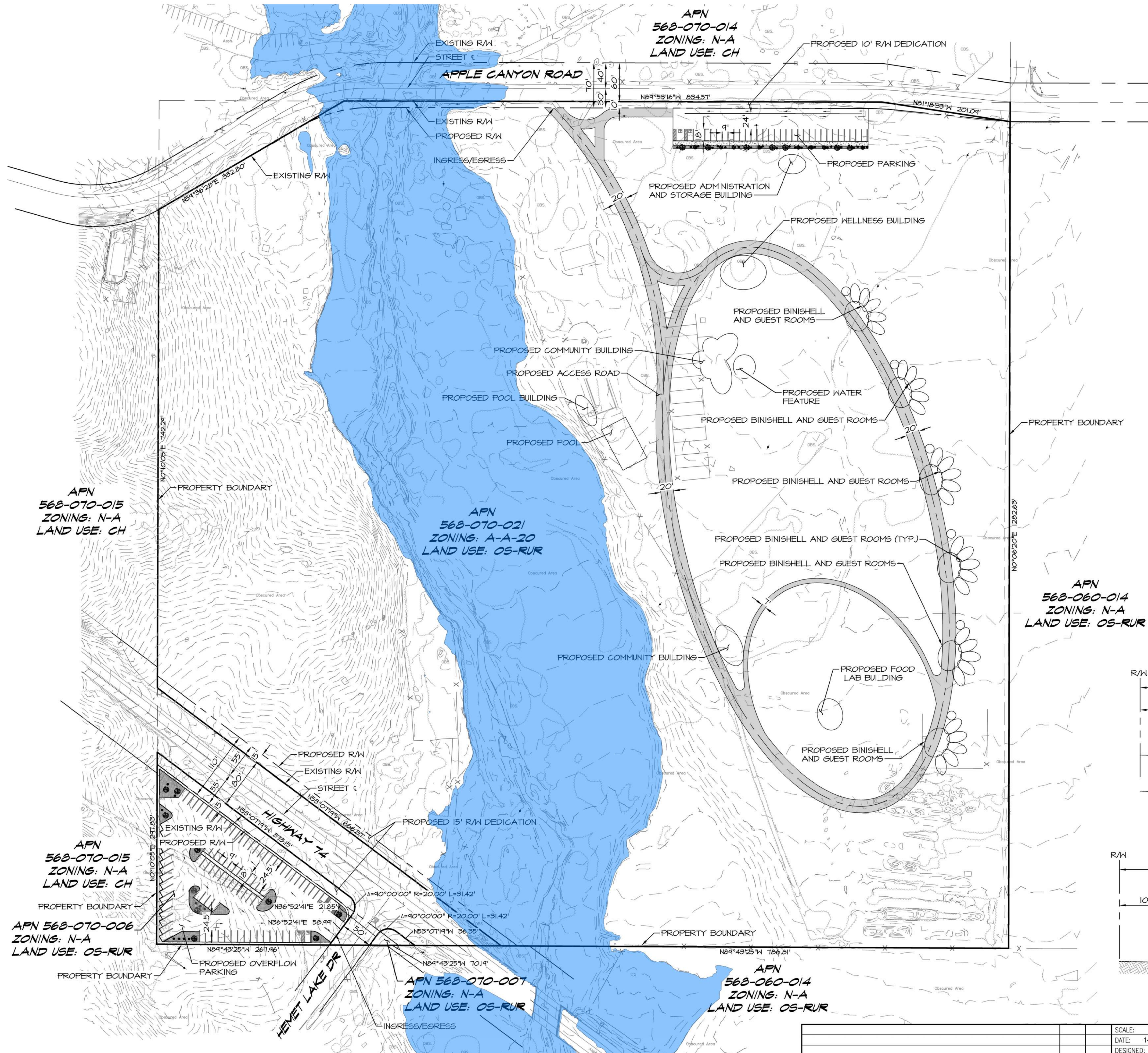
PROJECT DESCRIPTION
THE RIDGE PROPOSES AN ECO-CONSCIOUS GUEST RANCH FACILITY ON 31.5± ACRES LOCATED AT 56475 APPLE CANYON ROAD IN THE COUNTY OF RIVERSIDE (APNS: 568-170-021, -006, & -007). THE RIDGE WILL BE DESIGNED TO FACILITATE A FULL IMMERSION NATURE EXPERIENCE IN THE BEAUTIFUL MOUNTAIN CENTER/IDYLLWILD SETTING. THE FACILITY WILL OFFER A VARIETY OF SELF-DEVELOPMENT THERAPIES AND ACTIVITIES SUCH AS YOGA, HIKING, HORSEBACK RIDING, ROCK CLIMBING AND WATER BASED ACTIVITIES.

THE PROJECT PROPOSES TO CONSTRUCT BINISHELLS WITH GUEST ROOMS, A RECEPTION AND DINING HALL WITH A POOL, A WELLNESS CENTER, AND AN AGRICULTURAL PRODUCTION/FOOD LAB. TWO PARKING LOTS ARE PROPOSED FOR THIS PROJECT: ONE ALONG APPLE CANYON ROAD AND AN OVERFLOW PARKING ALONG HIGHWAY 74 AND HEMET LAKE DRIVE. RIGHT OF WAY SHALL BE DEDICATED ALONG HIGHWAY 74 AND APPLE CANYON ROAD FOR ROAD IMPROVEMENT PURPOSES.

APPLICANT/PROPERTY OWNER
THE RIDGE
8407 WYNDHAM ROAD
LOS ANGELES, CA 90046
ATT: CAROLINE LEGRAND
PHONE: (310) 666-3623
EMAIL: LEGRAND.CAROLINE@GOOGLEMAIL.COM

ENGINEER
ALBERT A. WEBB ASSOCIATES
3788 McCRAY STREET
RIVERSIDE, CA 92506
ATT: SANDY CHANDLER
PHONE: (951) 686 - 1070
FAX: (951) 788 - 1256
EMAIL: SANDY.CHANDLER@WEBBASSOCIATES.COM

ASSESSOR PARCEL NUMBER
568-170-021
568-170-006
568-170-007

SITE ADDRESS
56475 APPLE CANYON ROAD
MOUNTAIN CENTER, CA 92561

GROSS ACREAGE
37.48 ACRES

NET ACREAGE
37.37 ACRES

EXISTING ZONING
A-1-20 (LIGHT AGRICULTURE)
N-A (NATURAL ASSETS)

PROPOSED ZONING
N-A (NATURAL ASSETS)

SETBACK REQUIREMENTS
FRONT: 100 FEET
REAR: 50 FEET
SIDE: 50 FEET

*PER N-A ZONING

TOPOGRAPHY
INLAND AERIAL SURVEYS, INC.
7117 ARLINGTON AVENUE SUITE A
RIVERSIDE, CA 92503
PHONE: (951) 687 - 4252
DATED: 07-13-2020

LEGAL DESCRIPTION
THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 4, TOWNSHIP 6 SOUTH, RANGE 3 EAST, SAN BERNARDINO BASE AND MERIDIAN, AS SHOWN BY UNITED STATES GOVERNMENT SURVEY.

