APPENDIX I1B: PRELIMINARY HYDROLOGY STUDY SITE 1

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PRELIMINARY HYDROLOGY AND HYDRAULICS STUDY FOR THE BLOOMINGTON COMMERCE CENTER SP4

COUNTY OF SAN BERNARDINO
CALIFORNIA

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County of San Bernardino
LAND DEVELOPMENT
PRELIMINARY
APPROVAL
THE APPROVAL OF THIS REPORT SHALL NOT BE CONSTRUED TO BE A PERMIT FOR ANY DEVELOPMENT OR SITE IMPROVEMENT
By: Osvaldo Roque (H6472)
Date: 08/28/2020 2:55:12 PM
This report has Preliminary Approval. Prior to Final Approval of the report, all outstanding comments and requirements shall be met.

JUNE 24, 2020
REVISED:

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.

Joseph L. Castaneda RCE 59835 Registered Civil Engineer	06/24/2020 Date	Seal

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I. PURPOSE AND SCOPE

The purpose of this study is to determine the necessary drainage and increased runoff mitigation improvements required for the Bloomington Commerce Center SP4. The Bloomington Commerce Center SP4 is a proposed industrial building located on Jurupa Avenue between Maple Avenue and Linden Avenue in the unincorporated area of San Bernardino County.

The scope of the study includes the following:

1. Determination of points of flow concentration and watershed subareas for onsite and offsite areas.
2. Determination of the 100-year peak storm flows based upon the pre-project condition for the onsite and offsite areas utilizing the Rational Method as outlined in the San Bernardino County Flood Control Hydrology Manual.
3. Determination of the 100-year peak storm flows based upon the ultimate condition offsite and post-project onsite areas utilizing the Rational Method as outlined in the San Bernardino County Flood Control Hydrology Manual.
4. Determine the 100-year peak storm flows for the onsite area based upon the pre-project and post-project condition for the 24-hour storm duration utilizing the Unit Hydrograph Method as outlined in the San Bernardino County Flood Control Hydrology Manual.
5. Determine the preliminary required facilities to mitigate the 100-year peak storm flows for the 24-hour storm duration in the post-project condition to flows less than or equal to the existing condition flow rates. This is for the onsite area only.
6. Determine the required storm drain infrastructure to flood protect the project site for the 100-year storm event.
7. Preparation of a hydrology report, which consist of hydrological and analytical results and exhibits.

II. PROJECT SITE AND DRAINAGE AREA OVERVIEW

The Bloomington Commerce Center SP4 is a proposed industrial project that proposes to construct a distribution warehouse facility, parking lot area, landscaped area, storm drain infrastructure, offsite street improvements, pre-treatment drainage basins and subsurface infiltration basins. The project site is approximately 18 acres, and is roughly bounded by Maple Avenue to the west, Jurupa Avenue to the south, Linden Avenue to the east, and Stallion Lane to the north. The project is located in the unincorporated area of San Bernardino County.

The existing site consists of multiple single family residences that will be converted into a warehouse distribution center or similar industrial site warehouse. Even through the project site has various impervious surfaces existing within the project limits, the pre-project unit hydrograph analyses assumed 0% impervious to be conservative during the preliminary stages. The project site will collect onsite flows via a series of subsurface storm drains and sheet flows within pre-treatment drainage basins. These drainage basins will then drain into the subsurface basins. These flows will be treated for water quality purposes and mitigated

for increased runoff. The water quality analyses has been included in the Water Quality Management Plan. The increased runoff analyses for the preliminary stages only analyzed the 100-year analyses, since this storm event produces the larges volumes. During final engineering, detailed analyses for the outlet structures and smaller storm events will be performed.

The offsite flows will not enter or comingle with onsite flows. The offsite analyses utilized the ultimate land use based upon the general plan. All the onsite and offsite flows ultimately discharge into Jurupa Avenue.

III. HYDROLOGY

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

The rainfall depths for used in the hydrology calculations for the rational method and the unit hydrograph method are as follows:

Storm Event & Duration	Rainfall (inches)
2-Year, 6-Hour	1.34
2-Year, 24-Hour	2.41
10-Year, 1-Hour	0.821
100-Year, 1-Hour	1.30
100-Year, 6-Hour	3.09
100-Year, 24-Hour	5.66

The rainfall depths were obtained from NOAA Atlas 14, which has been included as Exhibit G.

The existing soil classification for the offsite area consists of Hydrologic Soil Group "A" and "D", and the onsite area consists of Hydrologic Soil Group "A", as shown in Exhibit F. Exhibit D 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.

The hydrology utilized the following land use covers:

Land Use Cover	Runoff Index Number (Soil "A")	Pervious Ratio
Open Brush – Fair Cover	46	1
Commercial	32	0.1

The pre-project unit hydrograph calculations utilized open brush, fair cover, with a pervious ratio of 1, which would be the most conservative for the project site since the project consists of existing roofs, driveways, streets, etc. The post-project condition utilized commercial land use for the onsite area.

The following hydrology analyses were performed by the study:

Offsite Hydrology Analyses -Rational Method

1. A **Pre-Project Offsite and Onsite** hydrology analysis was performed for the project using the downstream node at the intersection of Jurupa Avenue and Linden Avenue and Jurupa Avenue and Maple Avenue. See Exhibit A The tributary area to Jurupa Avenue and Linden Avenue is defined as Area A. The tributary area to Jurupa Avenue and Maple Avenue is defined as Area B.
2. A **Post-Project Offsite** hydrology analysis was performed for using the downstream node at the intersection of Jurupa Avenue and Linden Avenue and Jurupa Avenue and Maple Avenue. See Exhibit B. It should be noted that the Post-Project hydrology analysis did not include the **onsite project area**. The onsite project area was excluded from this analysis in order to determine the mitigation measure for the project assuming the onsite project area retained runoff that emanated from the project site. The tributary area to Jurupa Avenue and Linden Avenue is defined as Area A. The tributary area to Jurupa Avenue and Maple Avenue is defined as Area B.

Onsite Stand-alone Hydrology Analyses -Rational Method

1. A **Pre-Project Onsite** hydrology analysis was performed in order to determine the flow rates emanating from the project site. The pre-project model was also developed in order to obtain a time of concentration which is needed for the unit hydrograph analysis to assess the storage volume required by the project.
2. A **Post-Project Onsite** hydrology analysis was performed in order to determine the flow rates emanating from the project site and to size the proposed storm drain required for the project. The post-project model was also developed in order to obtain a time of concentration which is needed for the unit hydrograph analysis to assess the storage volume required by the project.

Onsite Stand-alone Unit Hydrograph Analyses

A hydrology analyses was developed using the unit hydrograph method in order to obtain a relationship between the watershed inflow and the volume generated by the direct runoff emanating from the drainage area. The unit hydrographs were used to size the retention basins proposed for the project in order to mitigate impacts associated with the project.

The offsite area was analyzed based upon the land use map. The San Bernardino County Land Use Plan has been included in Excerpt A. The land uses shown in this map were used to determine the curve numbers and pervious fractions of the sub-watershed areas. As previously mentioned, two watershed areas were analyzed as Areas A and B. Area A is the

watershed area tributary to Linden Avenue and Jurupa Avenue. Area B is the watershed area tributary to Maple Avenue and Jurupa Avenue. The offsite areas hydrology analyses were used to compare the peak flow rates at the intersections of Linden Avenue and Jurupa Avenue and Maple Avenue and Jurupa Avenue. This was done in order to determine the impacts of the project site and how much flow can be discharged from the project site. The existing condition rational method calculations for the onsite and offsite areas have been included in Appendix A, and the existing condition rational method hydrology map for the onsite and offsite areas has been included as Exhibit A. The post-project condition offsite rational method hydrology calculations have been included in Appendix C, and the post-project condition offsite rational method hydrology map has been included as Exhibit B.

The offsite hydrology analyses resulted in the following results shown on Table 1. Please note that the Post-Project Offsite does not include the area from the project site. The onsite project area was not included in order to define the level of mitigation the project requires on Table 1.

Table 1: Offsite Hydrology Results:

Area	Pre-Project 100-Year Rational Method Flow Rate	Post-Project Offsite Rational Method Flow Rate	Pre-Project minus Post-Project Offsite Flow Rate
Area A	158.40 ft^3/s	144.25 ft^3/s	14.15 ft^3/s
Area B	55.66 ft^3/s	52.64 ft^3/s	3.02 ft^3/s

The onsite rational method analysis analyzed two watersheds, Areas A and B. Area A is tributary to Linden Avenue and Jurupa Avenue, and Area B is tributary to Maple Avenue and Jurupa Avenue. The onsite areas were analyzed as commercial development. The pre-project onsite rational method hydrology calculations have been included in Appendix B, and the pre-project onsite rational method hydrology map has been included as Exhibit C. The post-project onsite rational method hydrology calculations have been included in Appendix D, and the post-project onsite rational method hydrology map has been included as Exhibit E. The results of the onsite rational method hydrology analyses are included in Table 2. The time of concentration resulting from this analysis was used to develop the unit hydrographs.

Table 2: Onsite Rational Method Hydrology Results

Area	Existing 100-Year Unit Hydrograph Flow Rate	Post-Project 100-Year Unit Hydrograph Flow Rate	Pre-Project minus Post-Project Offsite Flow Rate
Area A	20.70 ft^3/s	42.16 ft^3/s	21.46 ft^3/s
Area B	5.64 ft^3/s	11.28 ft^3/s	5.64 ft^3/s

The Pre-project condition and post-project condition unit hydrograph calculations were performed for the onsite areas in order to assess increased runoff mitigation. As previously mentioned, the time of concentration resulting from the onsite rational method analyses were used to establish the lag time which is required for the unit hydrographs. The pre-project unit hydrographs utilized 0% impervious area to be conservative, even though the existing project site includes 1 acre single family residential development. The pre-project unit hydrograph calculations have been included in Appendix E and the post-project unit hydrograph calculations have been included in Appendix F. The pre-project unit hydrograph watersheds are based upon the total onsite area A and B of 14.27 acres and 3.46 acres, respectively. The post-project unit hydrograph watersheds are based upon the total onsite area A and B of 13.96 acres and 3.74 acres, respectively.

The project site is required to mitigate increased runoff generated by the project site to pre-project levels. Based on the modelling performed the onsite project will be limited to the following outflow for the 100-year storm event:

- The onsite project area tributary to Area A will be limited to 14.15 ft^3/s.
- The onsite project area tributary to Area A will be limited to 3.02 ft^3/s.

This is based upon the smallest flow rate results from the delta difference between the pre-project and post project condition offsite hydrology analyses. These flow rates will be used as the maximum allowable outflow for the increased runoff mitigation analyses.

IV. HYDRAULICS AND INCREASED RUNOFF MITIGATION

The Bloomington Commerce Center SP4 incorporates subsurface storm drain to convey the flows within the project site. During the preliminary stages, the systems were sized using friction slope calculations to account for the ponded water within the basins.

The basin outlet structures were sized for the peak 100-year flow rate generated by the onsite areas. Since the basins will be routed through structures to mitigate the outflows, this is considered a conservative calculation. The basins will utilize parkway drain overflows that will outlet into Maple Avenue and Linden Avenue. The parkway drains will act as weir structures, and therefore were sized using the weir equation. The basic mechanics of the basins are such that flows shall be conveyed into the pre-treatment drainage basins via subsurface storm drains and sheet flow. Flows will then be conveyed into the subsurface systems via grate inlets or drop inlets. These will be located elevated slightly above the bottom of the pre-treatment drainage basins in order to allow for flows to pond, and sediments and debris to settle within the pre-treatment drainage basins. Flows will be retained within the subsurface basin, where flows will be treated for water quality purposes via infiltration and mitigated for increased runoff via retention and infiltration. Flows in excess of the required mitigation volume will pond back into the pre-treatment drainage basin, and overflow out of the parkway drain weir structure. The weir calculations included in Appendix G were utilized to determine the maximum 100-year water surface elevation within the pre-treatment drainage basins, which were used as the starting water surface elevations for the storm drain friction slope sizing calculations. Pre-treatment drainage basin

A has a maximum water surface elevation of 1005.85 and pre-treatment drainage basin B has a maximum water surface elevation of 1013.80.

The soffit control sizing spreadsheets were utilized to size the mainline storm drain systems designated as Lines A, B and C (shown on the Drainage Facilities Map included as Exhibit E). The laterals for these mainlines and the systems connecting the subsurface basins will be sized during final engineering. Additionally, all storm drain systems will be sized during final engineering using the Water Surface Profile Gradient Program. Detailed inlet calculations and basin calculations will also be performed during final engineering. The soffit control spreadsheets have been included in Appendix G.

The required mitigation volume for each area (Area A and Area B) was determined by finding the flow rate on the recess limb of the post-project unit hydrograph that corresponds to the existing condition flow rate determined in the hydrology section of the report. The flow rate on the recess limb must be less than or equal to the pre-project flow rate. The following tables summarize the required volumes needed to address increased runoff:

Area A – Existing Condition Flow Rate = 14.15 ft^3/s

Corresponding Flow Rate on Recess Limb of Post-Project Unit Hydrograph	Corresponding Volume (ac-ft)	Corresponding Volume (cu. ft.)
14.09 ft^3/s	4.2375	184,586

Area B – Existing Condition Flow Rate = 3.02 ft^3/s

Corresponding Flow Rate on Recess Limb of Post-Project Unit Hydrograph	Corresponding Volume (ac-ft)	Corresponding Volume (cu. ft.)
2.33 ft^3/s	1.1561	50,360

Subsurface Basin A has a total available storage volume of 201,856 cu. ft. and Subsurface Basin B has a total available storage volume of 50,867 cu. ft., therefore the subsurface basins have sufficient volume to mitigate for increased runoff.

The storm drain friction slope calculations, normal depth calculation, and basin outlet calculations have been included in Appendix G. The increased runoff mitigation calculations have been included in Appendix H.

VI. FINDINGS

The hydrology and hydraulic analyses evaluated the proposed development to determine the necessary drainage improvements required to mitigate flows for increased runoff. It has been concluded that:

1. The proposed drainage facilities will adequately convey the 100-year flows and provide flood protection to the project site.

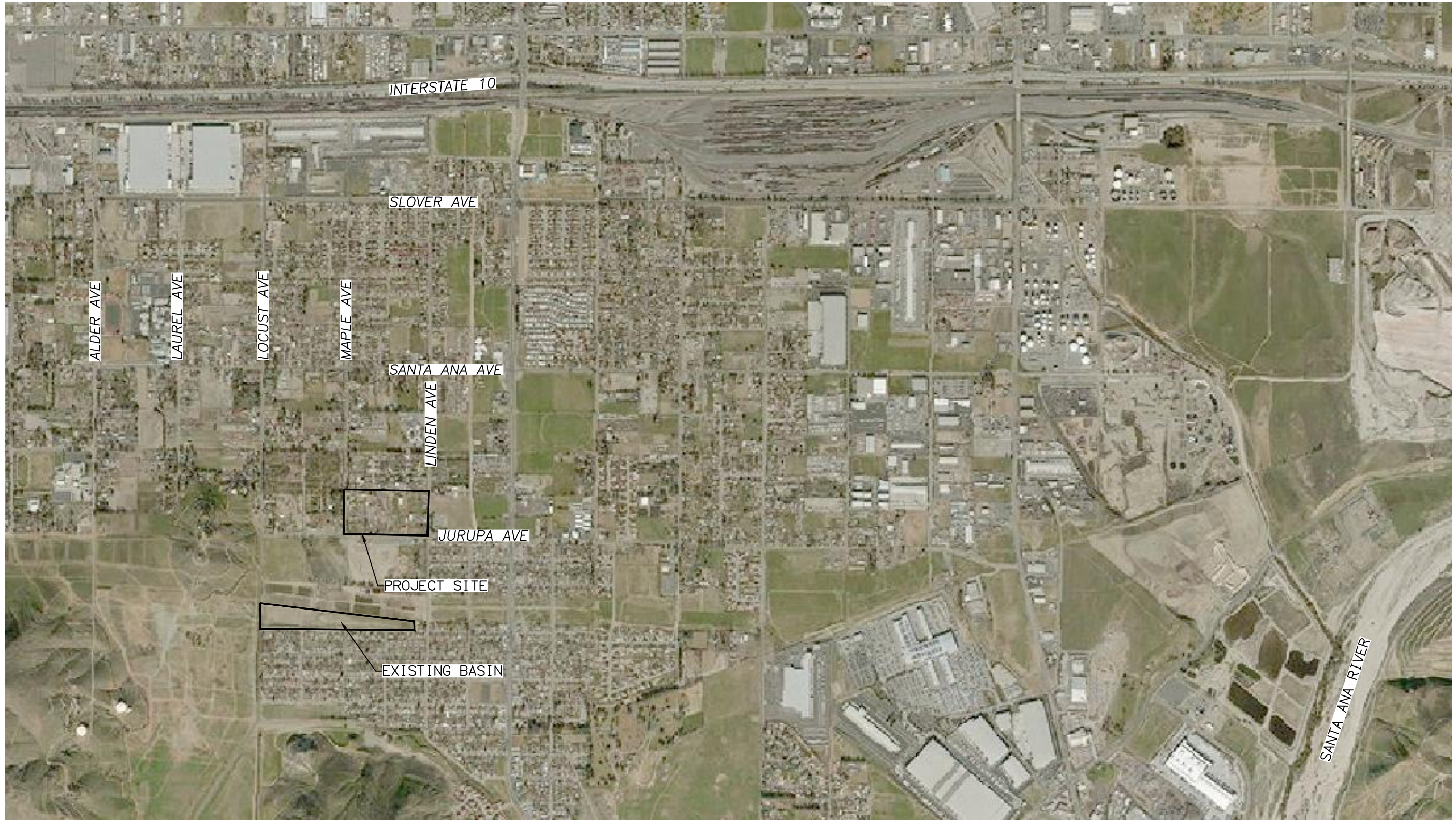
2. The proposed subsurface systems will adequately mitigate for increased runoff.

VII. REFERENCES

1. San Bernardino Flood Control Hydrology Manual, August 1986.

FIGURES

FIGURE 1: VICINITY MAP



BLOOMINGTON COMMERCE CENTER SP4
VICINITY MAP

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FIGURE 1

Drawing Name: O:\257.08.20\Engineering\WQMP\Exhibits and Figures\Figure 1-Vicinity Map.dwg
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APPENDICES

APPENDIX A: PRE-PROJECT CONDITION ONSITE AND OFFSITE RATIONAL METHOD HYDROLOGY

APPENDIX A.1: RATIONAL METHOD ANALYSIS, AREA "A"

100-YEAR

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 06/08/20

BLOOMINGTON PROJECT EXISTING CONDITION HYDROLOGY
RATIONAL METHOD ANALYSIS, 100-YEAR ANALYSIS
FILENAME: ARAEX100

Program License Serial Number 6279

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.300 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

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Process from Point/Station 101.000 to Point/Station 102.000
**** INITIAL AREA EVALUATION ****

RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.5000 Max loss rate(Fm)= 0.489(In/Hr)
Initial subarea data:
Initial area flow distance = 809.000(Ft.)
Top (of initial area) elevation = 1079.000(Ft.)
Bottom (of initial area) elevation = 1070.000(Ft.)
Difference in elevation = 9.000(Ft.)
Slope = 0.01112 s(%)= 1.11
TC = k(0.389)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 13.927 min.
Rainfall intensity = 3.123(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.759
Subarea runoff = 13.700(CFS)
Total initial stream area = 5.780(Ac.)
Pervious area fraction = 0.500
Initial area Fm value = 0.489(In/Hr)

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Process from Point/Station 102.000 to Point/Station 103.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****

Top of street segment elevation = 1070.000(Ft.)
End of street segment elevation = 1066.000(Ft.)
Length of street segment = 826.000(Ft.)
Height of curb above gutter flowline = 6.0(In.)
Width of half street (curb to crown) = 20.000(Ft.)
Distance from crown to crossfall grade break = 18.500(Ft.)
Slope from gutter to grade break (v/hz) = 0.020
Slope from grade break to crown (v/hz) = 0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line = 10.000(Ft.)
Slope from curb to property line (v/hz) = 0.020
Gutter width = 1.500(Ft.)