EXCEPTING THEREFROM ANY PORTION THEREOF LYING WITHIN STATE HIGHWAY 74, LAKE HEMET DRIVE AND APPLE CANYON ROAD;

ALSO EXCEPTING THEREFROM THAT PORTION CONVEYED TO THE COUNTY OF RIVERSIDE BY DEED RECORDED NOVEMBER 8, 1955 IN BOOK 1817 PAGE 296 OF OFFICIAL RECORDS OF RIVERSIDE COUNTY, CALIFORNIA.

EXISTING LAND USE
OS-RUR (OPEN SPACE-RURAL)

PROPOSED LAND USE
OS-RUR (OPEN SPACE-RURAL)

WASTE DISPOSAL SYSTEM
ONSITE SEWAGE DISPOSAL

ONSITE WATER NOTE
WATER FOR DOMESTIC, IRRIGATION, AND FIRE USES SHALL BE PROVIDED BY ONSITE WELLS.

APN 568-070-014
ZONING: N-A
LAND USE: CH

APN 568-070-015
ZONING: N-A
LAND USE: CH

APN 568-070-021
ZONING: A-A-20
LAND USE: OS-RUR

APN 568-060-014
ZONING: N-A
LAND USE: OS-RUR

APN 568-070-015
ZONING: N-A
LAND USE: CH

APN 568-070-006
ZONING: N-A
LAND USE: OS-RUR

APN 568-070-007
ZONING: N-A
LAND USE: OS-RUR

APN 568-060-014
ZONING: N-A
LAND USE: OS-RUR

APPLE CANYON ROAD

HIGHWAY 74

HEMET LAKE DR

PROPOSED 10' R/W DEDICATION
EXISTING R/W
STREET ℄
PROPOSED R/W
INGRESS/EGRESS
PROPOSED PARKING
PROPOSED ADMINISTRATION AND STORAGE BUILDING
PROPOSED WELLNESS BUILDING
PROPOSED BINISHELL AND GUEST ROOMS
PROPOSED COMMUNITY BUILDING
PROPOSED ACCESS ROAD
PROPOSED POOL BUILDING
PROPOSED WATER FEATURE
PROPOSED BINISHELL AND GUEST ROOMS
PROPOSED POOL
PROPERTY BOUNDARY
PROPOSED BINISHELL AND GUEST ROOMS
PROPOSED BINISHELL AND GUEST ROOMS (TYP.)
PROPOSED BINISHELL AND GUEST ROOMS
PROPOSED COMMUNITY BUILDING
PROPOSED FOOD LAB BUILDING
PROPOSED BINISHELL AND GUEST ROOMS
PROPOSED R/W
EXISTING R/W
STREET
PROPOSED 15' R/W DEDICATION
PROPOSED OVERFLOW PARKING
INGRESS/EGRESS

N89°58'16"W 834.57'
N81°18'33"N 201.04'
N84°39'25"W 766.51'

MOUNTAIN ARTERIAL HIGHWAY
110' R/W
HIGHWAY 74

110'
55' 55'
8' 8' 12' 12' 12' 12' 8' 8'
℄
AC DIKE
AC PAVEMENT 2%
AC PAVEMENT 2%
AC DIKE
BASE COURSE
COMPACTED SUB-GRADE
BASE COURSE
2% 2%

LOCAL STREET
60' R/W
APPLE CANYON ROAD

60'
40'
10' 8' 12' 12' 8' 10'
℄
AC DIKE
AC PAVEMENT
2% 2% 2% 2%
BASE COURSE
COMPACTED SUB-GRADE

1" = 80'
80 0 80 160 240

SCALE:	1" = 80'
DATE:	14-Aug-20
DESIGNED:	RH
CHECKED:	JRG
PLN CK REF:	

ALBERT A. WEBB ASSOCIATES
ENGINEERING CONSULTANTS
3788 McCRAY STREET
RIVERSIDE, CA. 92506
PH. (951) 686-1070
FAX (951) 788-1256

COUNTY OF RIVERSIDE
PRE-APPLICATION REVIEW

W.O. 20-0120
SHEET 1
OF 1 SHEETS
DWG. NO.

PLOT DATE: 14-Aug-20
REVISIONS DATE BY F.B.