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Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     32.074(CFS)
Depth of flow =   0.582(Ft.), Average velocity =   2.684(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    4.09(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.000(Ft.)
Flow velocity =   2.68(Ft/s)
Travel time =    5.13 min.     TC =   19.06  min.
 Adding area flow to street
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.489(In/Hr)
Rainfall intensity =      2.587(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.730
Subarea runoff =     36.623(CFS) for   20.870(Ac.)
Total runoff =     50.323(CFS)
Effective area this stream =       26.65(Ac.)
Total Study Area (Main Stream No. 1) =       26.65(Ac.)
Area averaged Fm value =    0.489(In/Hr)
Street flow at end of street =     50.323(CFS)
Half street flow at end of street =     25.162(CFS)
Depth of flow =   0.673(Ft.), Average velocity =   3.002(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    8.65(Ft.)
Flow width (from curb towards crown)=  20.000(Ft.)


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Process from Point/Station      103.000 to Point/Station      104.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1066.000(Ft.)
End of street segment elevation =  1055.000(Ft.)
Length of street segment  =   850.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     68.508(CFS)
Depth of flow =   0.634(Ft.), Average velocity =   4.689(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    6.71(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.000(Ft.)
Flow velocity =   4.69(Ft/s)
Travel time =    3.02 min.     TC =   22.08  min.
 Adding area flow to street
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
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Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.489(In/Hr)
Rainfall intensity =      2.368(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.714
Subarea runoff =     36.199(CFS) for   24.500(Ac.)
Total runoff =     86.522(CFS)
Effective area this stream =       51.15(Ac.)
Total Study Area (Main Stream No. 1) =       51.15(Ac.)
Area averaged Fm value =    0.489(In/Hr)
Street flow at end of street =     86.522(CFS)
Half street flow at end of street =     43.261(CFS)
Depth of flow =   0.684(Ft.), Average velocity =   4.970(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    9.21(Ft.)
Flow width (from curb towards crown)=  20.000(Ft.)


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Process from Point/Station      104.000 to Point/Station      105.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
____________________________________________________________________________
Top of street segment elevation =  1055.000(Ft.)
End of street segment elevation =  1038.000(Ft.)
Length of street segment  =  1159.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =    103.609(CFS)
Depth of flow =   0.709(Ft.), Average velocity =   5.488(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =   10.45(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.000(Ft.)
Flow velocity =   5.49(Ft/s)
Travel time =    3.52 min.     TC =   25.60  min.
 Adding area flow to street
RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.8000     Max loss rate(Fm)=     0.782(In/Hr)
Rainfall intensity =      2.167(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.648
Subarea runoff =     34.057(CFS) for   34.750(Ac.)
Total runoff =    120.579(CFS)
Effective area this stream =       85.90(Ac.)
Total Study Area (Main Stream No. 1) =       85.90(Ac.)
Area averaged Fm value =    0.608(In/Hr)
Street flow at end of street =    120.579(CFS)
Half street flow at end of street =     60.290(CFS)
Depth of flow =   0.739(Ft.), Average velocity =   5.831(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
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Distance that curb overflow reaches into property =   11.95(Ft.)
Flow width (from curb towards crown)=  20.000(Ft.)


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Process from Point/Station      105.000 to Point/Station      106.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
Top of street segment elevation =  1038.000(Ft.)
End of street segment elevation =  1022.000(Ft.)
Length of street segment  =  1308.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =    129.491(CFS)
Depth of flow =   0.774(Ft.), Average velocity =   5.682(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =   13.71(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.000(Ft.)
Flow velocity =   5.68(Ft/s)
Travel time =    3.84 min.     TC =   29.43  min.
 Adding area flow to street
RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.8000     Max loss rate(Fm)=     0.782(In/Hr)
Rainfall intensity =      1.993(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.606
Subarea runoff =     17.720(CFS) for   28.620(Ac.)
Total runoff =    138.300(CFS)
Effective area this stream =      114.52(Ac.)
Total Study Area (Main Stream No. 1) =      114.52(Ac.)
Area averaged Fm value =    0.651(In/Hr)
Street flow at end of street =    138.300(CFS)
Half street flow at end of street =     69.150(CFS)
Depth of flow =   0.789(Ft.), Average velocity =   5.834(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =   14.47(Ft.)
Flow width (from curb towards crown)=  20.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.000 to Point/Station      107.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
Top of street segment elevation =  1022.000(Ft.)
End of street segment elevation =  1005.000(Ft.)
Length of street segment  =  1262.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
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Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =    148.440(CFS)
Depth of flow =   0.795(Ft.), Average velocity =   6.177(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =   14.74(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.000(Ft.)
Flow velocity =   6.18(Ft/s)
Travel time =    3.40 min.     TC =   32.84  min.
 Adding area flow to street
RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.8000     Max loss rate(Fm)=     0.782(In/Hr)
Rainfall intensity =      1.866(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.572
Subarea runoff =     20.096(CFS) for   33.980(Ac.)
Total runoff =    158.396(CFS)
Effective area this stream =      148.50(Ac.)
Total Study Area (Main Stream No. 1) =      148.50(Ac.)
Area averaged Fm value =    0.681(In/Hr)
Street flow at end of street =    158.396(CFS)
Half street flow at end of street =     79.198(CFS)
Depth of flow =   0.811(Ft.), Average velocity =   6.340(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =   15.53(Ft.)
Flow width (from curb towards crown)=  20.000(Ft.)
End of computations, Total Study Area =          148.50 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.697
Area averaged SCS curve number =  32.0
```

10-YEAR

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 06/09/20

BLOOMINGTON PROJECT EXISTING CONDITION HYDROLOGY
RATIONAL METHOD ANALYSIS, 10-YEAR ANALYSIS
FILENAME: ARAEX10

Program License Serial Number 6279

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.820 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 101.000 to Point/Station 102.000
**** INITIAL AREA EVALUATION ****

RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.5000 Max loss rate(Fm)= 0.489(In/Hr)
Initial subarea data:
Initial area flow distance = 809.000(Ft.)
Top (of initial area) elevation = 1079.000(Ft.)
Bottom (of initial area) elevation = 1070.000(Ft.)
Difference in elevation = 9.000(Ft.)
Slope = 0.01112 s(%)= 1.11
TC = k(0.389)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 13.927 min.
Rainfall intensity = 1.970(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.677
Subarea runoff = 7.703(CFS)
Total initial stream area = 5.780(Ac.)
Pervious area fraction = 0.500
Initial area Fm value = 0.489(In/Hr)

++

Process from Point/Station 102.000 to Point/Station 103.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****

Top of street segment elevation = 1070.000(Ft.)
End of street segment elevation = 1066.000(Ft.)
Length of street segment = 826.000(Ft.)
Height of curb above gutter flowline = 6.0(In.)
Width of half street (curb to crown) = 20.000(Ft.)
Distance from crown to crossfall grade break = 18.500(Ft.)
Slope from gutter to grade break (v/hz) = 0.020
Slope from grade break to crown (v/hz) = 0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line = 10.000(Ft.)
Slope from curb to property line (v/hz) = 0.020
Gutter width = 1.500(Ft.)

```
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     17.114(CFS)
Depth of flow =   0.478(Ft.), Average velocity =   2.283(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  19.174(Ft.)
Flow velocity =   2.28(Ft/s)
Travel time =    6.03 min.     TC =   19.96  min.
 Adding area flow to street
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.489(In/Hr)
Rainfall intensity =      1.587(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.623
Subarea runoff =     18.642(CFS) for   20.870(Ac.)
Total runoff =     26.344(CFS)
Effective area this stream =       26.65(Ac.)
Total Study Area (Main Stream No. 1) =       26.65(Ac.)
Area averaged Fm value =    0.489(In/Hr)
Street flow at end of street =     26.344(CFS)
Half street flow at end of street =     13.172(CFS)
Depth of flow =   0.546(Ft.), Average velocity =   2.556(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    2.32(Ft.)
Flow width (from curb towards crown)=  20.000(Ft.)


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Process from Point/Station      103.000 to Point/Station      104.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
____________________________________________________________________________
Top of street segment elevation =  1066.000(Ft.)
End of street segment elevation =  1055.000(Ft.)
Length of street segment  =   850.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     35.081(CFS)
Depth of flow =   0.512(Ft.), Average velocity =   3.971(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    0.60(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.000(Ft.)
Flow velocity =   3.97(Ft/s)
Travel time =    3.57 min.     TC =   23.52  min.
 Adding area flow to street
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
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Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.489(In/Hr)
Rainfall intensity =      1.438(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.594
Subarea runoff =     17.353(CFS) for   24.500(Ac.)
Total runoff =     43.698(CFS)
Effective area this stream =       51.15(Ac.)
Total Study Area (Main Stream No. 1) =       51.15(Ac.)
Area averaged Fm value =    0.489(In/Hr)
Street flow at end of street =     43.698(CFS)
Half street flow at end of street =     21.849(CFS)
Depth of flow =   0.549(Ft.), Average velocity =   4.193(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    2.45(Ft.)
Flow width (from curb towards crown)=  20.000(Ft.)


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Process from Point/Station      104.000 to Point/Station      105.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1055.000(Ft.)
End of street segment elevation =  1038.000(Ft.)
Length of street segment  =  1159.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     48.741(CFS)
Depth of flow =   0.557(Ft.), Average velocity =   4.516(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    2.86(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.000(Ft.)
Flow velocity =   4.52(Ft/s)
Travel time =    4.28 min.     TC =   27.80  min.
 Adding area flow to street
RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.8000     Max loss rate(Fm)=     0.782(In/Hr)
Rainfall intensity =      1.301(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.480
Subarea runoff =      9.909(CFS) for   34.750(Ac.)
Total runoff =     53.607(CFS)
Effective area this stream =       85.90(Ac.)
Total Study Area (Main Stream No. 1) =       85.90(Ac.)
Area averaged Fm value =    0.608(In/Hr)
Street flow at end of street =     53.607(CFS)
Half street flow at end of street =     26.803(CFS)
Depth of flow =   0.574(Ft.), Average velocity =   4.624(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    3.72(Ft.)
Flow width (from curb towards crown)=  20.000(Ft.)
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Process from Point/Station      105.000 to Point/Station      106.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
Top of street segment elevation =  1038.000(Ft.)
End of street segment elevation =  1022.000(Ft.)
Length of street segment  =  1308.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     53.989(CFS)
Depth of flow =   0.593(Ft.), Average velocity =   4.327(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    4.63(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.000(Ft.)
Flow velocity =   4.33(Ft/s)
Travel time =    5.04 min.     TC =   32.84  min.
 Adding area flow to street
RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.8000     Max loss rate(Fm)=     0.782(In/Hr)
Rainfall intensity =      1.177(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.402
Subarea runoff =      0.609(CFS) for   28.620(Ac.)
Total runoff =     54.215(CFS)
Effective area this stream =      114.52(Ac.)
Total Study Area (Main Stream No. 1) =      114.52(Ac.)
Area averaged Fm value =    0.651(In/Hr)
Street flow at end of street =     54.215(CFS)
Half street flow at end of street =     27.108(CFS)
Depth of flow =   0.593(Ft.), Average velocity =   4.331(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    4.67(Ft.)
Flow width (from curb towards crown)=  20.000(Ft.)


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Process from Point/Station      106.000 to Point/Station      107.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
Top of street segment elevation =  1022.000(Ft.)
End of street segment elevation =  1005.000(Ft.)
Length of street segment  =  1262.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
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Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     54.284(CFS)
Depth of flow =   0.585(Ft.), Average velocity =   4.492(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    4.23(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.000(Ft.)
Flow velocity =   4.49(Ft/s)
Travel time =    4.68 min.     TC =   37.52  min.
 Adding area flow to street
RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.8000     Max loss rate(Fm)=     0.782(In/Hr)
The area added to the existing stream causes a
a lower flow rate of Q =     54.203(CFS)
therefore the upstream flow rate of Q =     54.215(CFS) is being used
Rainfall intensity =      1.087(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.336
Subarea runoff =      0.000(CFS) for   33.980(Ac.)
Total runoff =     54.215(CFS)
Effective area this stream =      148.50(Ac.)
Total Study Area (Main Stream No. 1) =      148.50(Ac.)
Area averaged Fm value =    0.681(In/Hr)
Street flow at end of street =     54.215(CFS)
Half street flow at end of street =     27.108(CFS)
Depth of flow =   0.584(Ft.), Average velocity =   4.491(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    4.22(Ft.)
Flow width (from curb towards crown)=  20.000(Ft.)
End of computations, Total Study Area =          148.50 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.697
Area averaged SCS curve number =  32.0
```

APPENDIX A.2: RATIONAL METHOD ANALYSIS, AREA "B"

100-YEAR

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 06/08/20

BLOOMINTON PROJECT EXISTING CONDITION HYDROLOGY
RATIONAL METHOD ANALYSIS, 100-YEAR STORM EVENT
FILENAME: ARBEX100

Program License Serial Number 6279

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.300 (In.)
Slope used for rainfall intensity curve b = 0.5000
Soil antecedent moisture condition (AMC) = 2

++
Process from Point/Station 201.000 to Point/Station 202.000
**** INITIAL AREA EVALUATION ****

RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.5000 Max loss rate(Fm)= 0.489(In/Hr)
Initial subarea data:
Initial area flow distance = 604.000(Ft.)
Top (of initial area) elevation = 1078.000(Ft.)
Bottom (of initial area) elevation = 1070.000(Ft.)
Difference in elevation = 8.000(Ft.)
Slope = 0.01325 s(%)= 1.32
TC = k(0.389)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 11.966 min.
Rainfall intensity = 2.911(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.749
Subarea runoff = 13.995(CFS)
Total initial stream area = 6.420(Ac.)
Pervious area fraction = 0.500
Initial area Fm value = 0.489(In/Hr)

++
Process from Point/Station 202.000 to Point/Station 203.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****

Top of street segment elevation = 1070.000(Ft.)
End of street segment elevation = 1065.000(Ft.)
Length of street segment = 906.000(Ft.)
Height of curb above gutter flowline = 6.0(In.)
Width of half street (curb to crown) = 20.000(Ft.)
Distance from crown to crossfall grade break = 18.500(Ft.)
Slope from gutter to grade break (v/hz) = 0.020
Slope from grade break to crown (v/hz) = 0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line = 10.000(Ft.)
Slope from curb to property line (v/hz) = 0.020
Gutter width = 1.500(Ft.)

```
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     17.329(CFS)
Depth of flow =   0.471(Ft.), Average velocity =   2.406(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.789(Ft.)
Flow velocity =   2.41(Ft/s)
Travel time =    6.28 min.     TC =   18.24  min.
 Adding area flow to street
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.489(In/Hr)
Rainfall intensity =      2.358(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.713
Subarea runoff =      6.557(CFS) for    5.800(Ac.)
Total runoff =     20.552(CFS)
Effective area this stream =       12.22(Ac.)
Total Study Area (Main Stream No. 1) =       12.22(Ac.)
Area averaged Fm value =    0.489(In/Hr)
Street flow at end of street =     20.552(CFS)
Half street flow at end of street =     10.276(CFS)
Depth of flow =   0.496(Ft.), Average velocity =   2.512(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  20.000(Ft.)


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Process from Point/Station      202.000 to Point/Station      203.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.489(In/Hr)
Time of concentration =    18.24 min.
Rainfall intensity =      2.358(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.713
Subarea runoff =     15.776(CFS) for    9.380(Ac.)
Total runoff =     36.328(CFS)
Effective area this stream =       21.60(Ac.)
Total Study Area (Main Stream No. 1) =       21.60(Ac.)
Area averaged Fm value =    0.489(In/Hr)


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Process from Point/Station      203.000 to Point/Station      204.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1065.000(Ft.)
End of street segment elevation =  1043.000(Ft.)
Length of street segment  =  1472.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
```

```
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     39.015(CFS)
Depth of flow =   0.518(Ft.), Average velocity =   4.304(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    0.88(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.000(Ft.)
Flow velocity =   4.30(Ft/s)
Travel time =    5.70 min.     TC =   23.94  min.
 Adding area flow to street
RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.8000     Max loss rate(Fm)=     0.782(In/Hr)
Rainfall intensity =      2.058(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.647
Subarea runoff =      5.185(CFS) for    9.590(Ac.)
Total runoff =     41.513(CFS)
Effective area this stream =       31.19(Ac.)
Total Study Area (Main Stream No. 1) =       31.19(Ac.)
Area averaged Fm value =    0.579(In/Hr)
Street flow at end of street =     41.513(CFS)
Half street flow at end of street =     20.756(CFS)
Depth of flow =   0.528(Ft.), Average velocity =   4.371(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    1.40(Ft.)
Flow width (from curb towards crown)=  20.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      204.000 to Point/Station      205.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1043.000(Ft.)
End of street segment elevation =  1035.000(Ft.)
Length of street segment  =   648.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     45.029(CFS)
Depth of flow =   0.558(Ft.), Average velocity =   4.150(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    2.92(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.000(Ft.)
Flow velocity =   4.15(Ft/s)
Travel time =    2.60 min.     TC =   26.54  min.
 Adding area flow to street
RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
```

```
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.8000     Max loss rate(Fm)=     0.782(In/Hr)
Rainfall intensity =      1.954(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.612
Subarea runoff =      6.854(CFS) for    9.250(Ac.)
Total runoff =     48.367(CFS)
Effective area this stream =       40.44(Ac.)
Total Study Area (Main Stream No. 1) =       40.44(Ac.)
Area averaged Fm value =    0.626(In/Hr)
Street flow at end of street =     48.367(CFS)
Half street flow at end of street =     24.184(CFS)
Depth of flow =   0.571(Ft.), Average velocity =   4.225(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    3.56(Ft.)
Flow width (from curb towards crown)=  20.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      205.000 to Point/Station      206.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1035.000(Ft.)
End of street segment elevation =  1014.000(Ft.)
Length of street segment  =  1947.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     52.082(CFS)
Depth of flow =   0.598(Ft.), Average velocity =   4.090(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    4.89(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.000(Ft.)
Flow velocity =   4.09(Ft/s)
Travel time =    7.93 min.     TC =   34.48  min.
 Adding area flow to street
RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.8000     Max loss rate(Fm)=     0.782(In/Hr)
Rainfall intensity =      1.715(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.545
Subarea runoff =      7.289(CFS) for   19.070(Ac.)
Total runoff =     55.656(CFS)
Effective area this stream =       59.51(Ac.)
Total Study Area (Main Stream No. 1) =       59.51(Ac.)
Area averaged Fm value =    0.676(In/Hr)
Street flow at end of street =     55.656(CFS)
Half street flow at end of street =     27.828(CFS)
Depth of flow =   0.611(Ft.), Average velocity =   4.158(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
```

```
Distance that curb overflow reaches into property =    5.54(Ft.)
Flow width (from curb towards crown)=  20.000(Ft.)
End of computations, Total Study Area =           59.51 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.691
Area averaged SCS curve number =  32.0
```

10-YEAR

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 06/08/20

BLOOMINTON PROJECT EXISTING CONDITION HYDROLOGY
RATIONAL METHOD ANALYSIS, 10-YEAR STORM EVENT
FILENAME: ARBEX10

Program License Serial Number 6279

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.820 (In.)
Slope used for rainfall intensity curve b = 0.5000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 201.000 to Point/Station 202.000
**** INITIAL AREA EVALUATION ****

RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.5000 Max loss rate(Fm)= 0.489(In/Hr)
Initial subarea data:
Initial area flow distance = 604.000(Ft.)
Top (of initial area) elevation = 1078.000(Ft.)
Bottom (of initial area) elevation = 1070.000(Ft.)
Difference in elevation = 8.000(Ft.)
Slope = 0.01325 s(%)= 1.32
TC = k(0.389)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 11.966 min.
Rainfall intensity = 1.836(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.660
Subarea runoff = 7.784(CFS)
Total initial stream area = 6.420(Ac.)
Pervious area fraction = 0.500
Initial area Fm value = 0.489(In/Hr)

++

Process from Point/Station 202.000 to Point/Station 203.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****

Top of street segment elevation = 1070.000(Ft.)
End of street segment elevation = 1065.000(Ft.)
Length of street segment = 906.000(Ft.)
Height of curb above gutter flowline = 6.0(In.)
Width of half street (curb to crown) = 20.000(Ft.)
Distance from crown to crossfall grade break = 18.500(Ft.)
Slope from gutter to grade break (v/hz) = 0.020
Slope from grade break to crown (v/hz) = 0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line = 10.000(Ft.)
Slope from curb to property line (v/hz) = 0.020
Gutter width = 1.500(Ft.)

```
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      9.233(CFS)
Depth of flow =   0.390(Ft.), Average velocity =   2.060(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  14.729(Ft.)
Flow velocity =   2.06(Ft/s)
Travel time =    7.33 min.     TC =   19.29  min.
 Adding area flow to street
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.489(In/Hr)
Rainfall intensity =      1.446(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.596
Subarea runoff =      2.742(CFS) for    5.800(Ac.)
Total runoff =     10.526(CFS)
Effective area this stream =       12.22(Ac.)
Total Study Area (Main Stream No. 1) =       12.22(Ac.)
Area averaged Fm value =    0.489(In/Hr)
Street flow at end of street =     10.526(CFS)
Half street flow at end of street =      5.263(CFS)
Depth of flow =   0.405(Ft.), Average velocity =   2.128(Ft/s)
Flow width (from curb towards crown)=  15.499(Ft.)