Maximum Water Depth

APPLE CANYON RD

HWY 74

Legend

Depth

- 15 ft

- < 1 ft

—— Parcel Boundary

Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community, Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
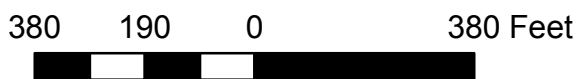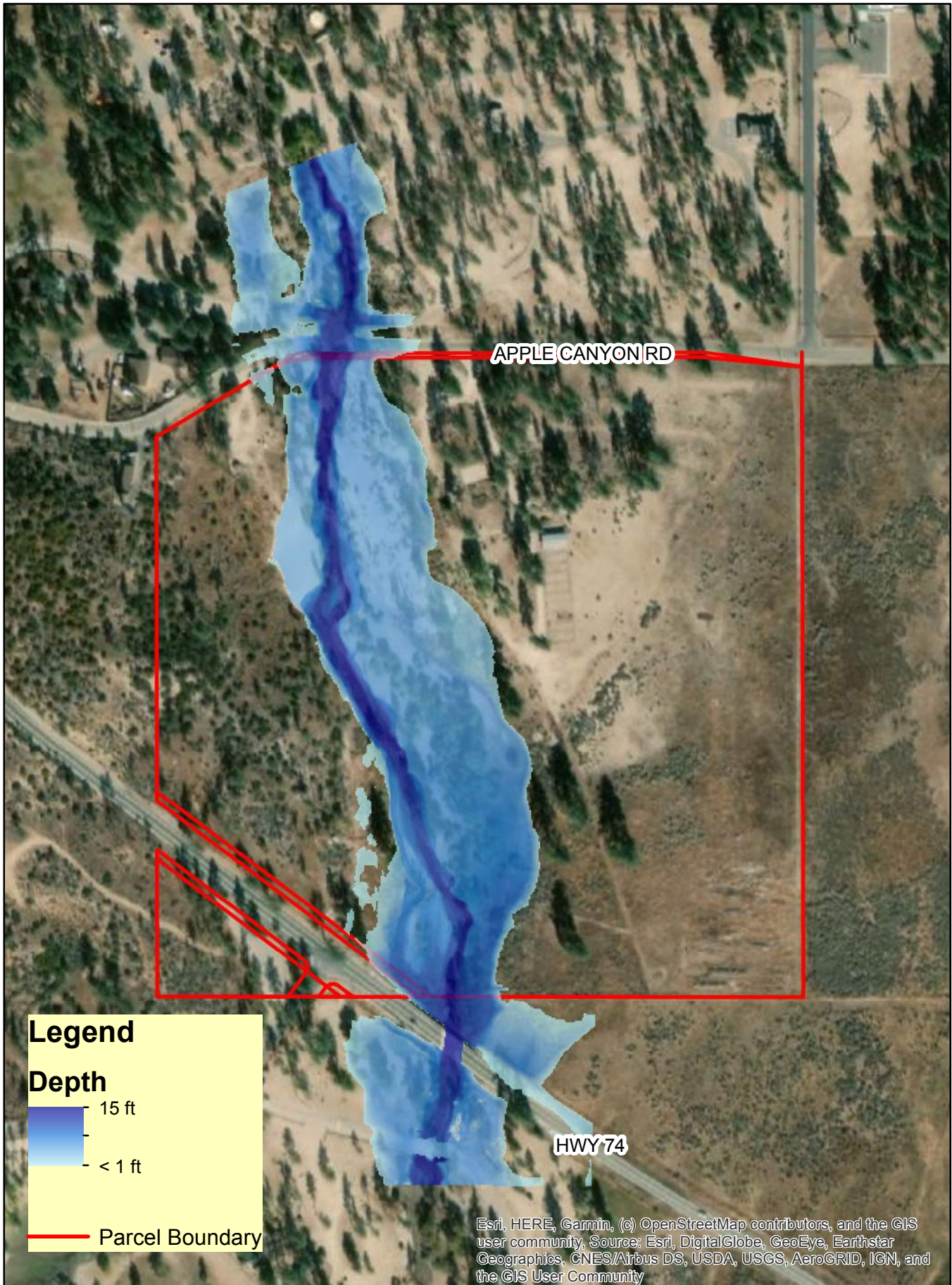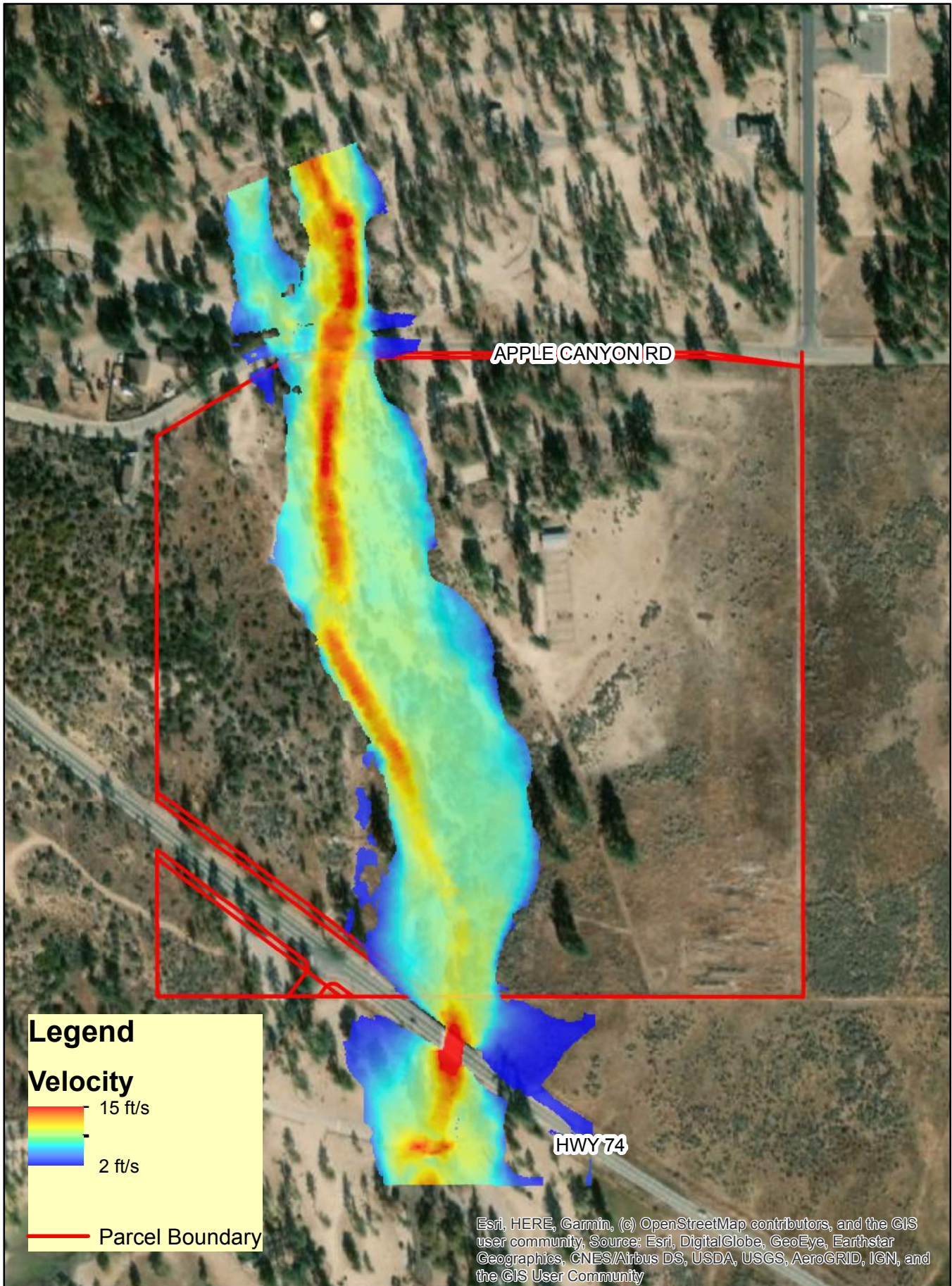
380   190   0   380 Feet

ALBERT A.
WEBB
ASSOCIATES

29/30

Maximum Water Depth

APPLE CANYON RD

HWY 74

Legend

Velocity

- 15 ft/s

- 2 ft/s

—— Parcel Boundary

Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS
user community, Source: Esri, DigitalGlobe, GeoEye, Earthstar
Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and
the GIS User Community

380   190   0   380 Feet

30/30

EXCERPT B: NRCS HYDRAULIC SOILS MAP

USDA Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

7/13/2021
Page 1 of 4

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 National Forest Area, 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: Aug 18, 2018—Aug 22, 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
DaF	Pacifico-Wapi families complex, 30 to 50 percent slopes	D	39.1	5.6%
DxE	Wapi-Pacifico families, dry-Rock outcrop complex, 15 to 30 percent slopes	D	69.9	9.9%
KoD	Wind River-Oak Glen families association, 2 to 15 percent slopes	A	0.6	0.1%
MbF	Morical-Wind River families complex, 30 to 50 percent slopes	C	31.7	4.5%
MoFG	Typic Xerorthents-Morical family, dry association, 30 to 75 percent slopes	A	49.8	7.1%
OmD	Oak glen-rush families complex, 2 to 15 percent slopes	A	366.3	52.1%
SoDE	Oak Glen-Morical, very deep families complex, 2 to 30 percent slopes	A	116.9	16.6%
W	Water areas		29.1	4.1%
Totals for Area of Interest			**703.4**	**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

EXHIBITS

EXHIBIT A: **POST-PROJECT CONDITION RATIONAL METHOD HYDROLOGY MAP**

PRELIMINARY CONDITIONAL USE PERMIT 21-1021
COUNTY OF RIVERSIDE, STATE OF CALIFORNIA
## POST-PROJECT CONDITION SITE HYDROLOGY MAP

HYDROLOGY SUMMARY TABLE — AREA A

NODES	Q_{100} (CFS)	T_C (MIN)	Q_{10} (CFS)	T_C (MIN)
101–102	14.48	14.16	8.05	14.16
102–103	16.31	14.81	9.05	14.91
103–104	16.31	15.39	9.05	15.59
*104–104	16.31	15.39	9.05	15.59
105–106	14.22	16.08	7.89	16.08
106–109	14.22	17.68	7.89	17.95
*109–109	14.22	17.68	7.89	17.95
107–108	5.45	13.17	3.04	13.17
108–109	5.45	14.22	3.04	14.38
*108–109	19.05	17.68	10.58	17.95
109–111	19.05	17.92	10.58	18.23
*111–111	19.05	17.92	10.58	18.23
110–111	2.64	12.16	1.47	12.16
*110–111	21.19	17.92	11.76	18.23
111–104	21.19	18.46	11.76	18.85
*111–104	35.94	18.46	19.90	18.85
104–112	35.94	18.82	19.90	19.24
112–112	37.69	18.82	20.80	19.24
112–113	37.69	19.05	20.80	19.52

* DENOTES CONFLUENCE AREAS
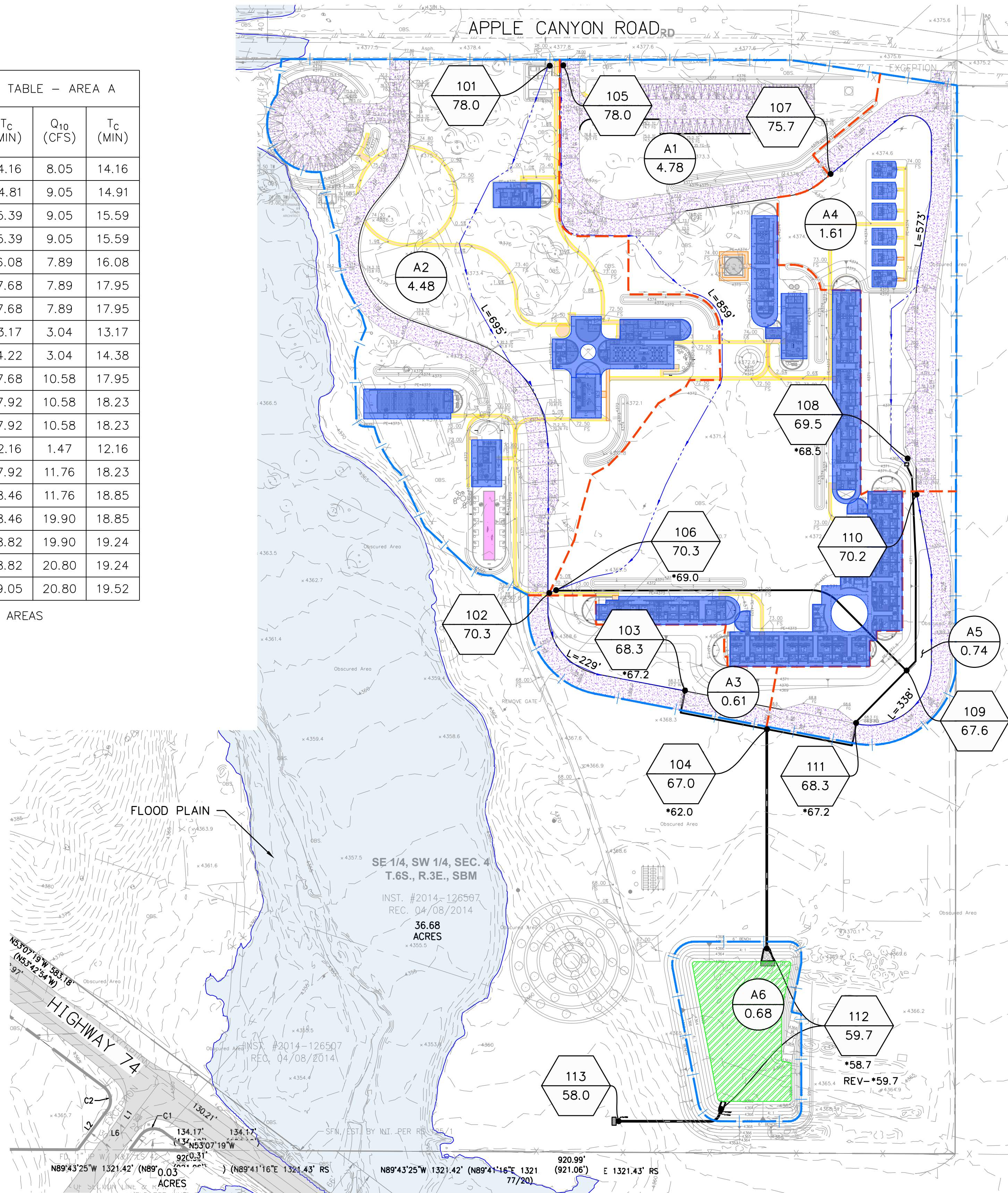
LEGEND:

- NODE/CONCENTRATION POINT / FLOWLINE ELEVATION / APPROXIMATE INVERT ELEVATION
- SUB AREA / ACRES
- L=XXX′ FLOW DISTANCE
- FLOW PATH
- WATERSHED SUB–BOUNDARY
- WATERSHED BOUNDARY
- BASIN
- DRIVE AISLE
- PEDESTRIAN PATH
- POOL
- ROOF

IMPERVIOUS AREA SUMMARY TABLE

SYMBOL	ROOF TOP AREA (SF)	SIDEWALK (SF)	ROAD	TOTAL IMPERVIOUS AREA (SF)	TOTAL NATURAL AREA (SF)	TOTAL AREA (AC)	IMPERVIOUS PERCENT
A1	36,002.00	2,926.00	16,175.00	55,103.00	153,114.00	4.78	26%
A2	17,725.00	15,042.00	30,696.00	63,463.00	131,686.00	4.48	33%
A3	0.00	0.00	8,418.00	8,418.00	18,153.00	0.61	32%
A4	3,507.00	1,190.00	17,708.00	22,405.00	47,726.00	1.61	32%
A5	0.00	0.00	11,981.00	11,981.00	20,253.00	0.74	37%
A6	0.00	0.00	0.00	0.00	38,768.00	0.89	0.00%
A7	0.00	0.00	0.00	0.00	29,621.00	0.68	0.00%
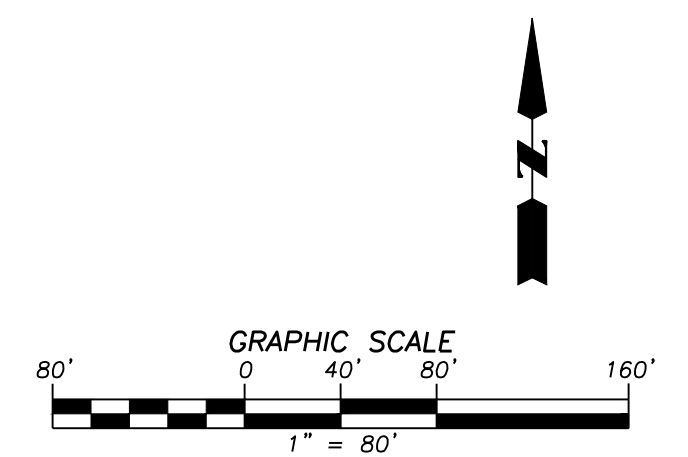
GRAPHIC SCALE
80′   0   40′   80′   160′
1″ = 80′