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Process from Point/Station      202.000 to Point/Station      203.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.489(In/Hr)
Time of concentration =    19.29 min.
Rainfall intensity =      1.446(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.596
Subarea runoff =      8.080(CFS) for    9.380(Ac.)
Total runoff =     18.606(CFS)
Effective area this stream =       21.60(Ac.)
Total Study Area (Main Stream No. 1) =       21.60(Ac.)
Area averaged Fm value =    0.489(In/Hr)


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Process from Point/Station      203.000 to Point/Station      204.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1065.000(Ft.)
End of street segment elevation =  1043.000(Ft.)
Length of street segment  =  1472.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(In.)
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```
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     18.677(CFS)
Depth of flow =   0.414(Ft.), Average velocity =   3.567(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  15.959(Ft.)
Flow velocity =   3.57(Ft/s)
Travel time =    6.88 min.     TC =   26.17  min.
 Adding area flow to street
RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.8000     Max loss rate(Fm)=     0.782(In/Hr)
The area added to the existing stream causes a
a lower flow rate of Q =     18.595(CFS)
therefore the upstream flow rate of Q =     18.606(CFS) is being used
Rainfall intensity =      1.242(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.480
Subarea runoff =      0.000(CFS) for    9.590(Ac.)
Total runoff =     18.606(CFS)
Effective area this stream =       31.19(Ac.)
Total Study Area (Main Stream No. 1) =       31.19(Ac.)
Area averaged Fm value =    0.579(In/Hr)
Street flow at end of street =     18.606(CFS)
Half street flow at end of street =      9.303(CFS)
Depth of flow =   0.414(Ft.), Average velocity =   3.563(Ft/s)
Flow width (from curb towards crown)=  15.935(Ft.)


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Process from Point/Station      204.000 to Point/Station      205.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1043.000(Ft.)
End of street segment elevation =  1035.000(Ft.)
Length of street segment  =   648.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     19.307(CFS)
Depth of flow =   0.430(Ft.), Average velocity =   3.346(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  16.774(Ft.)
Flow velocity =   3.35(Ft/s)
Travel time =    3.23 min.     TC =   29.40  min.
 Adding area flow to street
RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.8000     Max loss rate(Fm)=     0.782(In/Hr)
Rainfall intensity =      1.171(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.419
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Subarea runoff =      1.261(CFS) for    9.250(Ac.)
Total runoff =     19.867(CFS)
Effective area this stream =       40.44(Ac.)
Total Study Area (Main Stream No. 1) =       40.44(Ac.)
Area averaged Fm value =    0.626(In/Hr)
Street flow at end of street =     19.867(CFS)
Half street flow at end of street =      9.933(CFS)
Depth of flow =   0.434(Ft.), Average velocity =   3.370(Ft/s)
Flow width (from curb towards crown)=  16.960(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      205.000 to Point/Station      206.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1035.000(Ft.)
End of street segment elevation =  1014.000(Ft.)
Length of street segment  =  1947.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     19.940(CFS)
Depth of flow =   0.444(Ft.), Average velocity =   3.205(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  17.433(Ft.)
Flow velocity =   3.21(Ft/s)
Travel time =   10.12 min.     TC =   39.52  min.
 Adding area flow to street
RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.8000     Max loss rate(Fm)=     0.782(In/Hr)
The area added to the existing stream causes a
a lower flow rate of Q =     17.918(CFS)
therefore the upstream flow rate of Q =     19.867(CFS) is being used
Rainfall intensity =      1.010(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.298
Subarea runoff =      0.000(CFS) for   19.070(Ac.)
Total runoff =     19.867(CFS)
Effective area this stream =       59.51(Ac.)
Total Study Area (Main Stream No. 1) =       59.51(Ac.)
Area averaged Fm value =    0.676(In/Hr)
Street flow at end of street =     19.867(CFS)
Half street flow at end of street =      9.933(CFS)
Depth of flow =   0.443(Ft.), Average velocity =   3.203(Ft/s)
Flow width (from curb towards crown)=  17.408(Ft.)
End of computations, Total Study Area =           59.51 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.691
Area averaged SCS curve number =  32.0
```

APPENDIX B: PRE-PROJECT CONDITION ONSITE RATIONAL METHOD HYDROLOGY

APPENDIX B.1: RATIONAL METHOD ANALYSIS, AREAS "A"

100-YEAR

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 06/08/20

BLOOMINGTON PROJECT EXISTING CONDITION ONSITE HYDROLOGY
RATIONAL METHOD ANALYSIS, 100-YEAR ANALYSIS
FILENAME: ARAAEX100

Program License Serial Number 6279

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.300 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 100.100 to Point/Station 100.200
**** INITIAL AREA EVALUATION ****

RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.8000 Max loss rate(Fm)= 0.782(In/Hr)
Initial subarea data:
Initial area flow distance = 639.000(Ft.)
Top (of initial area) elevation = 1026.000(Ft.)
Bottom (of initial area) elevation = 1015.000(Ft.)
Difference in elevation = 11.000(Ft.)
Slope = 0.01721 s(%)= 1.72
TC = k(0.469)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 14.002 min.
Rainfall intensity = 3.113(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.674
Subarea runoff = 11.346(CFS)
Total initial stream area = 5.410(Ac.)
Pervious area fraction = 0.800
Initial area Fm value = 0.782(In/Hr)

++

Process from Point/Station 100.200 to Point/Station 100.300
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1015.000(Ft.)
Downstream point elevation = 1006.400(Ft.)
Channel length thru subarea = 614.000(Ft.)
Channel base width = 5.000(Ft.)
Slope or 'Z' of left channel bank = 20.000
Slope or 'Z' of right channel bank = 20.000
Estimated mean flow rate at midpoint of channel = 17.868(CFS)
Manning's 'N' = 0.030
Maximum depth of channel = 1.000(Ft.)
Flow(q) thru subarea = 17.868(CFS)
Depth of flow = 0.479(Ft.), Average velocity = 2.560(Ft/s)
Channel flow top width = 24.151(Ft.)

```
Flow Velocity =    2.56(Ft/s)
Travel time  =    4.00 min.
Time of concentration =   18.00 min.
Critical depth =      0.441(Ft.)
 Adding area flow to channel
RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.8000     Max loss rate(Fm)=     0.782(In/Hr)
Rainfall intensity =      2.677(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.637
Subarea runoff =     12.991(CFS) for    8.860(Ac.)
Total runoff =     24.337(CFS)
Effective area this stream =       14.27(Ac.)
Total Study Area (Main Stream No. 1) =       14.27(Ac.)
Area averaged Fm value =    0.782(In/Hr)
Depth of flow =   0.549(Ft.), Average velocity =   2.772(Ft/s)
Critical depth =      0.512(Ft.)
End of computations, Total Study Area =           14.27 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.800
Area averaged SCS curve number =  32.0
```

10-YEAR

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 06/09/20

BLOOMINGTON PROJECT EXISTING CONDITION ONSITE HYDROLOGY
RATIONAL METHOD ANALYSIS, 10-YEAR ANALYSIS
FILENAME: ARAAEX10

Program License Serial Number 6279

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.820 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

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Process from Point/Station 100.100 to Point/Station 100.200
**** INITIAL AREA EVALUATION ****

RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.8000 Max loss rate(Fm)= 0.782(In/Hr)
Initial subarea data:
Initial area flow distance = 639.000(Ft.)
Top (of initial area) elevation = 1026.000(Ft.)
Bottom (of initial area) elevation = 1015.000(Ft.)
Difference in elevation = 11.000(Ft.)
Slope = 0.01721 s(%)= 1.72
TC = k(0.469)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 14.002 min.
Rainfall intensity = 1.963(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.541
Subarea runoff = 5.751(CFS)
Total initial stream area = 5.410(Ac.)
Pervious area fraction = 0.800
Initial area Fm value = 0.782(In/Hr)

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Process from Point/Station 100.200 to Point/Station 100.300
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 1015.000(Ft.)
Downstream point elevation = 1006.400(Ft.)
Channel length thru subarea = 614.000(Ft.)
Channel base width = 5.000(Ft.)
Slope or 'Z' of left channel bank = 20.000
Slope or 'Z' of right channel bank = 20.000
Estimated mean flow rate at midpoint of channel = 8.437(CFS)
Manning's 'N' = 0.030
Maximum depth of channel = 1.000(Ft.)
Flow(q) thru subarea = 8.437(CFS)
Depth of flow = 0.340(Ft.), Average velocity = 2.106(Ft/s)
Channel flow top width = 18.587(Ft.)

```
Flow Velocity =    2.11(Ft/s)
Travel time  =    4.86 min.
Time of concentration =   18.86 min.
Critical depth =      0.305(Ft.)
 Adding area flow to channel
RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.8000     Max loss rate(Fm)=     0.782(In/Hr)
Rainfall intensity =      1.642(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.471
Subarea runoff =      5.291(CFS) for    8.860(Ac.)
Total runoff =     11.041(CFS)
Effective area this stream =       14.27(Ac.)
Total Study Area (Main Stream No. 1) =       14.27(Ac.)
Area averaged Fm value =    0.782(In/Hr)
Depth of flow =   0.385(Ft.), Average velocity =   2.260(Ft/s)
Critical depth =      0.348(Ft.)
End of computations, Total Study Area =           14.27 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.800
Area averaged SCS curve number =  32.0
```

APPENDIX B.2: RATIONAL METHOD ANALYSIS, AREAS "B"

100-YEAR

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 06/08/20

BLOOMINGTON PROJECT EXISTING CONDITION ONSITE HYDROLOGY
RATIONAL METHOD ANALYSIS, 100-YEAR ANALYSIS
FILENAME: ARBBEX100

Program License Serial Number 6279

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.300 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 200.100 to Point/Station 200.200
**** INITIAL AREA EVALUATION ****

RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.8000 Max loss rate(Fm)= 0.782(In/Hr)
Initial subarea data:
Initial area flow distance = 713.000(Ft.)
Top (of initial area) elevation = 1024.000(Ft.)
Bottom (of initial area) elevation = 1014.000(Ft.)
Difference in elevation = 10.000(Ft.)
Slope = 0.01403 s(%)= 1.40
TC = k(0.469)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 15.241 min.
Rainfall intensity = 2.958(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.662
Subarea runoff = 6.776(CFS)
Total initial stream area = 3.460(Ac.)
Pervious area fraction = 0.800
Initial area Fm value = 0.782(In/Hr)
End of computations, Total Study Area = 3.46 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.800
Area averaged SCS curve number = 32.0

10-YEAR

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 06/09/20

BLOOMINGTON PROJECT EXISTING CONDITION ONSITE HYDROLOGY
RATIONAL METHOD ANALYSIS, 10-YEAR ANALYSIS
FILENAME: ARBBEX10

Program License Serial Number 6279

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.820 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 200.100 to Point/Station 200.200
**** INITIAL AREA EVALUATION ****

RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.8000 Max loss rate(Fm)= 0.782(In/Hr)
Initial subarea data:
Initial area flow distance = 713.000(Ft.)
Top (of initial area) elevation = 1024.000(Ft.)
Bottom (of initial area) elevation = 1014.000(Ft.)
Difference in elevation = 10.000(Ft.)
Slope = 0.01403 s(%)= 1.40
TC = k(0.469)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 15.241 min.
Rainfall intensity = 1.866(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.523
Subarea runoff = 3.375(CFS)
Total initial stream area = 3.460(Ac.)
Pervious area fraction = 0.800
Initial area Fm value = 0.782(In/Hr)
End of computations, Total Study Area = 3.46 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.800
Area averaged SCS curve number = 32.0

APPENDIX C: POST-PROJECT CONDITION OFFSITE RATIONAL METHOD HYDROLOGY

APPENDIX C.1: RATIONAL METHOD ANALYSIS, AREAS "A"

100-YEAR

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 06/22/20

BLOOMINGTON PROJECT POST PROJECT CONDITION HYDROLOGY
RATIONAL METHOD ANALYSIS, 100-YEAR ANALYSIS
FILENAME: ARAPOST100

Program License Serial Number 6279

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.300 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

++
Process from Point/Station 101.000 to Point/Station 102.000
**** INITIAL AREA EVALUATION ****

RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.5000 Max loss rate(Fm)= 0.489(In/Hr)
Initial subarea data:
Initial area flow distance = 809.000(Ft.)
Top (of initial area) elevation = 1079.000(Ft.)
Bottom (of initial area) elevation = 1070.000(Ft.)
Difference in elevation = 9.000(Ft.)
Slope = 0.01112 s(%)= 1.11
TC = k(0.389)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 13.927 min.
Rainfall intensity = 3.123(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.759
Subarea runoff = 13.700(CFS)
Total initial stream area = 5.780(Ac.)
Pervious area fraction = 0.500
Initial area Fm value = 0.489(In/Hr)

++
Process from Point/Station 102.000 to Point/Station 103.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****

Top of street segment elevation = 1070.000(Ft.)
End of street segment elevation = 1066.000(Ft.)
Length of street segment = 826.000(Ft.)
Height of curb above gutter flowline = 6.0(In.)
Width of half street (curb to crown) = 20.000(Ft.)
Distance from crown to crossfall grade break = 18.500(Ft.)
Slope from gutter to grade break (v/hz) = 0.020
Slope from grade break to crown (v/hz) = 0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line = 10.000(Ft.)
Slope from curb to property line (v/hz) = 0.020
Gutter width = 1.500(Ft.)

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Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     32.074(CFS)
Depth of flow =   0.582(Ft.), Average velocity =   2.684(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    4.09(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.000(Ft.)
Flow velocity =   2.68(Ft/s)
Travel time =    5.13 min.     TC =   19.06  min.
 Adding area flow to street
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.489(In/Hr)
Rainfall intensity =      2.587(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.730
Subarea runoff =     36.623(CFS) for   20.870(Ac.)
Total runoff =     50.323(CFS)
Effective area this stream =       26.65(Ac.)
Total Study Area (Main Stream No. 1) =       26.65(Ac.)
Area averaged Fm value =    0.489(In/Hr)
Street flow at end of street =     50.323(CFS)
Half street flow at end of street =     25.162(CFS)
Depth of flow =   0.673(Ft.), Average velocity =   3.002(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    8.65(Ft.)
Flow width (from curb towards crown)=  20.000(Ft.)


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Process from Point/Station      103.000 to Point/Station      104.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1066.000(Ft.)
End of street segment elevation =  1055.000(Ft.)
Length of street segment  =   850.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     68.508(CFS)
Depth of flow =   0.634(Ft.), Average velocity =   4.689(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    6.71(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.000(Ft.)
Flow velocity =   4.69(Ft/s)
Travel time =    3.02 min.     TC =   22.08  min.
 Adding area flow to street
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
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Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.489(In/Hr)
Rainfall intensity =      2.368(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.714
Subarea runoff =     36.199(CFS) for   24.500(Ac.)
Total runoff =     86.522(CFS)
Effective area this stream =       51.15(Ac.)
Total Study Area (Main Stream No. 1) =       51.15(Ac.)
Area averaged Fm value =    0.489(In/Hr)
Street flow at end of street =     86.522(CFS)
Half street flow at end of street =     43.261(CFS)
Depth of flow =   0.684(Ft.), Average velocity =   4.970(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    9.21(Ft.)
Flow width (from curb towards crown)=  20.000(Ft.)


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Process from Point/Station      104.000 to Point/Station      105.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
____________________________________________________________________________
Top of street segment elevation =  1055.000(Ft.)
End of street segment elevation =  1038.000(Ft.)
Length of street segment  =  1159.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =    103.609(CFS)
Depth of flow =   0.709(Ft.), Average velocity =   5.488(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =   10.45(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.000(Ft.)
Flow velocity =   5.49(Ft/s)
Travel time =    3.52 min.     TC =   25.60  min.
 Adding area flow to street
RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.8000     Max loss rate(Fm)=     0.782(In/Hr)
Rainfall intensity =      2.167(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.648
Subarea runoff =     34.057(CFS) for   34.750(Ac.)
Total runoff =    120.579(CFS)
Effective area this stream =       85.90(Ac.)
Total Study Area (Main Stream No. 1) =       85.90(Ac.)
Area averaged Fm value =    0.608(In/Hr)
Street flow at end of street =    120.579(CFS)
Half street flow at end of street =     60.290(CFS)
Depth of flow =   0.739(Ft.), Average velocity =   5.831(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
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Distance that curb overflow reaches into property =   11.95(Ft.)
Flow width (from curb towards crown)=  20.000(Ft.)


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Process from Point/Station      105.000 to Point/Station      106.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
Top of street segment elevation =  1038.000(Ft.)
End of street segment elevation =  1022.000(Ft.)
Length of street segment  =  1308.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =    129.491(CFS)
Depth of flow =   0.774(Ft.), Average velocity =   5.682(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =   13.71(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.000(Ft.)
Flow velocity =   5.68(Ft/s)
Travel time =    3.84 min.     TC =   29.43  min.
 Adding area flow to street
RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.8000     Max loss rate(Fm)=     0.782(In/Hr)
Rainfall intensity =      1.993(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.606
Subarea runoff =     17.720(CFS) for   28.620(Ac.)
Total runoff =    138.300(CFS)
Effective area this stream =      114.52(Ac.)
Total Study Area (Main Stream No. 1) =      114.52(Ac.)
Area averaged Fm value =    0.651(In/Hr)
Street flow at end of street =    138.300(CFS)
Half street flow at end of street =     69.150(CFS)
Depth of flow =   0.789(Ft.), Average velocity =   5.834(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =   14.47(Ft.)
Flow width (from curb towards crown)=  20.000(Ft.)


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Process from Point/Station      106.000 to Point/Station      107.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
Top of street segment elevation =  1022.000(Ft.)
End of street segment elevation =  1005.000(Ft.)
Length of street segment  =  1262.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
```

```
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =    141.351(CFS)
Depth of flow =   0.783(Ft.), Average velocity =   6.058(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =   14.16(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.000(Ft.)
Flow velocity =   6.06(Ft/s)
Travel time =    3.47 min.     TC =   32.91  min.
 Adding area flow to street
RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.8000     Max loss rate(Fm)=     0.782(In/Hr)
Rainfall intensity =      1.864(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.576
Subarea runoff =      5.945(CFS) for   19.760(Ac.)
Total runoff =    144.245(CFS)
Effective area this stream =      134.28(Ac.)
Total Study Area (Main Stream No. 1) =      134.28(Ac.)
Area averaged Fm value =    0.671(In/Hr)
Street flow at end of street =    144.245(CFS)
Half street flow at end of street =     72.122(CFS)
Depth of flow =   0.788(Ft.), Average velocity =   6.107(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =   14.40(Ft.)
Flow width (from curb towards crown)=  20.000(Ft.)
End of computations, Total Study Area =          134.28 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.686
Area averaged SCS curve number =  32.0
```

10-YEAR

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 06/22/20

BLOOMINGTON PROJECT POST PROJECT CONDITION HYDROLOGY
RATIONAL METHOD ANALYSIS, 10-YEAR ANALYSIS
FILENAME: ARAPOST10

Program License Serial Number 6279

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.820 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 101.000 to Point/Station 102.000
**** INITIAL AREA EVALUATION ****

RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.5000 Max loss rate(Fm)= 0.489(In/Hr)
Initial subarea data:
Initial area flow distance = 809.000(Ft.)
Top (of initial area) elevation = 1079.000(Ft.)
Bottom (of initial area) elevation = 1070.000(Ft.)
Difference in elevation = 9.000(Ft.)
Slope = 0.01112 s(%)= 1.11
TC = k(0.389)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 13.927 min.
Rainfall intensity = 1.970(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.677
Subarea runoff = 7.703(CFS)
Total initial stream area = 5.780(Ac.)
Pervious area fraction = 0.500
Initial area Fm value = 0.489(In/Hr)

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Process from Point/Station 102.000 to Point/Station 103.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****

Top of street segment elevation = 1070.000(Ft.)
End of street segment elevation = 1066.000(Ft.)
Length of street segment = 826.000(Ft.)
Height of curb above gutter flowline = 6.0(In.)
Width of half street (curb to crown) = 20.000(Ft.)
Distance from crown to crossfall grade break = 18.500(Ft.)
Slope from gutter to grade break (v/hz) = 0.020
Slope from grade break to crown (v/hz) = 0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line = 10.000(Ft.)
Slope from curb to property line (v/hz) = 0.020
Gutter width = 1.500(Ft.)

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Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     17.114(CFS)
Depth of flow =   0.478(Ft.), Average velocity =   2.283(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  19.174(Ft.)
Flow velocity =   2.28(Ft/s)
Travel time =    6.03 min.     TC =   19.96  min.
 Adding area flow to street
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.489(In/Hr)
Rainfall intensity =      1.587(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.623
Subarea runoff =     18.642(CFS) for   20.870(Ac.)
Total runoff =     26.344(CFS)
Effective area this stream =       26.65(Ac.)
Total Study Area (Main Stream No. 1) =       26.65(Ac.)
Area averaged Fm value =    0.489(In/Hr)
Street flow at end of street =     26.344(CFS)
Half street flow at end of street =     13.172(CFS)
Depth of flow =   0.546(Ft.), Average velocity =   2.556(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    2.32(Ft.)
Flow width (from curb towards crown)=  20.000(Ft.)


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Process from Point/Station      103.000 to Point/Station      104.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
____________________________________________________________________________
Top of street segment elevation =  1066.000(Ft.)
End of street segment elevation =  1055.000(Ft.)
Length of street segment  =   850.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     35.081(CFS)
Depth of flow =   0.512(Ft.), Average velocity =   3.971(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    0.60(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.000(Ft.)
Flow velocity =   3.97(Ft/s)
Travel time =    3.57 min.     TC =   23.52  min.
 Adding area flow to street
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
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Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.489(In/Hr)
Rainfall intensity =      1.438(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.594
Subarea runoff =     17.353(CFS) for   24.500(Ac.)
Total runoff =     43.698(CFS)
Effective area this stream =       51.15(Ac.)
Total Study Area (Main Stream No. 1) =       51.15(Ac.)
Area averaged Fm value =    0.489(In/Hr)
Street flow at end of street =     43.698(CFS)
Half street flow at end of street =     21.849(CFS)
Depth of flow =   0.549(Ft.), Average velocity =   4.193(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    2.45(Ft.)
Flow width (from curb towards crown)=  20.000(Ft.)


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Process from Point/Station      104.000 to Point/Station      105.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1055.000(Ft.)
End of street segment elevation =  1038.000(Ft.)
Length of street segment  =  1159.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     48.741(CFS)
Depth of flow =   0.557(Ft.), Average velocity =   4.516(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    2.86(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.000(Ft.)
Flow velocity =   4.52(Ft/s)
Travel time =    4.28 min.     TC =   27.80  min.
 Adding area flow to street
RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.8000     Max loss rate(Fm)=     0.782(In/Hr)
Rainfall intensity =      1.301(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.480
Subarea runoff =      9.909(CFS) for   34.750(Ac.)
Total runoff =     53.607(CFS)
Effective area this stream =       85.90(Ac.)
Total Study Area (Main Stream No. 1) =       85.90(Ac.)
Area averaged Fm value =    0.608(In/Hr)
Street flow at end of street =     53.607(CFS)
Half street flow at end of street =     26.803(CFS)
Depth of flow =   0.574(Ft.), Average velocity =   4.624(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    3.72(Ft.)
Flow width (from curb towards crown)=  20.000(Ft.)
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Process from Point/Station      105.000 to Point/Station      106.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
Top of street segment elevation =  1038.000(Ft.)
End of street segment elevation =  1022.000(Ft.)
Length of street segment  =  1308.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     53.989(CFS)
Depth of flow =   0.593(Ft.), Average velocity =   4.327(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    4.63(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.000(Ft.)
Flow velocity =   4.33(Ft/s)
Travel time =    5.04 min.     TC =   32.84  min.
 Adding area flow to street
RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.8000     Max loss rate(Fm)=     0.782(In/Hr)
Rainfall intensity =      1.177(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.402
Subarea runoff =      0.609(CFS) for   28.620(Ac.)
Total runoff =     54.215(CFS)
Effective area this stream =      114.52(Ac.)
Total Study Area (Main Stream No. 1) =      114.52(Ac.)
Area averaged Fm value =    0.651(In/Hr)
Street flow at end of street =     54.215(CFS)
Half street flow at end of street =     27.108(CFS)
Depth of flow =   0.593(Ft.), Average velocity =   4.331(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    4.67(Ft.)
Flow width (from curb towards crown)=  20.000(Ft.)


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Process from Point/Station      106.000 to Point/Station      107.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
Top of street segment elevation =  1022.000(Ft.)
End of street segment elevation =  1005.000(Ft.)
Length of street segment  =  1262.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
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Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     54.289(CFS)
Depth of flow =   0.585(Ft.), Average velocity =   4.492(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    4.23(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.000(Ft.)
Flow velocity =   4.49(Ft/s)
Travel time =    4.68 min.     TC =   37.52  min.
 Adding area flow to street
RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.8000     Max loss rate(Fm)=     0.782(In/Hr)
The area added to the existing stream causes a
a lower flow rate of Q =     50.306(CFS)
therefore the upstream flow rate of Q =     54.215(CFS) is being used
Rainfall intensity =      1.087(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.345
Subarea runoff =      0.000(CFS) for   19.760(Ac.)
Total runoff =     54.215(CFS)
Effective area this stream =      134.28(Ac.)
Total Study Area (Main Stream No. 1) =      134.28(Ac.)
Area averaged Fm value =    0.671(In/Hr)
Street flow at end of street =     54.215(CFS)
Half street flow at end of street =     27.108(CFS)
Depth of flow =   0.584(Ft.), Average velocity =   4.491(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    4.22(Ft.)
Flow width (from curb towards crown)=  20.000(Ft.)
End of computations, Total Study Area =          134.28 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.686
Area averaged SCS curve number =  32.0
```

APPENDIX C.2: RATIONAL METHOD ANALYSIS, AREAS "B"

100-YEAR

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 06/22/20

BLOOMINTON PROJECT POST PROJECT CONDITION HYDROLOGY
RATIONAL METHOD ANALYSIS, 100-YEAR STORM EVENT
FILENAME: ARBPOST100

Program License Serial Number 6279

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.300 (In.)
Slope used for rainfall intensity curve b = 0.5000
Soil antecedent moisture condition (AMC) = 2

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Process from Point/Station 201.000 to Point/Station 202.000
**** INITIAL AREA EVALUATION ****

RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.5000 Max loss rate(Fm)= 0.489(In/Hr)
Initial subarea data:
Initial area flow distance = 604.000(Ft.)
Top (of initial area) elevation = 1078.000(Ft.)
Bottom (of initial area) elevation = 1070.000(Ft.)
Difference in elevation = 8.000(Ft.)
Slope = 0.01325 s(%)= 1.32
TC = k(0.389)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 11.966 min.
Rainfall intensity = 2.911(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.749
Subarea runoff = 13.995(CFS)
Total initial stream area = 6.420(Ac.)
Pervious area fraction = 0.500
Initial area Fm value = 0.489(In/Hr)

++

Process from Point/Station 202.000 to Point/Station 203.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****

Top of street segment elevation = 1070.000(Ft.)
End of street segment elevation = 1065.000(Ft.)
Length of street segment = 906.000(Ft.)
Height of curb above gutter flowline = 6.0(In.)
Width of half street (curb to crown) = 20.000(Ft.)
Distance from crown to crossfall grade break = 18.500(Ft.)
Slope from gutter to grade break (v/hz) = 0.020
Slope from grade break to crown (v/hz) = 0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line = 10.000(Ft.)
Slope from curb to property line (v/hz) = 0.020
Gutter width = 1.500(Ft.)

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Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     17.329(CFS)
Depth of flow =   0.471(Ft.), Average velocity =   2.406(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.789(Ft.)
Flow velocity =   2.41(Ft/s)
Travel time =    6.28 min.     TC =   18.24  min.
 Adding area flow to street
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.489(In/Hr)
Rainfall intensity =      2.358(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.713
Subarea runoff =      6.557(CFS) for    5.800(Ac.)
Total runoff =     20.552(CFS)
Effective area this stream =       12.22(Ac.)
Total Study Area (Main Stream No. 1) =       12.22(Ac.)
Area averaged Fm value =    0.489(In/Hr)
Street flow at end of street =     20.552(CFS)
Half street flow at end of street =     10.276(CFS)
Depth of flow =   0.496(Ft.), Average velocity =   2.512(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  20.000(Ft.)


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Process from Point/Station      202.000 to Point/Station      203.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.489(In/Hr)
Time of concentration =    18.24 min.
Rainfall intensity =      2.358(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.713
Subarea runoff =     15.776(CFS) for    9.380(Ac.)
Total runoff =     36.328(CFS)
Effective area this stream =       21.60(Ac.)
Total Study Area (Main Stream No. 1) =       21.60(Ac.)
Area averaged Fm value =    0.489(In/Hr)


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Process from Point/Station      203.000 to Point/Station      204.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1065.000(Ft.)
End of street segment elevation =  1043.000(Ft.)
Length of street segment  =  1472.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
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Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     39.015(CFS)
Depth of flow =   0.518(Ft.), Average velocity =   4.304(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    0.88(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.000(Ft.)
Flow velocity =   4.30(Ft/s)
Travel time =    5.70 min.     TC =   23.94  min.
 Adding area flow to street
RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.8000     Max loss rate(Fm)=     0.782(In/Hr)
Rainfall intensity =      2.058(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.647
Subarea runoff =      5.185(CFS) for    9.590(Ac.)
Total runoff =     41.513(CFS)
Effective area this stream =       31.19(Ac.)
Total Study Area (Main Stream No. 1) =       31.19(Ac.)
Area averaged Fm value =    0.579(In/Hr)
Street flow at end of street =     41.513(CFS)
Half street flow at end of street =     20.756(CFS)
Depth of flow =   0.528(Ft.), Average velocity =   4.371(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    1.40(Ft.)
Flow width (from curb towards crown)=  20.000(Ft.)


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Process from Point/Station      204.000 to Point/Station      205.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1043.000(Ft.)
End of street segment elevation =  1035.000(Ft.)
Length of street segment  =   648.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     45.029(CFS)
Depth of flow =   0.558(Ft.), Average velocity =   4.150(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    2.92(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.000(Ft.)
Flow velocity =   4.15(Ft/s)
Travel time =    2.60 min.     TC =   26.54  min.
 Adding area flow to street
RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
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Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.8000     Max loss rate(Fm)=     0.782(In/Hr)
Rainfall intensity =      1.954(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.612
Subarea runoff =      6.854(CFS) for    9.250(Ac.)
Total runoff =     48.367(CFS)
Effective area this stream =       40.44(Ac.)
Total Study Area (Main Stream No. 1) =       40.44(Ac.)
Area averaged Fm value =    0.626(In/Hr)
Street flow at end of street =     48.367(CFS)
Half street flow at end of street =     24.184(CFS)
Depth of flow =   0.571(Ft.), Average velocity =   4.225(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    3.56(Ft.)
Flow width (from curb towards crown)=  20.000(Ft.)


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Process from Point/Station      205.000 to Point/Station      206.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
____________________________________________________________________________
Top of street segment elevation =  1035.000(Ft.)
End of street segment elevation =  1014.000(Ft.)
Length of street segment  =  1947.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     50.566(CFS)
Depth of flow =   0.592(Ft.), Average velocity =   4.060(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    4.61(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  20.000(Ft.)
Flow velocity =   4.06(Ft/s)
Travel time =    7.99 min.     TC =   34.54  min.
 Adding area flow to street
RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.8000     Max loss rate(Fm)=     0.782(In/Hr)
Rainfall intensity =      1.713(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.549
Subarea runoff =      4.269(CFS) for   15.560(Ac.)
Total runoff =     52.637(CFS)
Effective area this stream =       56.00(Ac.)
Total Study Area (Main Stream No. 1) =       56.00(Ac.)
Area averaged Fm value =    0.669(In/Hr)
Street flow at end of street =     52.637(CFS)
Half street flow at end of street =     26.318(CFS)
Depth of flow =   0.600(Ft.), Average velocity =   4.101(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
```

```
Distance that curb overflow reaches into property =    4.99(Ft.)
Flow width (from curb towards crown)=  20.000(Ft.)
End of computations, Total Study Area =           56.00 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.684
Area averaged SCS curve number =  32.0
```

10-YEAR

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 06/26/20

BLOOMINTON PROJECT POST PROJECT CONDITION HYDROLOGY
RATIONAL METHOD ANALYSIS, 10-YEAR STORM EVENT
FILENAME: ARBPOST10

Program License Serial Number 6279

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.820 (In.)
Slope used for rainfall intensity curve b = 0.5000
Soil antecedent moisture condition (AMC) = 2

++
Process from Point/Station 201.000 to Point/Station 202.000
**** INITIAL AREA EVALUATION ****

RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.5000 Max loss rate(Fm)= 0.489(In/Hr)
Initial subarea data:
Initial area flow distance = 604.000(Ft.)
Top (of initial area) elevation = 1078.000(Ft.)
Bottom (of initial area) elevation = 1070.000(Ft.)
Difference in elevation = 8.000(Ft.)
Slope = 0.01325 s(%)= 1.32
TC = k(0.389)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 11.966 min.
Rainfall intensity = 1.836(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.660
Subarea runoff = 7.784(CFS)
Total initial stream area = 6.420(Ac.)
Pervious area fraction = 0.500
Initial area Fm value = 0.489(In/Hr)

++
Process from Point/Station 202.000 to Point/Station 203.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****

Top of street segment elevation = 1070.000(Ft.)
End of street segment elevation = 1065.000(Ft.)
Length of street segment = 906.000(Ft.)
Height of curb above gutter flowline = 6.0(In.)
Width of half street (curb to crown) = 20.000(Ft.)
Distance from crown to crossfall grade break = 18.500(Ft.)
Slope from gutter to grade break (v/hz) = 0.020
Slope from grade break to crown (v/hz) = 0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line = 10.000(Ft.)
Slope from curb to property line (v/hz) = 0.020
Gutter width = 1.500(Ft.)

```
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      9.233(CFS)
Depth of flow =   0.390(Ft.), Average velocity =   2.060(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  14.729(Ft.)
Flow velocity =   2.06(Ft/s)
Travel time =    7.33 min.     TC =   19.29  min.
 Adding area flow to street
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.489(In/Hr)
Rainfall intensity =      1.446(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.596
Subarea runoff =      2.742(CFS) for    5.800(Ac.)
Total runoff =     10.526(CFS)
Effective area this stream =       12.22(Ac.)
Total Study Area (Main Stream No. 1) =       12.22(Ac.)
Area averaged Fm value =    0.489(In/Hr)
Street flow at end of street =     10.526(CFS)
Half street flow at end of street =      5.263(CFS)
Depth of flow =   0.405(Ft.), Average velocity =   2.128(Ft/s)
Flow width (from curb towards crown)=  15.499(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      203.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.489(In/Hr)
Time of concentration =    19.29 min.
Rainfall intensity =      1.446(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.596
Subarea runoff =      8.080(CFS) for    9.380(Ac.)
Total runoff =     18.606(CFS)
Effective area this stream =       21.60(Ac.)
Total Study Area (Main Stream No. 1) =       21.60(Ac.)
Area averaged Fm value =    0.489(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      204.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1065.000(Ft.)
End of street segment elevation =  1043.000(Ft.)
Length of street segment  =  1472.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(In.)
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```
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     18.677(CFS)
Depth of flow =   0.414(Ft.), Average velocity =   3.567(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  15.959(Ft.)
Flow velocity =   3.57(Ft/s)
Travel time =    6.88 min.     TC =   26.17  min.
 Adding area flow to street
RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.8000     Max loss rate(Fm)=     0.782(In/Hr)
The area added to the existing stream causes a
a lower flow rate of Q =     18.595(CFS)
therefore the upstream flow rate of Q =     18.606(CFS) is being used
Rainfall intensity =      1.242(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.480
Subarea runoff =      0.000(CFS) for    9.590(Ac.)
Total runoff =     18.606(CFS)
Effective area this stream =       31.19(Ac.)
Total Study Area (Main Stream No. 1) =       31.19(Ac.)
Area averaged Fm value =    0.579(In/Hr)
Street flow at end of street =     18.606(CFS)
Half street flow at end of street =      9.303(CFS)
Depth of flow =   0.414(Ft.), Average velocity =   3.563(Ft/s)
Flow width (from curb towards crown)=  15.935(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      204.000 to Point/Station      205.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1043.000(Ft.)
End of street segment elevation =  1035.000(Ft.)
Length of street segment  =   648.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     19.307(CFS)
Depth of flow =   0.430(Ft.), Average velocity =   3.346(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  16.774(Ft.)
Flow velocity =   3.35(Ft/s)
Travel time =    3.23 min.     TC =   29.40  min.
 Adding area flow to street
RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.8000     Max loss rate(Fm)=     0.782(In/Hr)
Rainfall intensity =      1.171(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.419
```

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Subarea runoff =      1.261(CFS) for    9.250(Ac.)
Total runoff =     19.867(CFS)
Effective area this stream =       40.44(Ac.)
Total Study Area (Main Stream No. 1) =       40.44(Ac.)
Area averaged Fm value =    0.626(In/Hr)
Street flow at end of street =     19.867(CFS)
Half street flow at end of street =      9.933(CFS)
Depth of flow =   0.434(Ft.), Average velocity =   3.370(Ft/s)
Flow width (from curb towards crown)=  16.960(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      205.000 to Point/Station      206.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1035.000(Ft.)
End of street segment elevation =  1014.000(Ft.)
Length of street segment  =  1947.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     19.926(CFS)
Depth of flow =   0.444(Ft.), Average velocity =   3.205(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  17.428(Ft.)
Flow velocity =   3.20(Ft/s)
Travel time =   10.12 min.     TC =   39.53  min.
 Adding area flow to street
RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.8000     Max loss rate(Fm)=     0.782(In/Hr)
The area added to the existing stream causes a
a lower flow rate of Q =     17.196(CFS)
therefore the upstream flow rate of Q =     19.867(CFS) is being used
Rainfall intensity =      1.010(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.304
Subarea runoff =      0.000(CFS) for   15.560(Ac.)
Total runoff =     19.867(CFS)
Effective area this stream =       56.00(Ac.)
Total Study Area (Main Stream No. 1) =       56.00(Ac.)
Area averaged Fm value =    0.669(In/Hr)
Street flow at end of street =     19.867(CFS)
Half street flow at end of street =      9.933(CFS)
Depth of flow =   0.443(Ft.), Average velocity =   3.203(Ft/s)
Flow width (from curb towards crown)=  17.408(Ft.)
End of computations, Total Study Area =           56.00 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.684
Area averaged SCS curve number =  32.0
```

APPENDIX D: POST-PROJECT CONDITION ONSITE RATIONAL METHOD HYDROLOGY

APPENDIX D.1: RATIONAL METHOD ANALYSIS, AREAS "A"

100-YEAR

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 06/08/20

BLOOMINGTON PROJECT POST PROJECT CONDITION ONSITE HYDROLOGY
RATIONAL METHOD ANALYSIS, 100-YEAR ANALYSIS
FILENAME: ARBB100

Program License Serial Number 6279

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.300 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

++
Process from Point/Station 100.100 to Point/Station 100.200
**** INITIAL AREA EVALUATION ****

COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.098(In/Hr)
Initial subarea data:
Initial area flow distance = 918.200(Ft.)
Top (of initial area) elevation = 1019.200(Ft.)
Bottom (of initial area) elevation = 1012.200(Ft.)
Difference in elevation = 7.000(Ft.)
Slope = 0.00762 s(%)= 0.76
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.349 min.
Rainfall intensity = 3.356(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.874
Subarea runoff = 13.960(CFS)
Total initial stream area = 4.760(Ac.)
Pervious area fraction = 0.100
Initial area Fm value = 0.098(In/Hr)

++
Process from Point/Station 100.200 to Point/Station 100.500
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 1007.200(Ft.)
Downstream point/station elevation = 1004.000(Ft.)
Pipe length = 503.90(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 13.960(CFS)
Given pipe size = 18.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
6.665(Ft.) at the headworks or inlet of the pipe(s)
Pipe friction loss = 8.896(Ft.)
Minor friction loss = 0.969(Ft.) K-factor = 1.00
Pipe flow velocity = 7.90(Ft/s)
Travel time through pipe = 1.06 min.

```
Time of concentration (TC) =    13.41 min.