N

EXHIBIT "A"
CUP NO. 21-0121
POST-PROJECT RATIONAL METHOD MAP
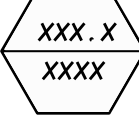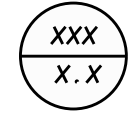
EXHIBIT B: PRE-PROJECT CONDITION UNIT HYDROGRAPH MAP

PRELIMINARY CONDITIONAL USE PERMIT 21-1021
COUNTY OF RIVERSIDE, STATE OF CALIFORNIA
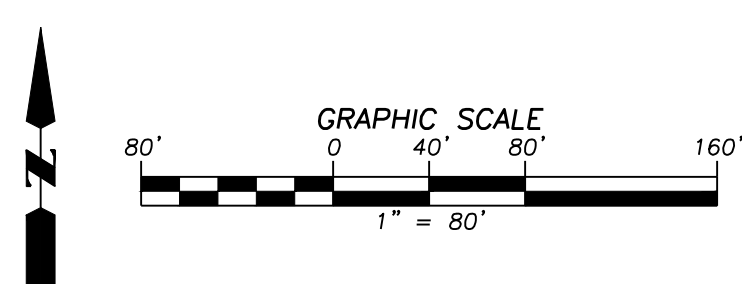## PRE-PROJECT CONDITION UNIT HYDROGRAPH MAP

APPLE CANYON ROAD

HIGHWAY 74

LEGEND:

Symbol	Description
XXX.X / XXXX	NODE/CONCENTRATION POINT / FLOWLINE ELEVATION
XXX / X.X	SUB AREA / ACRES
●	CENTROID
—·—·—	FLOW PATH
—|—|—	WATERSHED BOUNDARY

101 / 78.0

102 / 68.5

A1 / 12.23

UNIT HYDROGRAPH RESULTS

AREA	AREA (AC)	PEAK FLOW RATE (CFS)	
		2-YEAR, 24-HOUR	10-YEAR, 24-HOUR
A1	12.23	0.5	1.4
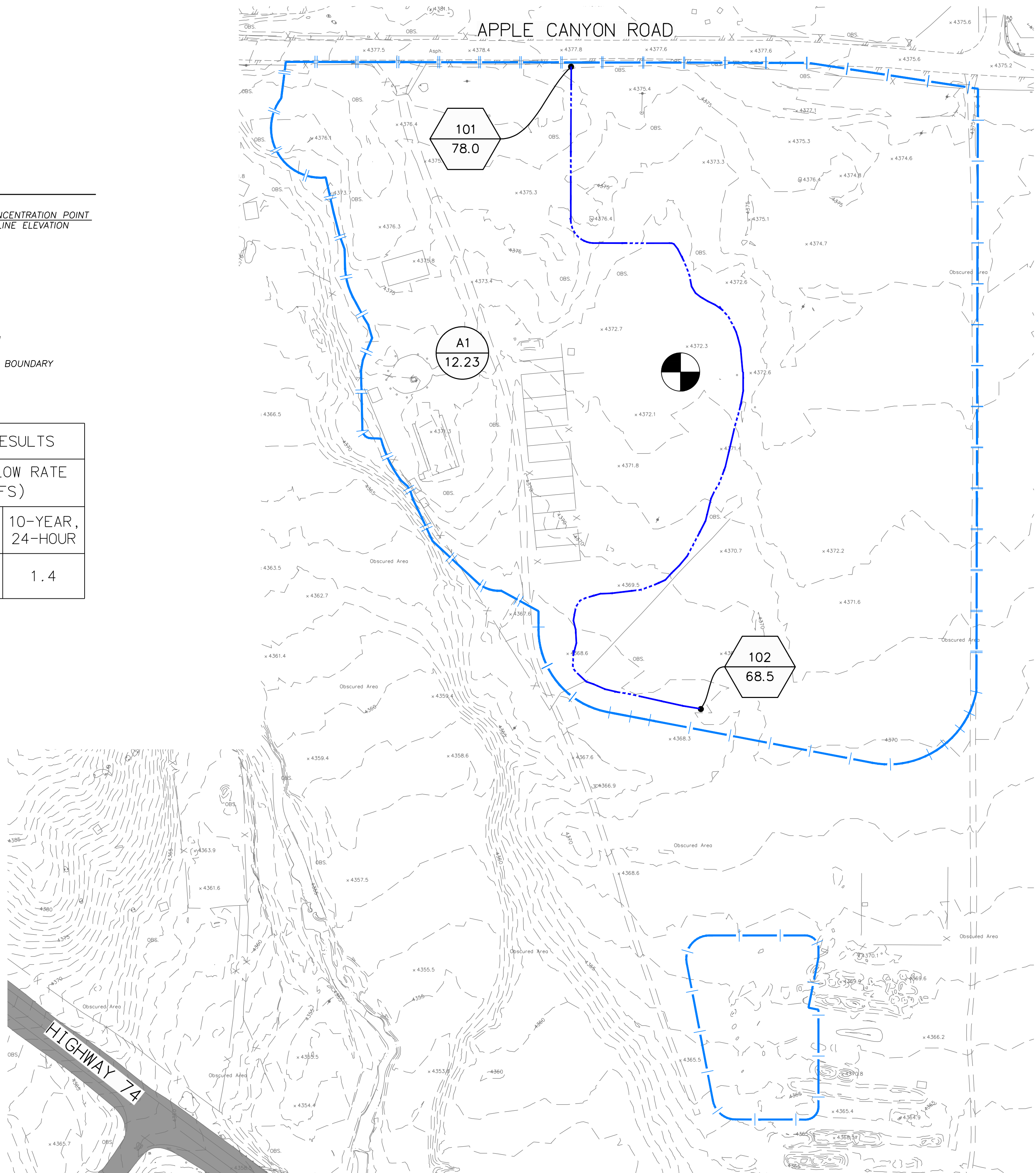
AREA INFORMATION