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Process from Point/Station      100.200 to Point/Station      100.500
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      4.760(Ac.)
Runoff from this stream =     13.960(CFS)
Time of concentration =   13.41 min.
Rainfall intensity =     3.194(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


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Process from Point/Station      100.300 to Point/Station      100.400
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Initial subarea data:
Initial area flow distance =   985.000(Ft.)
Top (of initial area) elevation =  1020.700(Ft.)
Bottom (of initial area) elevation =  1010.500(Ft.)
Difference in elevation =    10.200(Ft.)
Slope =    0.01036  s(%)=       1.04
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.946 min.
Rainfall intensity =      3.424(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.874
Subarea runoff =     27.539(CFS)
Total initial stream area =        9.200(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      100.400 to Point/Station      100.500
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =  1005.500(Ft.)
Downstream point/station elevation =  1004.000(Ft.)
Pipe length  =    55.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    27.539(CFS)
Given pipe size =     18.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
     6.050(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =      3.779(Ft.)
 Minor friction loss =      3.771(Ft.)       K-factor =   1.00
Pipe flow velocity =     15.58(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =    12.00 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      100.400 to Point/Station      100.500
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      9.200(Ac.)
Runoff from this stream =     27.539(CFS)
Time of concentration =   12.00 min.
Rainfall intensity =     3.414(In/Hr)
```

```
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

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


1     13.96     4.760     13.41    0.098      3.194
2     27.54     9.200     12.00    0.098      3.414
Qmax(1) =
           1.000 *    1.000 *    13.960) +
           0.934 *    1.000 *    27.539) + =      39.675
Qmax(2) =
           1.071 *    0.895 *    13.960) +
           1.000 *    1.000 *    27.539) + =      40.921

Total of 2 streams to confluence:
Flow rates before confluence point:
      13.960      27.539
Maximum flow rates at confluence using above data:
       39.675       40.921
Area of streams before confluence:
        4.760        9.200
Effective area values after confluence:
       13.960       13.461
Results of confluence:
Total flow rate =     40.921(CFS)
Time of concentration =    12.005 min.
Effective stream area after confluence =     13.461(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.098(In/Hr)
Study area total (this main stream) =      13.96(Ac.)
End of computations, Total Study Area =           13.96 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

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

10-YEAR

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 06/09/20

BLOOMINGTON PROJECT POST PROJECT CONDITION ONSITE HYDROLOGY
RATIONAL METHOD ANALYSIS, 10-YEAR ANALYSIS
FILENAME: ARBB10

Program License Serial Number 6279

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.820 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 100.100 to Point/Station 100.200
**** INITIAL AREA EVALUATION ****

COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.098(In/Hr)
Initial subarea data:
Initial area flow distance = 918.200(Ft.)
Top (of initial area) elevation = 1019.200(Ft.)
Bottom (of initial area) elevation = 1012.200(Ft.)
Difference in elevation = 7.000(Ft.)
Slope = 0.00762 s(%)= 0.76
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.349 min.
Rainfall intensity = 2.117(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.858
Subarea runoff = 8.651(CFS)
Total initial stream area = 4.760(Ac.)
Pervious area fraction = 0.100
Initial area Fm value = 0.098(In/Hr)