AREA	AREA (AC)	FLOW LENGTH (FT)	CENTROID LENGTH (FT)	RUNOFF INDEX	IMPERVIOUS FRACTION	NODE TO NODE	
A1	12.23	1106	611	46.0	0.00	101	102
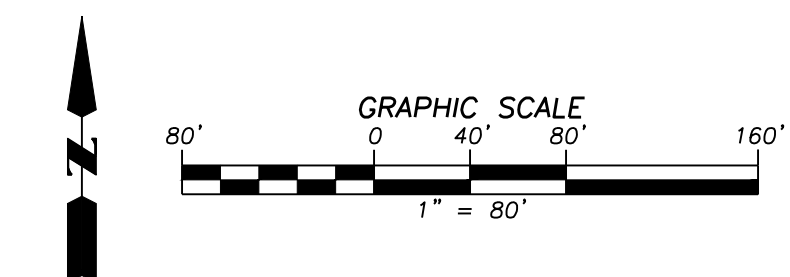
GRAPHIC SCALE
80' 0 40' 80' 160'
1" = 80'

N

EXHIBIT "B"
CUP NO. 21-1021
PRE-PROJECT UNIT HYDROGRAPH MAP

EXHIBIT C: **POST-PROJECT CONDITION UNIT HYDROGRAPH MAP**

PRELIMINARY CONDITIONAL USE PERMIT 21-1021
COUNTY OF RIVERSIDE, STATE OF CALIFORNIA
POST-PROJECT CONDITION UNIT HYDROGRAPH MAP

APPLE CANYON ROAD

101
78.0

A1
12.23

102
68.5

HIGHWAY 74

LEGEND:

XXX.X / XXXX	NODE/CONCENTRATION POINT / FLOWLINE ELEVATION
XXX / X.X	SUB AREA / ACRES
◓	CENTROID
——	FLOW PATH
—I—I—	WATERSHED BOUNDARY

UNIT HYDROGRAPH RESULTS

AREA	AREA (AC)	PEAK FLOW RATE (CFS)	
		2-YEAR, 24-HOUR	10-YEAR, 24-HOUR
A1	12.23	1.8	3.0

AREA INFORMATION

AREA	AREA (AC)	FLOW LENGTH (FT)	CENTROID LENGTH (FT)	RUNOFF INDEX	IMPERVIOUS FRACTION	NODE TO NODE	
A1	12.23	1106	611	33.6	0.35	101	102

GRAPHIC SCALE

80'   0   40'   80'   160'

1" = 80'

N

EXHIBIT "C"

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PH. 951.304.9552 FAX 951.304.3568

CUP NO. 21-1021

POST-PROJECT UNIT HYDROGRAPH MAP

EXHIBIT D: **DRAINAGE FACILITIES MAP**

PRELIMINARY CONDITIONAL USE PERMIT 21-1021
COUNTY OF RIVERSIDE, STATE OF CALIFORNIA
## DRAINAGE FACILITIES MAP

APPLE CANYON ROAD

HIGHWAY 74

INLET 3
Q_{100}=5.5 CFS

LINE B
Q_{100}=14.2 CFS

INLET 2
Q_{100}=14.2 CFS

INLET 3
Q_{100}=16.3 CFS

LINE A
Q_{100}=19.1 CFS

INLET 4
Q_{100}=2.6 CFS

LINE C
Q_{100}=16.3 CFS

LINE D
Q_{100}=21.2 CFS

LINE E

LINE E
Q_{100}=35.9 CFS

BASIN 1
BIORETENTION
BASIN

LINE F
Q_{100}=37.7 CFS
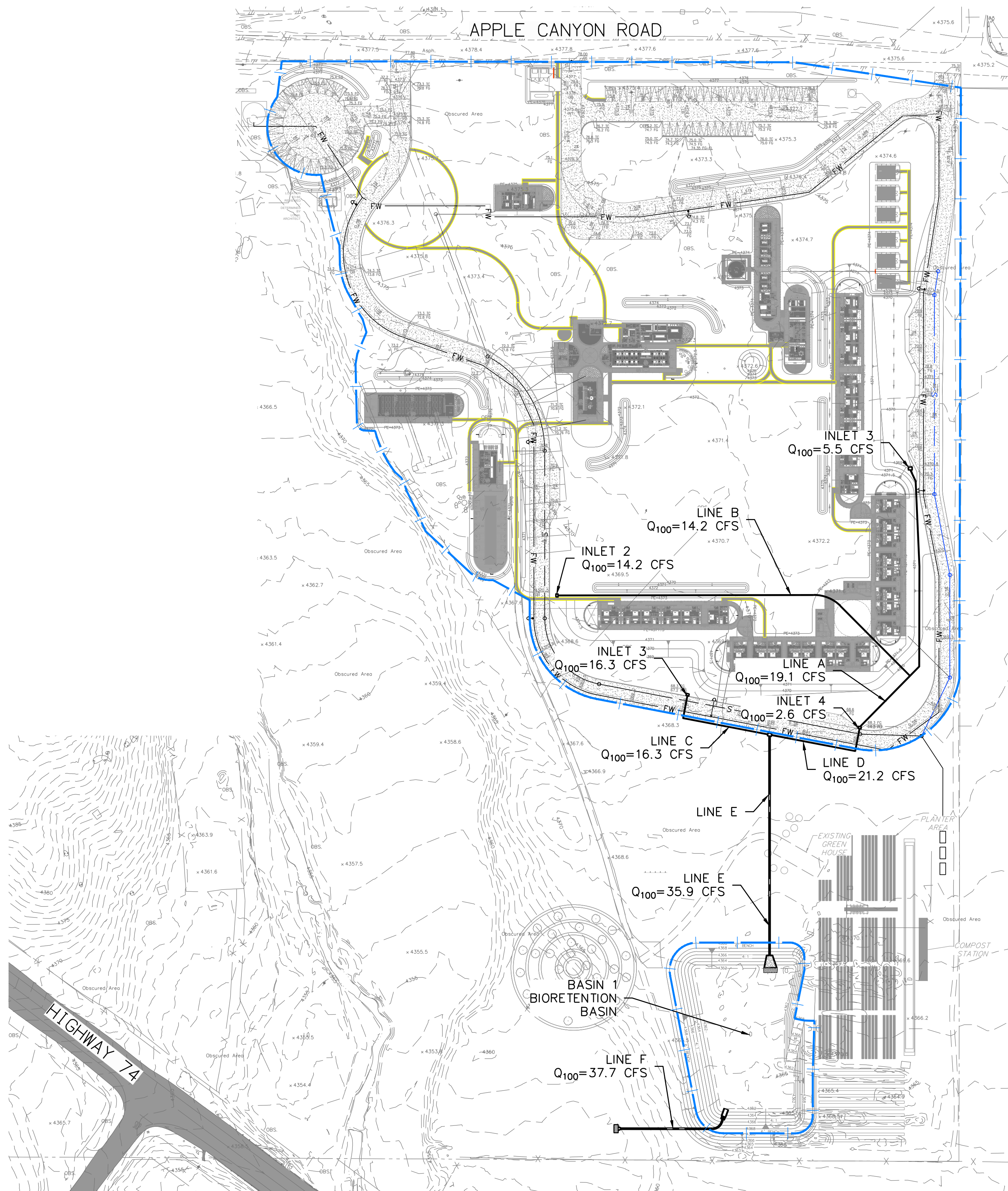
LEGEND:
———|———|——— WATERSHED BOUNDARY
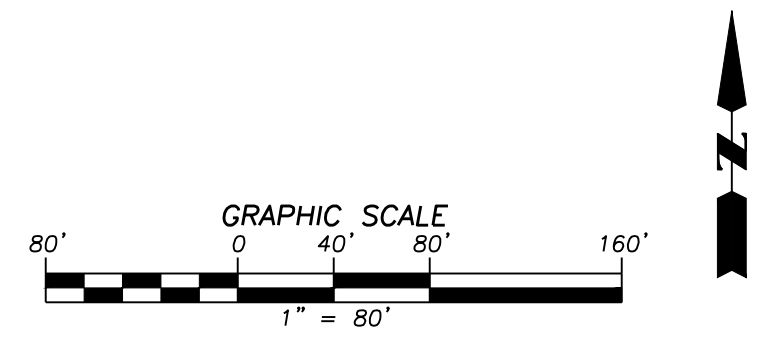
GRAPHIC SCALE
80'   0   40'   80'   160'
1" = 80'

N

EXHIBIT "D"
CUP NO. 21-1021
DRAINAGE FACILITIES
MAP

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EXHIBIT E: OFFSITE RATIONAL METHOD HYDROLOGY

PRELIMINARY CONDITIONAL USE PERMIT 21-0121
COUNTY OF RIVERSIDE, STATE OF CALIFORNIA
OFFSITE HYDROLOGY MAP
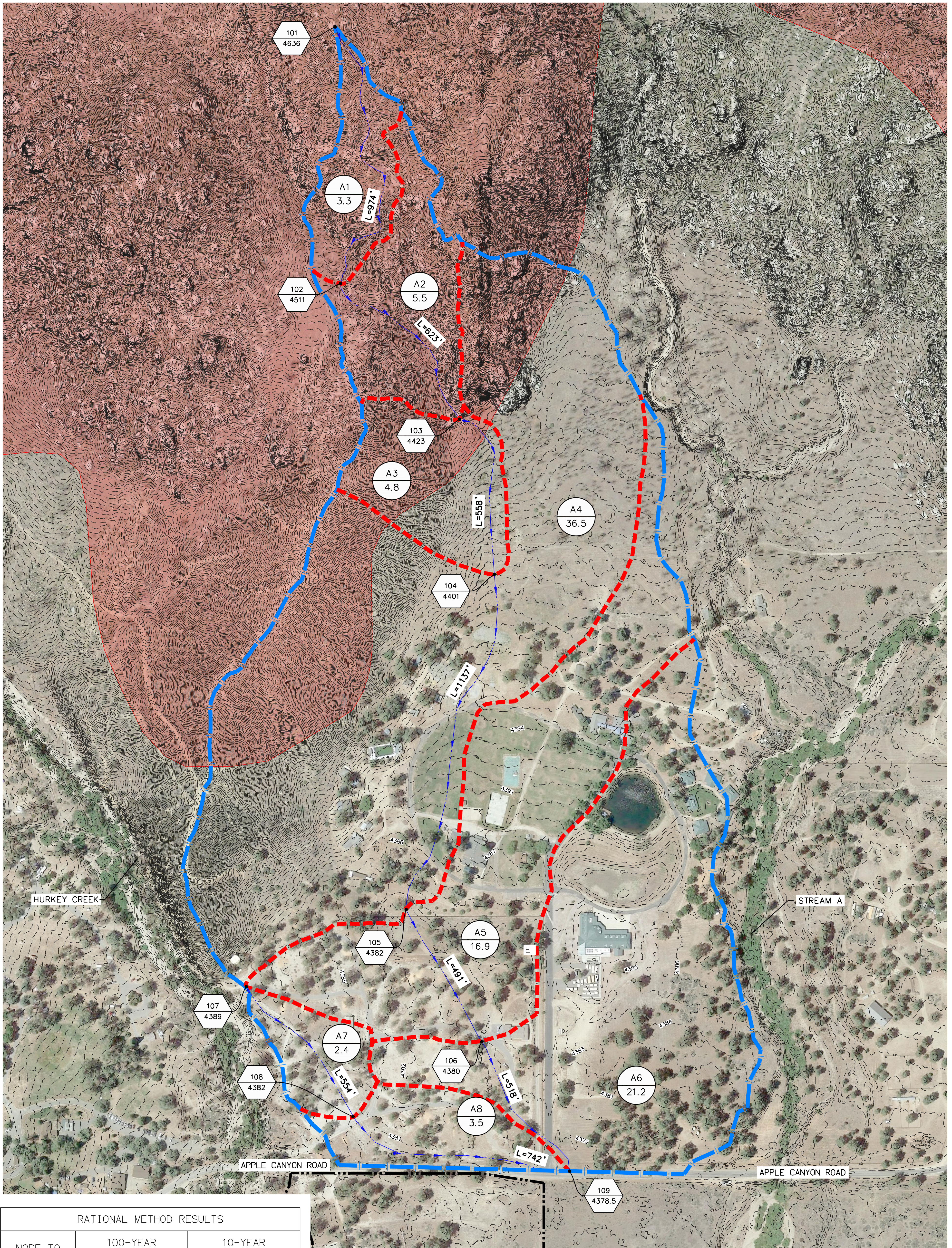
RATIONAL METHOD RESULTS					
NODE TO NODE		100-YEAR		10-YEAR	
		T_C (MIN)	Q (CFS)	T_C (MIN)	Q (CFS)
101	102	16.79	11.86	16.79	7.02
102	103	17.69	31.02	17.82	18.30
103	104	18.98	45.80	19.32	26.56
104	105	22.01	140.61	22.88	76.54
105	106	24.33	178.46	25.67	95.48
106	109	27.04	221.41	28.95	116.53
107	108	21.30	5.90	21.30	3.10
108	109	28.21	12.78	29.39	6.54
108	109	27.04	233.66	28.95	122.96

LEGEND:

⬡ XXX.X / XXXX — NODE/CONCENTRATION POINT / FLOWLINE ELEVATION

XXXX.X — APPROXIMATE INVERT ELEVATION

◯ XXX / X.X — SUB AREA / ACRES

L=XXX' — FLOW DISTANCE

—— FLOW PATH

▬ ▬ ▬ WATERSHED SUB-BOUNDARY

▬▬▬ WATERSHED BOUNDARY

━ ・ ━ ・ ONSITE PROJECT BOUNDARY
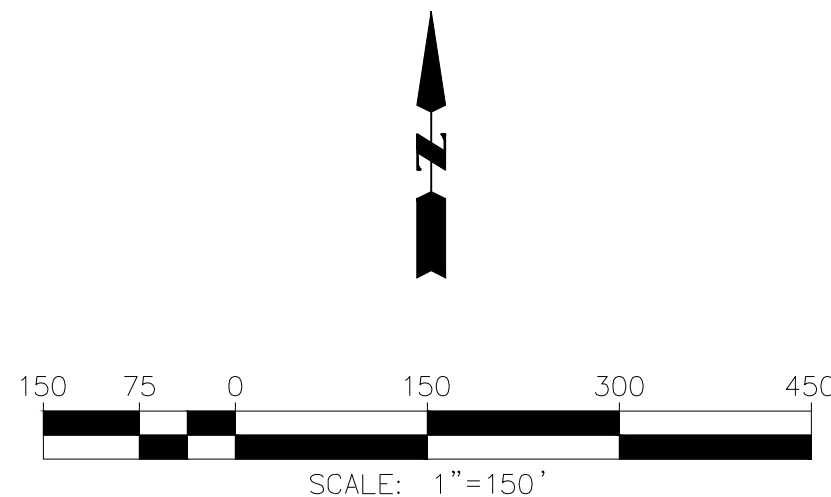
SCALE: 1"=150'