++

Process from Point/Station 100.200 to Point/Station 100.500
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 1007.200(Ft.)
Downstream point/station elevation = 1004.000(Ft.)
Pipe length = 503.90(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 8.651(CFS)
Given pipe size = 18.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
0.588(Ft.) at the headworks or inlet of the pipe(s)
Pipe friction loss = 3.416(Ft.)
Minor friction loss = 0.372(Ft.) K-factor = 1.00
Pipe flow velocity = 4.90(Ft/s)
Travel time through pipe = 1.72 min.

```
Time of concentration (TC) =    14.06 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      100.200 to Point/Station      100.500
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      4.760(Ac.)
Runoff from this stream =      8.651(CFS)
Time of concentration =   14.06 min.
Rainfall intensity =     1.958(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      100.300 to Point/Station      100.400
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Initial subarea data:
Initial area flow distance =   985.000(Ft.)
Top (of initial area) elevation =  1020.700(Ft.)
Bottom (of initial area) elevation =  1010.500(Ft.)
Difference in elevation =    10.200(Ft.)
Slope =    0.01036  s(%)=       1.04
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.946 min.
Rainfall intensity =      2.160(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.859
Subarea runoff =     17.072(CFS)
Total initial stream area =        9.200(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      100.400 to Point/Station      100.500
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________________
Upstream point/station elevation =  1005.500(Ft.)
Downstream point/station elevation =  1004.000(Ft.)
Pipe length  =    55.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    17.072(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =    17.072(CFS)
Normal flow depth in pipe =   14.51(In.)
Flow top width inside pipe =   14.24(In.)
Critical depth could not be calculated.
Pipe flow velocity =     11.19(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    12.03 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      100.400 to Point/Station      100.500
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      9.200(Ac.)
Runoff from this stream =     17.072(CFS)
Time of concentration =   12.03 min.
Rainfall intensity =     2.151(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
```

```
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

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


1      8.65     4.760     14.06    0.098      1.958
2     17.07     9.200     12.03    0.098      2.151
Qmax(1) =
          1.000 *    1.000 *     8.651) +
          0.906 *    1.000 *    17.072) + =      24.120
Qmax(2) =
          1.104 *    0.855 *     8.651) +
          1.000 *    1.000 *    17.072) + =      25.236

Total of 2 streams to confluence:
Flow rates before confluence point:
       8.651      17.072
Maximum flow rates at confluence using above data:
       24.120       25.236
Area of streams before confluence:
        4.760        9.200
Effective area values after confluence:
       13.960       13.271
Results of confluence:
Total flow rate =     25.236(CFS)
Time of concentration =    12.028 min.
Effective stream area after confluence =     13.271(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.098(In/Hr)
Study area total (this main stream) =      13.96(Ac.)
End of computations, Total Study Area =           13.96 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

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

APPENDIX D.2: RATIONAL METHOD ANALYSIS, AREAS "B"

100-YEAR

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 06/08/20

BLOOMINGTON PROJECT POST PROJECT CONDITION ONSITE HYDROLOGY
RATIONAL METHOD ANALYSIS, 100-YEAR ANALYSIS
FILENAME: ARBB100

Program License Serial Number 6279

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.300 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 200.100 to Point/Station 200.200
**** INITIAL AREA EVALUATION ****

COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.098(In/Hr)
Initial subarea data:
Initial area flow distance = 777.000(Ft.)
Top (of initial area) elevation = 1019.200(Ft.)
Bottom (of initial area) elevation = 1011.000(Ft.)
Difference in elevation = 8.200(Ft.)
Slope = 0.01055 s(%)= 1.06
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 10.823 min.
Rainfall intensity = 3.633(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.876
Subarea runoff = 11.898(CFS)
Total initial stream area = 3.740(Ac.)
Pervious area fraction = 0.100
Initial area Fm value = 0.098(In/Hr)
End of computations, Total Study Area = 3.74 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

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

10-YEAR

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 06/09/20

BLOOMINGTON PROJECT POST PROJECT CONDITION ONSITE HYDROLOGY
RATIONAL METHOD ANALYSIS, 10-YEAR ANALYSIS
FILENAME: ARBB10

Program License Serial Number 6279

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.820 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 200.100 to Point/Station 200.200
**** INITIAL AREA EVALUATION ****

COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.098(In/Hr)
Initial subarea data:
Initial area flow distance = 777.000(Ft.)
Top (of initial area) elevation = 1019.200(Ft.)
Bottom (of initial area) elevation = 1011.000(Ft.)
Difference in elevation = 8.200(Ft.)
Slope = 0.01055 s(%)= 1.06
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 10.823 min.
Rainfall intensity = 2.291(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.862
Subarea runoff = 7.383(CFS)
Total initial stream area = 3.740(Ac.)
Pervious area fraction = 0.100
Initial area Fm value = 0.098(In/Hr)
End of computations, Total Study Area = 3.74 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

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

APPENDIX E: PRE-PROJECT CONDITION UNIT HYDROGRAPH HYDROLOGY

APPENDIX E.1: UNIT HYDROGRAPH ANALYSIS, AREA "A"

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

Study date 06/23/20

++

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

Program License Serial Number 6279

BLOOMINGTON COMMERCE CENTER EXISTING CONDITION ONSITE HYDROLOGY
UNIT HYDROGRAPH ANALYSIS, 100-YEAR STORM EVENT'
FILENAME: ARAEX

Storm Event Year = 100

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 100		
14.27	1	1.30
Rainfall data for year 100		
14.27	6	3.09
Rainfall data for year 100		
14.27	24	5.66

++

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

SCS curve No.(AMCII)	SCS curve NO.(AMC 2)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
46.0	46.0	14.27	1.000	0.856	1.000	0.856

Area-averaged adjusted loss rate Fm (In/Hr) = 0.856

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

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC2)	S	Pervious Yield Fr
14.27	1.000	46.0	46.0	11.74	0.129

Area-averaged catchment yield fraction, Y = 0.129
Area-averaged low loss fraction, Yb = 0.871
User entry of time of concentration = 0.300 (hours)
++
Watershed area = 14.27(Ac.)

Catchment Lag time = 0.240 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 34.7222
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.856(In/Hr)
Average low loss rate fraction (Yb) = 0.871 (decimal)
VALLEY UNDEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.481(In)
Computed peak 30-minute rainfall = 0.985(In)
Specified peak 1-hour rainfall = 1.300(In)
Computed peak 3-hour rainfall = 2.211(In)
Specified peak 6-hour rainfall = 3.090(In)
Specified peak 24-hour rainfall = 5.660(In)

Rainfall depth area reduction factors:
Using a total area of 14.27(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999 Adjusted rainfall = 0.481(In)
30-minute factor = 0.999 Adjusted rainfall = 0.985(In)
1-hour factor = 0.999 Adjusted rainfall = 1.299(In)
3-hour factor = 1.000 Adjusted rainfall = 2.210(In)
6-hour factor = 1.000 Adjusted rainfall = 3.090(In)
24-hour factor = 1.000 Adjusted rainfall = 5.660(In)

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

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 172.58 (CFS))	
1	3.546	6.120
2	17.421	23.945
3	40.461	39.761
4	60.129	33.944
5	70.639	18.138
6	76.635	10.348
7	80.989	7.514
8	84.407	5.897
9	87.123	4.688
10	89.292	3.743
11	91.140	3.190
12	92.621	2.557
13	93.789	2.015
14	94.862	1.853
15	95.854	1.711
16	96.638	1.354
17	97.312	1.163
18	97.901	1.016
19	98.388	0.839
20	98.771	0.661
21	99.118	0.599
22	99.465	0.599
23	99.812	0.599
24	100.000	0.324

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.4808	0.4808
2	0.6344	0.1536
3	0.7462	0.1117
4	0.8372	0.0910
5	0.9153	0.0782
6	0.9846	0.0692
7	1.0472	0.0626
8	1.1046	0.0575
9	1.1579	0.0533
10	1.2078	0.0498
11	1.2547	0.0469

12	1.2991	0.0444
13	1.3504	0.0513
14	1.3997	0.0493
15	1.4472	0.0475
16	1.4931	0.0459
17	1.5375	0.0444
18	1.5807	0.0431
19	1.6225	0.0419
20	1.6633	0.0408
21	1.7030	0.0397
22	1.7418	0.0388
23	1.7796	0.0379
24	1.8167	0.0370
25	1.8529	0.0362
26	1.8884	0.0355
27	1.9232	0.0348
28	1.9573	0.0341
29	1.9908	0.0335
30	2.0237	0.0329
31	2.0561	0.0324
32	2.0879	0.0318
33	2.1192	0.0313
34	2.1501	0.0308
35	2.1804	0.0304
36	2.2103	0.0299
37	2.2398	0.0295
38	2.2689	0.0291
39	2.2975	0.0287
40	2.3258	0.0283
41	2.3537	0.0279
42	2.3813	0.0276
43	2.4085	0.0272
44	2.4354	0.0269
45	2.4620	0.0266
46	2.4883	0.0263
47	2.5143	0.0260
48	2.5400	0.0257
49	2.5655	0.0254
50	2.5906	0.0252
51	2.6155	0.0249
52	2.6402	0.0247
53	2.6646	0.0244
54	2.6888	0.0242
55	2.7128	0.0239
56	2.7365	0.0237
57	2.7600	0.0235
58	2.7833	0.0233
59	2.8064	0.0231
60	2.8293	0.0229
61	2.8520	0.0227
62	2.8745	0.0225
63	2.8968	0.0223
64	2.9189	0.0221
65	2.9408	0.0220
66	2.9626	0.0218
67	2.9842	0.0216
68	3.0057	0.0214
69	3.0270	0.0213
70	3.0481	0.0211
71	3.0690	0.0210
72	3.0899	0.0208
73	3.1085	0.0187
74	3.1270	0.0185
75	3.1454	0.0184
76	3.1637	0.0182
77	3.1818	0.0181
78	3.1998	0.0180
79	3.2176	0.0178
80	3.2353	0.0177
81	3.2529	0.0176
82	3.2704	0.0175

83	3.2877	0.0174
84	3.3050	0.0172
85	3.3221	0.0171
86	3.3391	0.0170
87	3.3560	0.0169
88	3.3728	0.0168
89	3.3895	0.0167
90	3.4061	0.0166
91	3.4225	0.0165
92	3.4389	0.0164
93	3.4552	0.0163
94	3.4713	0.0162
95	3.4874	0.0161
96	3.5034	0.0160
97	3.5193	0.0159
98	3.5351	0.0158
99	3.5508	0.0157
100	3.5664	0.0156
101	3.5819	0.0155
102	3.5974	0.0154
103	3.6127	0.0154
104	3.6280	0.0153
105	3.6432	0.0152
106	3.6583	0.0151
107	3.6733	0.0150
108	3.6883	0.0149
109	3.7031	0.0149
110	3.7179	0.0148
111	3.7327	0.0147
112	3.7473	0.0146
113	3.7619	0.0146
114	3.7764	0.0145
115	3.7908	0.0144
116	3.8052	0.0144
117	3.8195	0.0143
118	3.8337	0.0142
119	3.8478	0.0142
120	3.8619	0.0141
121	3.8759	0.0140
122	3.8899	0.0140
123	3.9038	0.0139
124	3.9176	0.0138
125	3.9314	0.0138
126	3.9451	0.0137
127	3.9587	0.0136
128	3.9723	0.0136
129	3.9858	0.0135
130	3.9993	0.0135
131	4.0127	0.0134
132	4.0260	0.0133
133	4.0393	0.0133
134	4.0525	0.0132
135	4.0657	0.0132
136	4.0788	0.0131
137	4.0919	0.0131
138	4.1049	0.0130
139	4.1179	0.0130
140	4.1308	0.0129
141	4.1436	0.0129
142	4.1564	0.0128
143	4.1692	0.0128
144	4.1819	0.0127
145	4.1946	0.0127
146	4.2072	0.0126
147	4.2197	0.0126
148	4.2322	0.0125
149	4.2447	0.0125
150	4.2571	0.0124
151	4.2695	0.0124
152	4.2818	0.0123
153	4.2941	0.0123

154	4.3063	0.0122
155	4.3185	0.0122
156	4.3306	0.0121
157	4.3427	0.0121
158	4.3548	0.0121
159	4.3668	0.0120
160	4.3788	0.0120
161	4.3907	0.0119
162	4.4026	0.0119
163	4.4144	0.0118
164	4.4262	0.0118
165	4.4380	0.0118
166	4.4497	0.0117
167	4.4614	0.0117
168	4.4731	0.0116
169	4.4847	0.0116
170	4.4962	0.0116
171	4.5078	0.0115
172	4.5192	0.0115
173	4.5307	0.0115
174	4.5421	0.0114
175	4.5535	0.0114
176	4.5648	0.0113
177	4.5761	0.0113
178	4.5874	0.0113
179	4.5986	0.0112
180	4.6098	0.0112
181	4.6210	0.0112
182	4.6321	0.0111
183	4.6432	0.0111
184	4.6543	0.0111
185	4.6653	0.0110
186	4.6763	0.0110
187	4.6873	0.0110
188	4.6982	0.0109
189	4.7091	0.0109
190	4.7200	0.0109
191	4.7308	0.0108
192	4.7416	0.0108
193	4.7524	0.0108
194	4.7631	0.0107
195	4.7738	0.0107
196	4.7845	0.0107
197	4.7951	0.0106
198	4.8057	0.0106
199	4.8163	0.0106
200	4.8269	0.0106
201	4.8374	0.0105
202	4.8479	0.0105
203	4.8583	0.0105
204	4.8688	0.0104
205	4.8792	0.0104
206	4.8896	0.0104
207	4.8999	0.0103
208	4.9102	0.0103
209	4.9205	0.0103
210	4.9308	0.0103
211	4.9410	0.0102
212	4.9512	0.0102
213	4.9614	0.0102
214	4.9716	0.0102
215	4.9817	0.0101
216	4.9918	0.0101
217	5.0019	0.0101
218	5.0119	0.0101
219	5.0220	0.0100
220	5.0320	0.0100
221	5.0419	0.0100
222	5.0519	0.0099
223	5.0618	0.0099
224	5.0717	0.0099

225	5.0816	0.0099
226	5.0914	0.0098
227	5.1013	0.0098
228	5.1111	0.0098
229	5.1208	0.0098
230	5.1306	0.0098
231	5.1403	0.0097
232	5.1500	0.0097
233	5.1597	0.0097
234	5.1694	0.0097
235	5.1790	0.0096
236	5.1886	0.0096
237	5.1982	0.0096
238	5.2077	0.0096
239	5.2173	0.0095
240	5.2268	0.0095
241	5.2363	0.0095
242	5.2458	0.0095
243	5.2552	0.0095
244	5.2647	0.0094
245	5.2741	0.0094
246	5.2835	0.0094
247	5.2928	0.0094
248	5.3022	0.0093
249	5.3115	0.0093
250	5.3208	0.0093
251	5.3301	0.0093
252	5.3394	0.0093
253	5.3486	0.0092
254	5.3578	0.0092
255	5.3670	0.0092
256	5.3762	0.0092
257	5.3853	0.0092
258	5.3945	0.0091
259	5.4036	0.0091
260	5.4127	0.0091
261	5.4218	0.0091
262	5.4308	0.0091
263	5.4399	0.0090
264	5.4489	0.0090
265	5.4579	0.0090
266	5.4669	0.0090
267	5.4759	0.0090
268	5.4848	0.0089
269	5.4937	0.0089
270	5.5026	0.0089
271	5.5115	0.0089
272	5.5204	0.0089
273	5.5292	0.0089
274	5.5381	0.0088
275	5.5469	0.0088
276	5.5557	0.0088
277	5.5645	0.0088
278	5.5732	0.0088
279	5.5820	0.0087
280	5.5907	0.0087
281	5.5994	0.0087
282	5.6081	0.0087
283	5.6168	0.0087
284	5.6254	0.0087
285	5.6341	0.0086
286	5.6427	0.0086
287	5.6513	0.0086
288	5.6599	0.0086

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0086	0.0075	0.0011
2	0.0086	0.0075	0.0011

3	0.0086	0.0075	0.0011
4	0.0087	0.0075	0.0011
5	0.0087	0.0076	0.0011
6	0.0087	0.0076	0.0011
7	0.0087	0.0076	0.0011
8	0.0088	0.0076	0.0011
9	0.0088	0.0077	0.0011
10	0.0088	0.0077	0.0011
11	0.0089	0.0077	0.0011
12	0.0089	0.0077	0.0011
13	0.0089	0.0078	0.0011
14	0.0089	0.0078	0.0011
15	0.0090	0.0078	0.0012
16	0.0090	0.0078	0.0012
17	0.0090	0.0079	0.0012
18	0.0090	0.0079	0.0012
19	0.0091	0.0079	0.0012
20	0.0091	0.0079	0.0012
21	0.0091	0.0080	0.0012
22	0.0092	0.0080	0.0012
23	0.0092	0.0080	0.0012
24	0.0092	0.0080	0.0012
25	0.0093	0.0081	0.0012
26	0.0093	0.0081	0.0012
27	0.0093	0.0081	0.0012
28	0.0093	0.0081	0.0012
29	0.0094	0.0082	0.0012
30	0.0094	0.0082	0.0012
31	0.0095	0.0082	0.0012
32	0.0095	0.0083	0.0012
33	0.0095	0.0083	0.0012
34	0.0095	0.0083	0.0012
35	0.0096	0.0084	0.0012
36	0.0096	0.0084	0.0012
37	0.0097	0.0084	0.0012
38	0.0097	0.0084	0.0012
39	0.0097	0.0085	0.0013
40	0.0098	0.0085	0.0013
41	0.0098	0.0085	0.0013
42	0.0098	0.0086	0.0013
43	0.0099	0.0086	0.0013
44	0.0099	0.0086	0.0013
45	0.0099	0.0087	0.0013
46	0.0100	0.0087	0.0013
47	0.0100	0.0087	0.0013
48	0.0101	0.0088	0.0013
49	0.0101	0.0088	0.0013
50	0.0101	0.0088	0.0013
51	0.0102	0.0089	0.0013
52	0.0102	0.0089	0.0013
53	0.0103	0.0089	0.0013
54	0.0103	0.0090	0.0013
55	0.0103	0.0090	0.0013
56	0.0104	0.0090	0.0013
57	0.0104	0.0091	0.0013
58	0.0105	0.0091	0.0013
59	0.0105	0.0092	0.0014
60	0.0106	0.0092	0.0014
61	0.0106	0.0092	0.0014
62	0.0106	0.0093	0.0014
63	0.0107	0.0093	0.0014
64	0.0107	0.0094	0.0014
65	0.0108	0.0094	0.0014
66	0.0108	0.0094	0.0014
67	0.0109	0.0095	0.0014
68	0.0109	0.0095	0.0014
69	0.0110	0.0096	0.0014
70	0.0110	0.0096	0.0014
71	0.0111	0.0097	0.0014
72	0.0111	0.0097	0.0014
73	0.0112	0.0098	0.0014

74	0.0112	0.0098	0.0014
75	0.0113	0.0099	0.0015
76	0.0113	0.0099	0.0015
77	0.0114	0.0099	0.0015
78	0.0115	0.0100	0.0015
79	0.0115	0.0100	0.0015
80	0.0116	0.0101	0.0015
81	0.0116	0.0101	0.0015
82	0.0117	0.0102	0.0015
83	0.0118	0.0102	0.0015
84	0.0118	0.0103	0.0015
85	0.0119	0.0104	0.0015
86	0.0119	0.0104	0.0015
87	0.0120	0.0105	0.0015
88	0.0121	0.0105	0.0016
89	0.0121	0.0106	0.0016
90	0.0122	0.0106	0.0016
91	0.0123	0.0107	0.0016
92	0.0123	0.0107	0.0016
93	0.0124	0.0108	0.0016
94	0.0125	0.0109	0.0016
95	0.0126	0.0109	0.0016
96	0.0126	0.0110	0.0016
97	0.0127	0.0111	0.0016
98	0.0128	0.0111	0.0016
99	0.0129	0.0112	0.0017
100	0.0129	0.0112	0.0017
101	0.0130	0.0113	0.0017
102	0.0131	0.0114	0.0017
103	0.0132	0.0115	0.0017
104	0.0132	0.0115	0.0017
105	0.0133	0.0116	0.0017
106	0.0134	0.0117	0.0017
107	0.0135	0.0118	0.0017
108	0.0136	0.0118	0.0017
109	0.0137	0.0119	0.0018
110	0.0138	0.0120	0.0018
111	0.0139	0.0121	0.0018
112	0.0140	0.0122	0.0018
113	0.0141	0.0123	0.0018
114	0.0142	0.0123	0.0018
115	0.0143	0.0124	0.0018
116	0.0144	0.0125	0.0018
117	0.0145	0.0126	0.0019
118	0.0146	0.0127	0.0019
119	0.0147	0.0128	0.0019
120	0.0148	0.0129	0.0019
121	0.0149	0.0130	0.0019
122	0.0150	0.0131	0.0019
123	0.0152	0.0132	0.0020
124	0.0153	0.0133	0.0020
125	0.0154	0.0135	0.0020
126	0.0155	0.0135	0.0020
127	0.0157	0.0137	0.0020
128	0.0158	0.0138	0.0020
129	0.0160	0.0139	0.0021
130	0.0161	0.0140	0.0021
131	0.0163	0.0142	0.0021
132	0.0164	0.0143	0.0021
133	0.0166	0.0144	0.0021
134	0.0167	0.0145	0.0021
135	0.0169	0.0147	0.0022
136	0.0170	0.0148	0.0022
137	0.0172	0.0150	0.0022
138	0.0174	0.0151	0.0022
139	0.0176	0.0153	0.0023
140	0.0177	0.0154	0.0023
141	0.0180	0.0157	0.0023
142	0.0181	0.0158	0.0023
143	0.0184	0.0160	0.0024
144	0.0185	0.0161	0.0024

145	0.0208	0.0181	0.0027
146	0.0210	0.0183	0.0027
147	0.0213	0.0185	0.0027
148	0.0214	0.0187	0.0028
149	0.0218	0.0190	0.0028
150	0.0220	0.0191	0.0028
151	0.0223	0.0194	0.0029
152	0.0225	0.0196	0.0029
153	0.0229	0.0199	0.0029
154	0.0231	0.0201	0.0030
155	0.0235	0.0205	0.0030
156	0.0237	0.0207	0.0031
157	0.0242	0.0211	0.0031
158	0.0244	0.0213	0.0031
159	0.0249	0.0217	0.0032
160	0.0252	0.0219	0.0032
161	0.0257	0.0224	0.0033
162	0.0260	0.0226	0.0033
163	0.0266	0.0232	0.0034
164	0.0269	0.0234	0.0035
165	0.0276	0.0240	0.0036
166	0.0279	0.0243	0.0036
167	0.0287	0.0250	0.0037
168	0.0291	0.0253	0.0037
169	0.0299	0.0261	0.0039
170	0.0304	0.0265	0.0039
171	0.0313	0.0273	0.0040
172	0.0318	0.0277	0.0041
173	0.0329	0.0287	0.0042
174	0.0335	0.0292	0.0043
175	0.0348	0.0303	0.0045
176	0.0355	0.0309	0.0046
177	0.0370	0.0323	0.0048
178	0.0379	0.0330	0.0049
179	0.0397	0.0346	0.0051
180	0.0408	0.0355	0.0052
181	0.0431	0.0376	0.0056
182	0.0444	0.0387	0.0057
183	0.0475	0.0414	0.0061
184	0.0493	0.0429	0.0063
185	0.0444	0.0387	0.0057
186	0.0469	0.0409	0.0060
187	0.0533	0.0464	0.0069
188	0.0575	0.0501	0.0074
189	0.0692	0.0603	0.0089
190	0.0782	0.0681	0.0101
191	0.1117	0.0713	0.0404
192	0.1536	0.0713	0.0823
193	0.4808	0.0713	0.4095
194	0.0910	0.0713	0.0197
195	0.0626	0.0546	0.0081
196	0.0498	0.0434	0.0064
197	0.0513	0.0447	0.0066
198	0.0459	0.0400	0.0059
199	0.0419	0.0365	0.0054
200	0.0388	0.0338	0.0050
201	0.0362	0.0316	0.0047
202	0.0341	0.0297	0.0044