150 75 0 150 300 450

EXHIBIT "E"

CUP NO. 21-0121

OFFSITE HYDROLOGY MAP
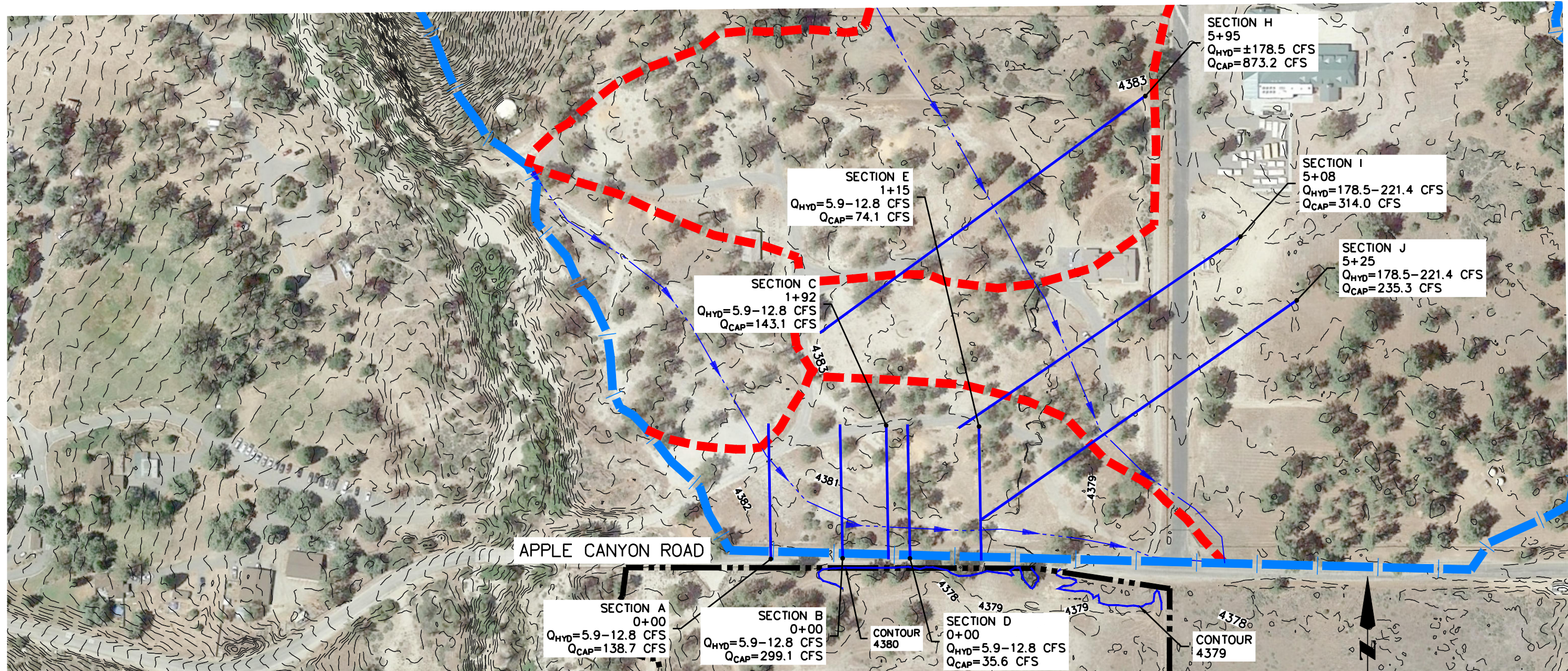
JLC Engineering & Consulting, Inc.
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MURRIETA, CA 92562
PH. 951.304.9552   FAX 951.304.3568

EXHIBIT F: O<small>FFSITE</small> F<small>LOW</small> R<small>ATE</small> A<small>NALYSIS</small>

SECTION H
5+95
$Q_{HYD}=\pm178.5$ CFS
$Q_{CAP}=873.2$ CFS

SECTION I
5+08
$Q_{HYD}=178.5-221.4$ CFS
$Q_{CAP}=314.0$ CFS

SECTION J
5+25
$Q_{HYD}=178.5-221.4$ CFS
$Q_{CAP}=235.3$ CFS

SECTION E
1+15
$Q_{HYD}=5.9-12.8$ CFS
$Q_{CAP}=74.1$ CFS

SECTION C
1+92
$Q_{HYD}=5.9-12.8$ CFS
$Q_{CAP}=143.1$ CFS

4383

4383

4381

4382

4379

APPLE CANYON ROAD

4378

4379

4379

4378

SECTION A
0+00
$Q_{HYD}=5.9-12.8$ CFS
$Q_{CAP}=138.7$ CFS

SECTION B
0+00
$Q_{HYD}=5.9-12.8$ CFS
$Q_{CAP}=299.1$ CFS

CONTOUR
4380

SECTION D
0+00
$Q_{HYD}=5.9-12.8$ CFS
$Q_{CAP}=35.6$ CFS

CONTOUR
4379

NOTE:
Q_{HYD} = RATIONAL METHOD HYDROLOGY 100 YEAR
FLOW RATE, FOUND IN EXHIBIT "E"
Q_{CAP} = HYDRAULIC CAPACITY FLOW RATE OF
THE CROSS SECTION, FOUND IN APPENDIX F.

CROSS SECTION DETAILS AND CALCULATIONS
CAN BE FOUND IN APPENDIX F.

Drawing Name: O:\302.01.21\Engineering\Hydrology_Plan\Exhibits\Exhibit E – F – Offsite Hydrology Map.dwg
Last Opened: Nov 18, 2022 – 2:57pm by mhunt

LEGEND:

FLOW PATH

WATERSHED SUB-BOUNDARY

WATERSHED BOUNDARY

CROSS SECTIONS

ONSITE PROJECT BOUNDARY
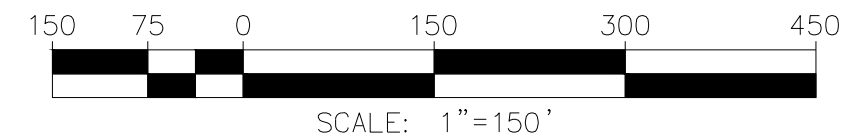
N

150   75   0   150   300   450

SCALE: 1"=150'

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EXHIBIT "F"

CUP NO. 21-0121

OFFSITE FLOW RATE

ANALYSIS