203	0.0324	0.0282	0.0042
204	0.0308	0.0269	0.0040
205	0.0295	0.0257	0.0038
206	0.0283	0.0246	0.0036
207	0.0272	0.0237	0.0035
208	0.0263	0.0229	0.0034
209	0.0254	0.0222	0.0033
210	0.0247	0.0215	0.0032
211	0.0239	0.0209	0.0031
212	0.0233	0.0203	0.0030
213	0.0227	0.0198	0.0029
214	0.0221	0.0193	0.0028
215	0.0216	0.0188	0.0028

216	0.0211	0.0184	0.0027
217	0.0187	0.0163	0.0024
218	0.0182	0.0159	0.0023
219	0.0178	0.0155	0.0023
220	0.0175	0.0152	0.0023
221	0.0171	0.0149	0.0022
222	0.0168	0.0146	0.0022
223	0.0165	0.0144	0.0021
224	0.0162	0.0141	0.0021
225	0.0159	0.0138	0.0020
226	0.0156	0.0136	0.0020
227	0.0154	0.0134	0.0020
228	0.0151	0.0132	0.0019
229	0.0149	0.0130	0.0019
230	0.0146	0.0128	0.0019
231	0.0144	0.0126	0.0019
232	0.0142	0.0124	0.0018
233	0.0140	0.0122	0.0018
234	0.0138	0.0120	0.0018
235	0.0136	0.0119	0.0018
236	0.0135	0.0117	0.0017
237	0.0133	0.0116	0.0017
238	0.0131	0.0114	0.0017
239	0.0130	0.0113	0.0017
240	0.0128	0.0112	0.0016
241	0.0127	0.0110	0.0016
242	0.0125	0.0109	0.0016
243	0.0124	0.0108	0.0016
244	0.0122	0.0107	0.0016
245	0.0121	0.0105	0.0016
246	0.0120	0.0104	0.0015
247	0.0118	0.0103	0.0015
248	0.0117	0.0102	0.0015
249	0.0116	0.0101	0.0015
250	0.0115	0.0100	0.0015
251	0.0114	0.0099	0.0015
252	0.0113	0.0098	0.0015
253	0.0112	0.0097	0.0014
254	0.0111	0.0096	0.0014
255	0.0110	0.0095	0.0014
256	0.0109	0.0095	0.0014
257	0.0108	0.0094	0.0014
258	0.0107	0.0093	0.0014
259	0.0106	0.0092	0.0014
260	0.0105	0.0091	0.0014
261	0.0104	0.0091	0.0013
262	0.0103	0.0090	0.0013
263	0.0102	0.0089	0.0013
264	0.0102	0.0088	0.0013
265	0.0101	0.0088	0.0013
266	0.0100	0.0087	0.0013
267	0.0099	0.0086	0.0013
268	0.0098	0.0086	0.0013
269	0.0098	0.0085	0.0013
270	0.0097	0.0085	0.0012
271	0.0096	0.0084	0.0012
272	0.0096	0.0083	0.0012
273	0.0095	0.0083	0.0012
274	0.0094	0.0082	0.0012
275	0.0094	0.0082	0.0012
276	0.0093	0.0081	0.0012
277	0.0092	0.0081	0.0012
278	0.0092	0.0080	0.0012
279	0.0091	0.0079	0.0012
280	0.0091	0.0079	0.0012
281	0.0090	0.0078	0.0012
282	0.0089	0.0078	0.0012
283	0.0089	0.0077	0.0011
284	0.0088	0.0077	0.0011
285	0.0088	0.0076	0.0011
286	0.0087	0.0076	0.0011

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     287              0.0087           0.0076              0.0011
     288              0.0086           0.0075              0.0011
     ---------------------------------------------------------------------
     ---------------------------------------------------------------------
     Total soil rain loss =      4.49(In)
     Total effective rainfall =      1.17(In)
     Peak flow rate in flood hydrograph =     20.70(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        7.5      15.0      22.5      30.0
-------------------------------------------------------------------------
  0+ 5       0.0000      0.01  Q          |          |          |          |
  0+10       0.0003      0.03  Q          |          |          |          |
  0+15       0.0008      0.08  Q          |          |          |          |
  0+20       0.0016      0.12  Q          |          |          |          |
  0+25       0.0025      0.14  Q          |          |          |          |
  0+30       0.0035      0.15  Q          |          |          |          |
  0+35       0.0046      0.16  Q          |          |          |          |
  0+40       0.0057      0.16  Q          |          |          |          |
  0+45       0.0069      0.17  Q          |          |          |          |
  0+50       0.0081      0.17  Q          |          |          |          |
  0+55       0.0093      0.18  Q          |          |          |          |
  1+ 0       0.0106      0.18  Q          |          |          |          |
  1+ 5       0.0118      0.18  Q          |          |          |          |
  1+10       0.0131      0.19  Q          |          |          |          |
  1+15       0.0144      0.19  Q          |          |          |          |
  1+20       0.0157      0.19  Q          |          |          |          |
  1+25       0.0171      0.19  Q          |          |          |          |
  1+30       0.0184      0.19  Q          |          |          |          |
  1+35       0.0197      0.20  Q          |          |          |          |
  1+40       0.0211      0.20  Q          |          |          |          |
  1+45       0.0225      0.20  Q          |          |          |          |
  1+50       0.0238      0.20  Q          |          |          |          |
  1+55       0.0252      0.20  Q          |          |          |          |
  2+ 0       0.0266      0.20  Q          |          |          |          |
  2+ 5       0.0280      0.20  Q          |          |          |          |
  2+10       0.0294      0.20  Q          |          |          |          |
  2+15       0.0308      0.20  Q          |          |          |          |
  2+20       0.0322      0.20  Q          |          |          |          |
  2+25       0.0337      0.21  Q          |          |          |          |
  2+30       0.0351      0.21  QV         |          |          |          |
  2+35       0.0365      0.21  QV         |          |          |          |
  2+40       0.0379      0.21  QV         |          |          |          |
  2+45       0.0394      0.21  QV         |          |          |          |
  2+50       0.0408      0.21  QV         |          |          |          |
  2+55       0.0422      0.21  QV         |          |          |          |
  3+ 0       0.0437      0.21  QV         |          |          |          |
  3+ 5       0.0452      0.21  QV         |          |          |          |
  3+10       0.0466      0.21  QV         |          |          |          |
  3+15       0.0481      0.21  QV         |          |          |          |
  3+20       0.0495      0.21  QV         |          |          |          |
  3+25       0.0510      0.21  QV         |          |          |          |
  3+30       0.0525      0.22  QV         |          |          |          |
  3+35       0.0540      0.22  QV         |          |          |          |
  3+40       0.0555      0.22  QV         |          |          |          |
  3+45       0.0570      0.22  QV         |          |          |          |
  3+50       0.0585      0.22  QV         |          |          |          |
  3+55       0.0600      0.22  QV         |          |          |          |
  4+ 0       0.0615      0.22  QV         |          |          |          |
  4+ 5       0.0630      0.22  QV         |          |          |          |
  4+10       0.0646      0.22  QV         |          |          |          |
  4+15       0.0661      0.22  QV         |          |          |          |
  4+20       0.0676      0.22  QV         |          |          |          |
  4+25       0.0692      0.22  QV         |          |          |          |
  4+30       0.0707      0.23  Q V        |          |          |          |
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4+35	0.0723	0.23	Q V	|	|	|	|
4+40	0.0738	0.23	Q V	|	|	|	|
4+45	0.0754	0.23	Q V	|	|	|	|
4+50	0.0770	0.23	Q V	|	|	|	|
4+55	0.0786	0.23	Q V	|	|	|	|
5+ 0	0.0801	0.23	Q V	|	|	|	|
5+ 5	0.0817	0.23	Q V	|	|	|	|
5+10	0.0833	0.23	Q V	|	|	|	|
5+15	0.0850	0.23	Q V	|	|	|	|
5+20	0.0866	0.23	Q V	|	|	|	|
5+25	0.0882	0.24	Q V	|	|	|	|
5+30	0.0898	0.24	Q V	|	|	|	|
5+35	0.0915	0.24	Q V	|	|	|	|
5+40	0.0931	0.24	Q V	|	|	|	|
5+45	0.0947	0.24	Q V	|	|	|	|
5+50	0.0964	0.24	Q V	|	|	|	|
5+55	0.0981	0.24	Q V	|	|	|	|
6+ 0	0.0997	0.24	Q V	|	|	|	|
6+ 5	0.1014	0.24	Q V	|	|	|	|
6+10	0.1031	0.24	Q V	|	|	|	|
6+15	0.1048	0.25	Q V	|	|	|	|
6+20	0.1065	0.25	Q V	|	|	|	|
6+25	0.1082	0.25	Q V	|	|	|	|
6+30	0.1099	0.25	Q V	|	|	|	|
6+35	0.1117	0.25	Q V	|	|	|	|
6+40	0.1134	0.25	Q V	|	|	|	|
6+45	0.1151	0.25	Q V	|	|	|	|
6+50	0.1169	0.25	Q V	|	|	|	|
6+55	0.1187	0.26	Q V	|	|	|	|
7+ 0	0.1204	0.26	Q V	|	|	|	|
7+ 5	0.1222	0.26	Q V	|	|	|	|
7+10	0.1240	0.26	Q V	|	|	|	|
7+15	0.1258	0.26	Q V	|	|	|	|
7+20	0.1276	0.26	Q V	|	|	|	|
7+25	0.1294	0.26	Q V	|	|	|	|
7+30	0.1312	0.27	Q V	|	|	|	|
7+35	0.1331	0.27	Q V	|	|	|	|
7+40	0.1349	0.27	Q V	|	|	|	|
7+45	0.1368	0.27	Q V	|	|	|	|
7+50	0.1386	0.27	Q V	|	|	|	|
7+55	0.1405	0.27	Q V	|	|	|	|
8+ 0	0.1424	0.27	Q V	|	|	|	|
8+ 5	0.1443	0.28	Q V	|	|	|	|
8+10	0.1462	0.28	Q V	|	|	|	|
8+15	0.1481	0.28	Q V	|	|	|	|
8+20	0.1500	0.28	Q V	|	|	|	|
8+25	0.1520	0.28	Q V	|	|	|	|
8+30	0.1539	0.28	Q V	|	|	|	|
8+35	0.1559	0.29	Q V	|	|	|	|
8+40	0.1579	0.29	Q V	|	|	|	|
8+45	0.1599	0.29	Q V	|	|	|	|
8+50	0.1619	0.29	Q V	|	|	|	|
8+55	0.1639	0.29	Q V	|	|	|	|
9+ 0	0.1659	0.29	Q V	|	|	|	|
9+ 5	0.1679	0.30	Q V	|	|	|	|
9+10	0.1700	0.30	Q V	|	|	|	|
9+15	0.1721	0.30	Q V	|	|	|	|
9+20	0.1741	0.30	Q V	|	|	|	|
9+25	0.1762	0.30	Q V	|	|	|	|
9+30	0.1783	0.31	Q V	|	|	|	|
9+35	0.1804	0.31	Q V	|	|	|	|
9+40	0.1826	0.31	Q V	|	|	|	|
9+45	0.1847	0.31	Q V	|	|	|	|
9+50	0.1869	0.31	Q V	|	|	|	|
9+55	0.1891	0.32	Q V	|	|	|	|
10+ 0	0.1913	0.32	Q V	|	|	|	|
10+ 5	0.1935	0.32	Q V	|	|	|	|
10+10	0.1957	0.32	Q V	|	|	|	|
10+15	0.1980	0.33	Q V	|	|	|	|
10+20	0.2002	0.33	Q V	|	|	|	|
10+25	0.2025	0.33	Q V	|	|	|	|

10+30	0.2048	0.33	Q V	|	|	|	|
10+35	0.2071	0.34	Q V	|	|	|	|
10+40	0.2095	0.34	Q V	|	|	|	|
10+45	0.2118	0.34	Q V	|	|	|	|
10+50	0.2142	0.35	Q V	|	|	|	|
10+55	0.2166	0.35	Q V	|	|	|	|
11+ 0	0.2190	0.35	Q V	|	|	|	|
11+ 5	0.2215	0.35	Q V	|	|	|	|
11+10	0.2239	0.36	Q V	|	|	|	|
11+15	0.2264	0.36	Q V	|	|	|	|
11+20	0.2289	0.36	Q V	|	|	|	|
11+25	0.2314	0.37	Q V	|	|	|	|
11+30	0.2340	0.37	Q V	|	|	|	|
11+35	0.2366	0.37	Q V	|	|	|	|
11+40	0.2392	0.38	Q V	|	|	|	|
11+45	0.2418	0.38	Q V	|	|	|	|
11+50	0.2445	0.39	Q V	|	|	|	|
11+55	0.2471	0.39	Q V	|	|	|	|
12+ 0	0.2499	0.39	Q V	|	|	|	|
12+ 5	0.2526	0.40	Q V	|	|	|	|
12+10	0.2554	0.41	Q V	|	|	|	|
12+15	0.2584	0.43	Q V	|	|	|	|
12+20	0.2614	0.44	Q V	|	|	|	|
12+25	0.2645	0.45	Q V	|	|	|	|
12+30	0.2676	0.46	Q V	|	|	|	|
12+35	0.2708	0.46	Q V	|	|	|	|
12+40	0.2740	0.47	Q V	|	|	|	|
12+45	0.2773	0.48	Q V	|	|	|	|
12+50	0.2807	0.48	Q V	|	|	|	|
12+55	0.2840	0.49	Q V	|	|	|	|
13+ 0	0.2875	0.50	Q V	|	|	|	|
13+ 5	0.2909	0.50	Q V	|	|	|	|
13+10	0.2945	0.51	Q V	|	|	|	|
13+15	0.2980	0.52	Q V	|	|	|	|
13+20	0.3017	0.53	Q V	|	|	|	|
13+25	0.3053	0.53	Q V	|	|	|	|
13+30	0.3091	0.54	Q V	|	|	|	|
13+35	0.3129	0.55	Q V	|	|	|	|
13+40	0.3167	0.56	Q V	|	|	|	|
13+45	0.3207	0.57	Q V	|	|	|	|
13+50	0.3247	0.58	Q V	|	|	|	|
13+55	0.3287	0.59	Q V	|	|	|	|
14+ 0	0.3328	0.60	Q V	|	|	|	|
14+ 5	0.3371	0.61	Q V	|	|	|	|
14+10	0.3413	0.62	Q V	|	|	|	|
14+15	0.3457	0.64	Q V	|	|	|	|
14+20	0.3502	0.65	Q V	|	|	|	|
14+25	0.3548	0.66	Q V	|	|	|	|
14+30	0.3594	0.68	Q V	|	|	|	|
14+35	0.3642	0.69	Q V	|	|	|	|
14+40	0.3691	0.71	Q V	|	|	|	|
14+45	0.3742	0.73	Q V	|	|	|	|
14+50	0.3793	0.75	Q V	|	|	|	|
14+55	0.3847	0.77	Q V	|	|	|	|
15+ 0	0.3902	0.80	Q V	|	|	|	|
15+ 5	0.3959	0.82	Q V	|	|	|	|
15+10	0.4017	0.85	Q V	|	|	|	|
15+15	0.4079	0.89	Q V	|	|	|	|
15+20	0.4142	0.93	Q V	|	|	|	|
15+25	0.4208	0.96	Q V	|	|	|	|
15+30	0.4276	0.98	Q V	|	|	|	|
15+35	0.4345	0.99	Q V	|	|	|	|
15+40	0.4415	1.02	Q V	|	|	|	|
15+45	0.4490	1.09	Q V	|	|	|	|
15+50	0.4572	1.19	Q V	|	|	|	|
15+55	0.4675	1.50	Q V	|	|	|	|
16+ 0	0.4854	2.60	Q V	|	|	|	|
16+ 5	0.5329	6.90	Q V	|	|	|	|
16+10	0.6369	15.09	Q V	|	|	|	|
16+15	0.7795	20.70	Q V	|	|	|	|
16+20	0.8974	17.12	Q V	|	|	|	|

16+25	0.9663	10.00	|	Q	|	V	|
16+30	1.0101	6.37	|	Q	|	V	|
16+35	1.0440	4.92	|	Q	|	V	|
16+40	1.0719	4.05	|	Q	|	V	|
16+45	1.0953	3.39	|	Q	|	V	|
16+50	1.1151	2.88	|	Q	|	V	|
16+55	1.1324	2.52	|	Q	|	V	|
17+ 0	1.1473	2.16	|	Q	|	V	|
17+ 5	1.1603	1.88	|	Q	|	V	|
17+10	1.1723	1.74	|	Q	|	V	|
17+15	1.1834	1.61	|	Q	|	V	|
17+20	1.1931	1.41	|	Q	|	V	|
17+25	1.2020	1.29	|	Q	|	V	|
17+30	1.2101	1.18	|	Q	|	V	|
17+35	1.2174	1.06	|	Q	|	V	|
17+40	1.2240	0.96	|	Q	|	V	|
17+45	1.2303	0.91	|	Q	|	V	|
17+50	1.2364	0.88	|	Q	|	V	|
17+55	1.2421	0.83	|	Q	|	V	|
18+ 0	1.2468	0.68	|	Q	|	V	|
18+ 5	1.2504	0.53	|	Q	|	V	|
18+10	1.2539	0.50	|	Q	|	V	|
18+15	1.2572	0.48	|	Q	|	V	|
18+20	1.2603	0.46	|	Q	|	V	|
18+25	1.2633	0.44	|	Q	|	V	|
18+30	1.2663	0.43	|	Q	|	V	|
18+35	1.2691	0.42	|	Q	|	V	|
18+40	1.2719	0.40	|	Q	|	V	|
18+45	1.2746	0.39	|	Q	|	V	|
18+50	1.2773	0.39	|	Q	|	V	|
18+55	1.2799	0.38	|	Q	|	V	|
19+ 0	1.2824	0.37	|	Q	|	V	|
19+ 5	1.2849	0.36	|	Q	|	V	|
19+10	1.2874	0.35	|	Q	|	V	|
19+15	1.2898	0.35	|	Q	|	V	|
19+20	1.2921	0.34	|	Q	|	V	|
19+25	1.2944	0.34	|	Q	|	V	|
19+30	1.2967	0.33	|	Q	|	V	|
19+35	1.2989	0.33	|	Q	|	V	|
19+40	1.3012	0.32	|	Q	|	V	|
19+45	1.3033	0.32	|	Q	|	V	|
19+50	1.3055	0.31	|	Q	|	V	|
19+55	1.3076	0.31	|	Q	|	V	|
20+ 0	1.3096	0.30	|	Q	|	V	|
20+ 5	1.3117	0.30	|	Q	|	V	|
20+10	1.3137	0.29	|	Q	|	V	|
20+15	1.3157	0.29	|	Q	|	V	|
20+20	1.3177	0.29	|	Q	|	V	|
20+25	1.3197	0.28	|	Q	|	V	|
20+30	1.3216	0.28	|	Q	|	V	|
20+35	1.3235	0.28	|	Q	|	V	|
20+40	1.3254	0.27	|	Q	|	V	|
20+45	1.3272	0.27	|	Q	|	V	|
20+50	1.3291	0.27	|	Q	|	V	|
20+55	1.3309	0.26	|	Q	|	V	|
21+ 0	1.3327	0.26	|	Q	|	V	|
21+ 5	1.3345	0.26	|	Q	|	V	|
21+10	1.3363	0.26	|	Q	|	V	|
21+15	1.3380	0.25	|	Q	|	V	|
21+20	1.3398	0.25	|	Q	|	V	|
21+25	1.3415	0.25	|	Q	|	V	|
21+30	1.3432	0.25	|	Q	|	V	|
21+35	1.3449	0.24	|	Q	|	V	|
21+40	1.3465	0.24	|	Q	|	V	|
21+45	1.3482	0.24	|	Q	|	V	|
21+50	1.3498	0.24	|	Q	|	V	|
21+55	1.3515	0.24	|	Q	|	V	|
22+ 0	1.3531	0.23	|	Q	|	V	|
22+ 5	1.3547	0.23	|	Q	|	V	|
22+10	1.3563	0.23	|	Q	|	V	|
22+15	1.3578	0.23	|	Q	|	V	|

22+20	1.3594	0.23	Q	|	|	|	V|
22+25	1.3609	0.22	Q	|	|	|	V|
22+30	1.3625	0.22	Q	|	|	|	V|
22+35	1.3640	0.22	Q	|	|	|	V|
22+40	1.3655	0.22	Q	|	|	|	V|
22+45	1.3670	0.22	Q	|	|	|	V|
22+50	1.3685	0.22	Q	|	|	|	V|
22+55	1.3700	0.21	Q	|	|	|	V|
23+ 0	1.3715	0.21	Q	|	|	|	V|
23+ 5	1.3729	0.21	Q	|	|	|	V|
23+10	1.3744	0.21	Q	|	|	|	V|
23+15	1.3758	0.21	Q	|	|	|	V|
23+20	1.3772	0.21	Q	|	|	|	V|
23+25	1.3787	0.21	Q	|	|	|	V|
23+30	1.3801	0.20	Q	|	|	|	V|
23+35	1.3815	0.20	Q	|	|	|	V|
23+40	1.3829	0.20	Q	|	|	|	V|
23+45	1.3842	0.20	Q	|	|	|	V|
23+50	1.3856	0.20	Q	|	|	|	V|
23+55	1.3870	0.20	Q	|	|	|	V|
24+ 0	1.3883	0.20	Q	|	|	|	V|
24+ 5	1.3896	0.19	Q	|	|	|	V|
24+10	1.3908	0.16	Q	|	|	|	V|
24+15	1.3916	0.12	Q	|	|	|	V|
24+20	1.3921	0.08	Q	|	|	|	V|
24+25	1.3925	0.06	Q	|	|	|	V|
24+30	1.3928	0.05	Q	|	|	|	V|
24+35	1.3931	0.04	Q	|	|	|	V|
24+40	1.3933	0.03	Q	|	|	|	V|
24+45	1.3935	0.03	Q	|	|	|	V|
24+50	1.3936	0.02	Q	|	|	|	V|
24+55	1.3937	0.02	Q	|	|	|	V|
25+ 0	1.3938	0.01	Q	|	|	|	V|
25+ 5	1.3939	0.01	Q	|	|	|	V|
25+10	1.3940	0.01	Q	|	|	|	V|
25+15	1.3940	0.01	Q	|	|	|	V|
25+20	1.3941	0.01	Q	|	|	|	V|
25+25	1.3941	0.01	Q	|	|	|	V|
25+30	1.3941	0.00	Q	|	|	|	V|
25+35	1.3942	0.00	Q	|	|	|	V|
25+40	1.3942	0.00	Q	|	|	|	V|
25+45	1.3942	0.00	Q	|	|	|	V|
25+50	1.3942	0.00	Q	|	|	|	V|
25+55	1.3942	0.00	Q	|	|	|	V

APPENDIX E.2: UNIT HYDROGRAPH ANALYSIS, AREA "B"

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

Study date 06/23/20

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

Program License Serial Number 6279

BLOOMINGTON PRE-PROJECT CONDITION ONSITE HYDROLOGY
UNIT HYDROGRAPH ANALYSIS, 100-YEAR STORM EVENT
FILENAME: ARBEX

Storm Event Year = 100

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 100		
3.46	1	1.30
Rainfall data for year 100		
3.46	6	3.09
Rainfall data for year 100		
3.46	24	5.66

++

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

SCS curve No.(AMCII)	SCS curve NO.(AMC 2)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
46.0	46.0	3.46	1.000	0.856	1.000	0.856

Area-averaged adjusted loss rate Fm (In/Hr) = 0.856

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

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC2)	S	Pervious Yield Fr
3.46	1.000	46.0	46.0	11.74	0.129

Area-averaged catchment yield fraction, Y = 0.129
Area-averaged low loss fraction, Yb = 0.871
User entry of time of concentration = 0.254 (hours)
++
Watershed area = 3.46(Ac.)

Catchment Lag time = 0.203 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 41.0105
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.856(In/Hr)
Average low loss rate fraction (Yb) = 0.871 (decimal)
VALLEY UNDEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.481(In)
Computed peak 30-minute rainfall = 0.985(In)
Specified peak 1-hour rainfall = 1.300(In)
Computed peak 3-hour rainfall = 2.211(In)
Specified peak 6-hour rainfall = 3.090(In)
Specified peak 24-hour rainfall = 5.660(In)

Rainfall depth area reduction factors:
Using a total area of 3.46(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.481(In)
30-minute factor = 1.000 Adjusted rainfall = 0.985(In)
1-hour factor = 1.000 Adjusted rainfall = 1.300(In)
3-hour factor = 1.000 Adjusted rainfall = 2.210(In)
6-hour factor = 1.000 Adjusted rainfall = 3.090(In)
24-hour factor = 1.000 Adjusted rainfall = 5.660(In)

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

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 41.84 (CFS))	
1	4.523	1.893
2	23.212	7.820
3	50.477	11.409
4	67.423	7.091
5	75.672	3.452
6	80.959	2.212
7	84.927	1.661
8	87.930	1.257
9	90.344	1.010
10	92.227	0.788
11	93.679	0.608
12	94.949	0.531
13	96.072	0.470
14	96.952	0.368
15	97.693	0.310
16	98.297	0.253
17	98.767	0.196
18	99.177	0.172
19	99.587	0.172
20	100.000	0.086

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.4811	0.4811
2	0.6348	0.1537
3	0.7465	0.1118
4	0.8376	0.0910
5	0.9158	0.0782
6	0.9851	0.0693
7	1.0477	0.0627
8	1.1052	0.0575
9	1.1585	0.0533
10	1.2084	0.0499
11	1.2553	0.0470
12	1.2998	0.0445
13	1.3511	0.0513
14	1.4003	0.0493
15	1.4478	0.0475

16	1.4937	0.0459
17	1.5381	0.0444
18	1.5812	0.0431
19	1.6231	0.0419
20	1.6638	0.0407
21	1.7035	0.0397
22	1.7422	0.0387
23	1.7801	0.0378
24	1.8171	0.0370
25	1.8533	0.0362
26	1.8888	0.0355
27	1.9235	0.0348
28	1.9576	0.0341
29	1.9911	0.0335
30	2.0240	0.0329
31	2.0564	0.0323
32	2.0882	0.0318
33	2.1194	0.0313
34	2.1502	0.0308
35	2.1806	0.0303
36	2.2105	0.0299
37	2.2399	0.0295
38	2.2690	0.0291
39	2.2977	0.0287
40	2.3259	0.0283
41	2.3539	0.0279
42	2.3814	0.0276
43	2.4087	0.0272
44	2.4356	0.0269
45	2.4622	0.0266
46	2.4885	0.0263
47	2.5144	0.0260
48	2.5402	0.0257
49	2.5656	0.0254
50	2.5908	0.0252
51	2.6157	0.0249
52	2.6403	0.0247
53	2.6648	0.0244
54	2.6889	0.0242
55	2.7129	0.0239
56	2.7366	0.0237
57	2.7601	0.0235
58	2.7834	0.0233
59	2.8065	0.0231
60	2.8294	0.0229
61	2.8521	0.0227
62	2.8746	0.0225
63	2.8969	0.0223
64	2.9190	0.0221
65	2.9410	0.0220
66	2.9627	0.0218
67	2.9843	0.0216
68	3.0058	0.0214
69	3.0271	0.0213
70	3.0482	0.0211
71	3.0692	0.0210
72	3.0900	0.0208
73	3.1086	0.0187
74	3.1272	0.0185
75	3.1455	0.0184
76	3.1638	0.0182
77	3.1819	0.0181
78	3.1999	0.0180
79	3.2177	0.0178
80	3.2354	0.0177
81	3.2530	0.0176
82	3.2705	0.0175
83	3.2879	0.0174
84	3.3051	0.0172
85	3.3222	0.0171
86	3.3392	0.0170

87	3.3561	0.0169
88	3.3729	0.0168
89	3.3896	0.0167
90	3.4062	0.0166
91	3.4226	0.0165
92	3.4390	0.0164
93	3.4553	0.0163
94	3.4714	0.0162
95	3.4875	0.0161
96	3.5035	0.0160
97	3.5194	0.0159
98	3.5352	0.0158
99	3.5509	0.0157
100	3.5665	0.0156
101	3.5820	0.0155
102	3.5975	0.0154
103	3.6128	0.0154
104	3.6281	0.0153
105	3.6433	0.0152
106	3.6584	0.0151
107	3.6734	0.0150
108	3.6884	0.0149
109	3.7033	0.0149
110	3.7180	0.0148
111	3.7328	0.0147
112	3.7474	0.0146
113	3.7620	0.0146
114	3.7765	0.0145
115	3.7909	0.0144
116	3.8053	0.0144
117	3.8196	0.0143
118	3.8338	0.0142
119	3.8479	0.0142
120	3.8620	0.0141
121	3.8760	0.0140
122	3.8900	0.0140
123	3.9039	0.0139
124	3.9177	0.0138
125	3.9315	0.0138
126	3.9452	0.0137
127	3.9588	0.0136
128	3.9724	0.0136
129	3.9859	0.0135
130	3.9994	0.0135
131	4.0128	0.0134
132	4.0261	0.0133
133	4.0394	0.0133
134	4.0526	0.0132
135	4.0658	0.0132
136	4.0789	0.0131
137	4.0920	0.0131
138	4.1050	0.0130
139	4.1180	0.0130
140	4.1309	0.0129
141	4.1437	0.0129
142	4.1565	0.0128
143	4.1693	0.0128
144	4.1820	0.0127
145	4.1947	0.0127
146	4.2073	0.0126
147	4.2198	0.0126
148	4.2323	0.0125
149	4.2448	0.0125
150	4.2572	0.0124
151	4.2696	0.0124
152	4.2819	0.0123
153	4.2942	0.0123
154	4.3064	0.0122
155	4.3186	0.0122
156	4.3307	0.0121
157	4.3428	0.0121

158	4.3549	0.0121
159	4.3669	0.0120
160	4.3789	0.0120
161	4.3908	0.0119
162	4.4027	0.0119
163	4.4145	0.0118
164	4.4263	0.0118
165	4.4381	0.0118
166	4.4498	0.0117
167	4.4615	0.0117
168	4.4731	0.0116
169	4.4848	0.0116
170	4.4963	0.0116
171	4.5078	0.0115
172	4.5193	0.0115
173	4.5308	0.0115
174	4.5422	0.0114
175	4.5536	0.0114
176	4.5649	0.0113
177	4.5762	0.0113
178	4.5875	0.0113
179	4.5987	0.0112
180	4.6099	0.0112
181	4.6211	0.0112
182	4.6322	0.0111
183	4.6433	0.0111
184	4.6544	0.0111
185	4.6654	0.0110
186	4.6764	0.0110
187	4.6874	0.0110
188	4.6983	0.0109
189	4.7092	0.0109
190	4.7201	0.0109
191	4.7309	0.0108
192	4.7417	0.0108
193	4.7525	0.0108
194	4.7632	0.0107
195	4.7739	0.0107
196	4.7846	0.0107
197	4.7952	0.0106
198	4.8058	0.0106
199	4.8164	0.0106
200	4.8270	0.0106
201	4.8375	0.0105
202	4.8480	0.0105
203	4.8584	0.0105
204	4.8689	0.0104
205	4.8793	0.0104
206	4.8897	0.0104
207	4.9000	0.0103
208	4.9103	0.0103
209	4.9206	0.0103
210	4.9309	0.0103
211	4.9411	0.0102
212	4.9513	0.0102
213	4.9615	0.0102
214	4.9717	0.0102
215	4.9818	0.0101
216	4.9919	0.0101
217	5.0020	0.0101
218	5.0120	0.0101
219	5.0221	0.0100
220	5.0321	0.0100
221	5.0420	0.0100
222	5.0520	0.0099
223	5.0619	0.0099
224	5.0718	0.0099
225	5.0817	0.0099
226	5.0915	0.0098
227	5.1013	0.0098
228	5.1111	0.0098

229	5.1209	0.0098
230	5.1307	0.0098
231	5.1404	0.0097
232	5.1501	0.0097
233	5.1598	0.0097
234	5.1694	0.0097
235	5.1791	0.0096
236	5.1887	0.0096
237	5.1983	0.0096
238	5.2078	0.0096
239	5.2174	0.0095
240	5.2269	0.0095
241	5.2364	0.0095
242	5.2459	0.0095
243	5.2553	0.0095
244	5.2648	0.0094
245	5.2742	0.0094
246	5.2836	0.0094
247	5.2929	0.0094
248	5.3023	0.0093
249	5.3116	0.0093
250	5.3209	0.0093
251	5.3302	0.0093
252	5.3394	0.0093
253	5.3487	0.0092
254	5.3579	0.0092
255	5.3671	0.0092
256	5.3763	0.0092
257	5.3854	0.0092
258	5.3946	0.0091
259	5.4037	0.0091
260	5.4128	0.0091
261	5.4219	0.0091
262	5.4309	0.0091
263	5.4400	0.0090
264	5.4490	0.0090
265	5.4580	0.0090
266	5.4670	0.0090
267	5.4759	0.0090
268	5.4849	0.0089
269	5.4938	0.0089
270	5.5027	0.0089
271	5.5116	0.0089
272	5.5205	0.0089
273	5.5293	0.0089
274	5.5382	0.0088
275	5.5470	0.0088
276	5.5558	0.0088
277	5.5646	0.0088
278	5.5733	0.0088
279	5.5821	0.0087
280	5.5908	0.0087
281	5.5995	0.0087
282	5.6082	0.0087
283	5.6169	0.0087
284	5.6255	0.0087
285	5.6342	0.0086
286	5.6428	0.0086
287	5.6514	0.0086
288	5.6600	0.0086

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0086	0.0075	0.0011
2	0.0086	0.0075	0.0011
3	0.0086	0.0075	0.0011
4	0.0087	0.0075	0.0011
5	0.0087	0.0076	0.0011
6	0.0087	0.0076	0.0011

7	0.0087	0.0076	0.0011
8	0.0088	0.0076	0.0011
9	0.0088	0.0077	0.0011
10	0.0088	0.0077	0.0011
11	0.0089	0.0077	0.0011
12	0.0089	0.0077	0.0011
13	0.0089	0.0078	0.0011
14	0.0089	0.0078	0.0011
15	0.0090	0.0078	0.0012
16	0.0090	0.0078	0.0012
17	0.0090	0.0079	0.0012
18	0.0090	0.0079	0.0012
19	0.0091	0.0079	0.0012
20	0.0091	0.0079	0.0012
21	0.0091	0.0080	0.0012
22	0.0092	0.0080	0.0012
23	0.0092	0.0080	0.0012
24	0.0092	0.0080	0.0012
25	0.0093	0.0081	0.0012
26	0.0093	0.0081	0.0012
27	0.0093	0.0081	0.0012
28	0.0093	0.0081	0.0012
29	0.0094	0.0082	0.0012
30	0.0094	0.0082	0.0012
31	0.0095	0.0082	0.0012
32	0.0095	0.0083	0.0012
33	0.0095	0.0083	0.0012
34	0.0095	0.0083	0.0012
35	0.0096	0.0084	0.0012
36	0.0096	0.0084	0.0012
37	0.0097	0.0084	0.0012
38	0.0097	0.0084	0.0012
39	0.0097	0.0085	0.0013
40	0.0098	0.0085	0.0013
41	0.0098	0.0085	0.0013
42	0.0098	0.0086	0.0013
43	0.0099	0.0086	0.0013
44	0.0099	0.0086	0.0013
45	0.0099	0.0087	0.0013
46	0.0100	0.0087	0.0013
47	0.0100	0.0087	0.0013
48	0.0101	0.0088	0.0013
49	0.0101	0.0088	0.0013
50	0.0101	0.0088	0.0013
51	0.0102	0.0089	0.0013
52	0.0102	0.0089	0.0013
53	0.0103	0.0089	0.0013
54	0.0103	0.0090	0.0013
55	0.0103	0.0090	0.0013
56	0.0104	0.0090	0.0013
57	0.0104	0.0091	0.0013
58	0.0105	0.0091	0.0013
59	0.0105	0.0092	0.0014
60	0.0106	0.0092	0.0014
61	0.0106	0.0092	0.0014
62	0.0106	0.0093	0.0014
63	0.0107	0.0093	0.0014
64	0.0107	0.0094	0.0014
65	0.0108	0.0094	0.0014
66	0.0108	0.0094	0.0014
67	0.0109	0.0095	0.0014
68	0.0109	0.0095	0.0014
69	0.0110	0.0096	0.0014
70	0.0110	0.0096	0.0014
71	0.0111	0.0097	0.0014
72	0.0111	0.0097	0.0014
73	0.0112	0.0098	0.0014
74	0.0112	0.0098	0.0014
75	0.0113	0.0099	0.0015
76	0.0113	0.0099	0.0015
77	0.0114	0.0099	0.0015

78	0.0115	0.0100	0.0015
79	0.0115	0.0100	0.0015
80	0.0116	0.0101	0.0015
81	0.0116	0.0101	0.0015
82	0.0117	0.0102	0.0015
83	0.0118	0.0102	0.0015
84	0.0118	0.0103	0.0015
85	0.0119	0.0104	0.0015
86	0.0119	0.0104	0.0015
87	0.0120	0.0105	0.0015
88	0.0121	0.0105	0.0016
89	0.0121	0.0106	0.0016
90	0.0122	0.0106	0.0016
91	0.0123	0.0107	0.0016
92	0.0123	0.0107	0.0016
93	0.0124	0.0108	0.0016
94	0.0125	0.0109	0.0016
95	0.0126	0.0109	0.0016
96	0.0126	0.0110	0.0016
97	0.0127	0.0111	0.0016
98	0.0128	0.0111	0.0016
99	0.0129	0.0112	0.0017
100	0.0129	0.0112	0.0017
101	0.0130	0.0113	0.0017
102	0.0131	0.0114	0.0017
103	0.0132	0.0115	0.0017
104	0.0132	0.0115	0.0017
105	0.0133	0.0116	0.0017
106	0.0134	0.0117	0.0017
107	0.0135	0.0118	0.0017
108	0.0136	0.0118	0.0017
109	0.0137	0.0119	0.0018
110	0.0138	0.0120	0.0018
111	0.0139	0.0121	0.0018
112	0.0140	0.0122	0.0018
113	0.0141	0.0123	0.0018
114	0.0142	0.0123	0.0018
115	0.0143	0.0124	0.0018
116	0.0144	0.0125	0.0018
117	0.0145	0.0126	0.0019
118	0.0146	0.0127	0.0019
119	0.0147	0.0128	0.0019
120	0.0148	0.0129	0.0019
121	0.0149	0.0130	0.0019
122	0.0150	0.0131	0.0019
123	0.0152	0.0132	0.0020
124	0.0153	0.0133	0.0020
125	0.0154	0.0135	0.0020
126	0.0155	0.0135	0.0020
127	0.0157	0.0137	0.0020
128	0.0158	0.0138	0.0020
129	0.0160	0.0139	0.0021
130	0.0161	0.0140	0.0021
131	0.0163	0.0142	0.0021
132	0.0164	0.0143	0.0021
133	0.0166	0.0144	0.0021
134	0.0167	0.0145	0.0021
135	0.0169	0.0147	0.0022
136	0.0170	0.0148	0.0022
137	0.0172	0.0150	0.0022
138	0.0174	0.0151	0.0022
139	0.0176	0.0153	0.0023
140	0.0177	0.0154	0.0023
141	0.0180	0.0157	0.0023
142	0.0181	0.0158	0.0023
143	0.0184	0.0160	0.0024
144	0.0185	0.0161	0.0024
145	0.0208	0.0181	0.0027
146	0.0210	0.0183	0.0027
147	0.0213	0.0185	0.0027
148	0.0214	0.0187	0.0028

149	0.0218	0.0190	0.0028
150	0.0220	0.0191	0.0028
151	0.0223	0.0194	0.0029
152	0.0225	0.0196	0.0029
153	0.0229	0.0199	0.0029
154	0.0231	0.0201	0.0030
155	0.0235	0.0205	0.0030
156	0.0237	0.0207	0.0031
157	0.0242	0.0211	0.0031
158	0.0244	0.0213	0.0031
159	0.0249	0.0217	0.0032
160	0.0252	0.0219	0.0032
161	0.0257	0.0224	0.0033
162	0.0260	0.0226	0.0033
163	0.0266	0.0232	0.0034
164	0.0269	0.0234	0.0035
165	0.0276	0.0240	0.0036
166	0.0279	0.0243	0.0036
167	0.0287	0.0250	0.0037
168	0.0291	0.0253	0.0037
169	0.0299	0.0260	0.0038
170	0.0303	0.0264	0.0039
171	0.0313	0.0273	0.0040
172	0.0318	0.0277	0.0041
173	0.0329	0.0287	0.0042
174	0.0335	0.0292	0.0043
175	0.0348	0.0303	0.0045
176	0.0355	0.0309	0.0046
177	0.0370	0.0322	0.0048
178	0.0378	0.0330	0.0049
179	0.0397	0.0346	0.0051
180	0.0407	0.0355	0.0052
181	0.0431	0.0375	0.0055
182	0.0444	0.0387	0.0057
183	0.0475	0.0414	0.0061
184	0.0493	0.0429	0.0063
185	0.0445	0.0387	0.0057
186	0.0470	0.0409	0.0060
187	0.0533	0.0464	0.0069
188	0.0575	0.0501	0.0074
189	0.0693	0.0604	0.0089
190	0.0782	0.0681	0.0101
191	0.1118	0.0713	0.0405
192	0.1537	0.0713	0.0824
193	0.4811	0.0713	0.4098
194	0.0910	0.0713	0.0197
195	0.0627	0.0546	0.0081
196	0.0499	0.0434	0.0064
197	0.0513	0.0447	0.0066
198	0.0459	0.0400	0.0059
199	0.0419	0.0365	0.0054
200	0.0387	0.0337	0.0050
201	0.0362	0.0315	0.0047
202	0.0341	0.0297	0.0044
203	0.0323	0.0282	0.0042
204	0.0308	0.0268	0.0040
205	0.0295	0.0257	0.0038
206	0.0283	0.0246	0.0036
207	0.0272	0.0237	0.0035
208	0.0263	0.0229	0.0034
209	0.0254	0.0222	0.0033
210	0.0247	0.0215	0.0032
211	0.0239	0.0209	0.0031
212	0.0233	0.0203	0.0030
213	0.0227	0.0198	0.0029
214	0.0221	0.0193	0.0028
215	0.0216	0.0188	0.0028
216	0.0211	0.0184	0.0027
217	0.0187	0.0163	0.0024
218	0.0182	0.0159	0.0023
219	0.0178	0.0155	0.0023

220	0.0175	0.0152	0.0023
221	0.0171	0.0149	0.0022
222	0.0168	0.0146	0.0022
223	0.0165	0.0144	0.0021
224	0.0162	0.0141	0.0021
225	0.0159	0.0138	0.0020
226	0.0156	0.0136	0.0020
227	0.0154	0.0134	0.0020
228	0.0151	0.0132	0.0019
229	0.0149	0.0130	0.0019
230	0.0146	0.0128	0.0019
231	0.0144	0.0126	0.0019
232	0.0142	0.0124	0.0018
233	0.0140	0.0122	0.0018
234	0.0138	0.0120	0.0018
235	0.0136	0.0119	0.0018
236	0.0135	0.0117	0.0017
237	0.0133	0.0116	0.0017
238	0.0131	0.0114	0.0017
239	0.0130	0.0113	0.0017
240	0.0128	0.0112	0.0016
241	0.0127	0.0110	0.0016
242	0.0125	0.0109	0.0016
243	0.0124	0.0108	0.0016
244	0.0122	0.0107	0.0016
245	0.0121	0.0105	0.0016
246	0.0120	0.0104	0.0015
247	0.0118	0.0103	0.0015
248	0.0117	0.0102	0.0015
249	0.0116	0.0101	0.0015
250	0.0115	0.0100	0.0015
251	0.0114	0.0099	0.0015
252	0.0113	0.0098	0.0015
253	0.0112	0.0097	0.0014
254	0.0111	0.0096	0.0014
255	0.0110	0.0095	0.0014
256	0.0109	0.0095	0.0014
257	0.0108	0.0094	0.0014
258	0.0107	0.0093	0.0014
259	0.0106	0.0092	0.0014
260	0.0105	0.0091	0.0014
261	0.0104	0.0091	0.0013
262	0.0103	0.0090	0.0013
263	0.0102	0.0089	0.0013
264	0.0102	0.0088	0.0013
265	0.0101	0.0088	0.0013
266	0.0100	0.0087	0.0013
267	0.0099	0.0086	0.0013
268	0.0098	0.0086	0.0013
269	0.0098	0.0085	0.0013
270	0.0097	0.0085	0.0012
271	0.0096	0.0084	0.0012
272	0.0096	0.0083	0.0012
273	0.0095	0.0083	0.0012
274	0.0094	0.0082	0.0012
275	0.0094	0.0082	0.0012
276	0.0093	0.0081	0.0012
277	0.0092	0.0081	0.0012
278	0.0092	0.0080	0.0012
279	0.0091	0.0079	0.0012
280	0.0091	0.0079	0.0012
281	0.0090	0.0078	0.0012
282	0.0089	0.0078	0.0012
283	0.0089	0.0077	0.0011
284	0.0088	0.0077	0.0011
285	0.0088	0.0076	0.0011
286	0.0087	0.0076	0.0011
287	0.0087	0.0076	0.0011
288	0.0086	0.0075	0.0011

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      Total soil rain loss =      4.49(In)
      Total effective rainfall =      1.17(In)
      Peak flow rate in flood hydrograph =      5.64(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       0.0002      0.02  Q         |         |         |         |
  0+20       0.0005      0.03  Q         |         |         |         |
  0+25       0.0007      0.04  Q         |         |         |         |
  0+30       0.0010      0.04  Q         |         |         |         |
  0+35       0.0012      0.04  Q         |         |         |         |
  0+40       0.0015      0.04  Q         |         |         |         |
  0+45       0.0018      0.04  Q         |         |         |         |
  0+50       0.0021      0.04  Q         |         |         |         |
  0+55       0.0024      0.04  Q         |         |         |         |
  1+ 0       0.0027      0.04  Q         |         |         |         |
  1+ 5       0.0030      0.05  Q         |         |         |         |
  1+10       0.0034      0.05  Q         |         |         |         |
  1+15       0.0037      0.05  Q         |         |         |         |
  1+20       0.0040      0.05  Q         |         |         |         |
  1+25       0.0043      0.05  Q         |         |         |         |
  1+30       0.0047      0.05  Q         |         |         |         |
  1+35       0.0050      0.05  Q         |         |         |         |
  1+40       0.0053      0.05  Q         |         |         |         |
  1+45       0.0057      0.05  Q         |         |         |         |
  1+50       0.0060      0.05  Q         |         |         |         |
  1+55       0.0063      0.05  Q         |         |         |         |
  2+ 0       0.0067      0.05  Q         |         |         |         |
  2+ 5       0.0070      0.05  Q         |         |         |         |
  2+10       0.0074      0.05  Q         |         |         |         |
  2+15       0.0077      0.05  Q         |         |         |         |
  2+20       0.0080      0.05  Q         |         |         |         |
  2+25       0.0084      0.05  Q         |         |         |         |
  2+30       0.0087      0.05  QV        |         |         |         |
  2+35       0.0091      0.05  QV        |         |         |         |
  2+40       0.0094      0.05  QV        |         |         |         |
  2+45       0.0098      0.05  QV        |         |         |         |
  2+50       0.0101      0.05  QV        |         |         |         |
  2+55       0.0105      0.05  QV        |         |         |         |
  3+ 0       0.0108      0.05  QV        |         |         |         |
  3+ 5       0.0112      0.05  QV        |         |         |         |
  3+10       0.0115      0.05  QV        |         |         |         |
  3+15       0.0119      0.05  QV        |         |         |         |
  3+20       0.0122      0.05  QV        |         |         |         |
  3+25       0.0126      0.05  QV        |         |         |         |
  3+30       0.0130      0.05  QV        |         |         |         |
  3+35       0.0133      0.05  QV        |         |         |         |
  3+40       0.0137      0.05  QV        |         |         |         |
  3+45       0.0140      0.05  QV        |         |         |         |
  3+50       0.0144      0.05  QV        |         |         |         |
  3+55       0.0148      0.05  QV        |         |         |         |
  4+ 0       0.0151      0.05  QV        |         |         |         |
  4+ 5       0.0155      0.05  QV        |         |         |         |
  4+10       0.0159      0.05  QV        |         |         |         |
  4+15       0.0162      0.05  QV        |         |         |         |
  4+20       0.0166      0.05  QV        |         |         |         |
  4+25       0.0170      0.05  Q V       |         |         |         |
  4+30       0.0174      0.05  Q V       |         |         |         |
  4+35       0.0177      0.05  Q V       |         |         |         |
  4+40       0.0181      0.06  Q V       |         |         |         |
  4+45       0.0185      0.06  Q V       |         |         |         |
  4+50       0.0189      0.06  Q V       |         |         |         |
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4+55	0.0193	0.06	Q V	|	|	|	|
5+ 0	0.0197	0.06	Q V	|	|	|	|
5+ 5	0.0200	0.06	Q V	|	|	|	|
5+10	0.0204	0.06	Q V	|	|	|	|
5+15	0.0208	0.06	Q V	|	|	|	|
5+20	0.0212	0.06	Q V	|	|	|	|
5+25	0.0216	0.06	Q V	|	|	|	|
5+30	0.0220	0.06	Q V	|	|	|	|
5+35	0.0224	0.06	Q V	|	|	|	|
5+40	0.0228	0.06	Q V	|	|	|	|
5+45	0.0232	0.06	Q V	|	|	|	|
5+50	0.0236	0.06	Q V	|	|	|	|
5+55	0.0240	0.06	Q V	|	|	|	|
6+ 0	0.0244	0.06	Q V	|	|	|	|
6+ 5	0.0248	0.06	Q V	|	|	|	|
6+10	0.0252	0.06	Q V	|	|	|	|
6+15	0.0256	0.06	Q V	|	|	|	|
6+20	0.0261	0.06	Q V	|	|	|	|
6+25	0.0265	0.06	Q V	|	|	|	|
6+30	0.0269	0.06	Q V	|	|	|	|
6+35	0.0273	0.06	Q V	|	|	|	|
6+40	0.0277	0.06	Q V	|	|	|	|
6+45	0.0281	0.06	Q V	|	|	|	|
6+50	0.0286	0.06	Q V	|	|	|	|
6+55	0.0290	0.06	Q V	|	|	|	|
7+ 0	0.0294	0.06	Q V	|	|	|	|
7+ 5	0.0299	0.06	Q V	|	|	|	|
7+10	0.0303	0.06	Q V	|	|	|	|
7+15	0.0307	0.06	Q V	|	|	|	|
7+20	0.0312	0.06	Q V	|	|	|	|
7+25	0.0316	0.06	Q V	|	|	|	|
7+30	0.0321	0.06	Q V	|	|	|	|
7+35	0.0325	0.06	Q V	|	|	|	|
7+40	0.0330	0.07	Q V	|	|	|	|
7+45	0.0334	0.07	Q V	|	|	|	|
7+50	0.0339	0.07	Q V	|	|	|	|
7+55	0.0343	0.07	Q V	|	|	|	|
8+ 0	0.0348	0.07	Q V	|	|	|	|
8+ 5	0.0352	0.07	Q V	|	|	|	|
8+10	0.0357	0.07	Q V	|	|	|	|
8+15	0.0362	0.07	Q V	|	|	|	|
8+20	0.0366	0.07	Q V	|	|	|	|
8+25	0.0371	0.07	Q V	|	|	|	|
8+30	0.0376	0.07	Q V	|	|	|	|
8+35	0.0380	0.07	Q V	|	|	|	|
8+40	0.0385	0.07	Q V	|	|	|	|
8+45	0.0390	0.07	Q V	|	|	|	|
8+50	0.0395	0.07	Q V	|	|	|	|
8+55	0.0400	0.07	Q V	|	|	|	|
9+ 0	0.0405	0.07	Q V	|	|	|	|
9+ 5	0.0410	0.07	Q V	|	|	|	|
9+10	0.0415	0.07	Q V	|	|	|	|
9+15	0.0420	0.07	Q V	|	|	|	|
9+20	0.0425	0.07	Q V	|	|	|	|
9+25	0.0430	0.07	Q V	|	|	|	|
9+30	0.0435	0.07	Q V	|	|	|	|
9+35	0.0440	0.07	Q V	|	|	|	|
9+40	0.0445	0.08	Q V	|	|	|	|
9+45	0.0451	0.08	Q V	|	|	|	|
9+50	0.0456	0.08	Q V	|	|	|	|
9+55	0.0461	0.08	Q V	|	|	|	|
10+ 0	0.0466	0.08	Q V	|	|	|	|
10+ 5	0.0472	0.08	Q V	|	|	|	|
10+10	0.0477	0.08	Q V	|	|	|	|
10+15	0.0483	0.08	Q V	|	|	|	|
10+20	0.0488	0.08	Q V	|	|	|	|
10+25	0.0494	0.08	Q V	|	|	|	|
10+30	0.0499	0.08	Q V	|	|	|	|
10+35	0.0505	0.08	Q V	|	|	|	|
10+40	0.0511	0.08	Q V	|	|	|	|
10+45	0.0516	0.08	Q V	|	|	|	|

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10+50       0.0522      0.08  Q     V   |          |          |          |
10+55       0.0528      0.08  Q     V   |          |          |          |
11+ 0       0.0534      0.09  Q     V   |          |          |          |
11+ 5       0.0540      0.09  Q     V   |          |          |          |
11+10       0.0546      0.09  Q     V   |          |          |          |
11+15       0.0552      0.09  Q     V   |          |          |          |
11+20       0.0558      0.09  Q     V   |          |          |          |
11+25       0.0564      0.09  Q     V   |          |          |          |
11+30       0.0570      0.09  Q     V   |          |          |          |
11+35       0.0577      0.09  Q     V   |          |          |          |
11+40       0.0583      0.09  Q     V   |          |          |          |
11+45       0.0589      0.09  Q     V   |          |          |          |
11+50       0.0596      0.09  Q      V  |          |          |          |
11+55       0.0602      0.09  Q      V  |          |          |          |
12+ 0       0.0609      0.10  Q      V  |          |          |          |
12+ 5       0.0616      0.10  Q      V  |          |          |          |
12+10       0.0623      0.10  Q      V  |          |          |          |
12+15       0.0630      0.10  Q      V  |          |          |          |
12+20       0.0637      0.11  Q      V  |          |          |          |
12+25       0.0645      0.11  Q      V  |          |          |          |
12+30       0.0653      0.11  Q      V  |          |          |          |
12+35       0.0660      0.11  Q      V  |          |          |          |
12+40       0.0668      0.11  Q      V  |          |          |          |
12+45       0.0676      0.12  Q       V |          |          |          |
12+50       0.0684      0.12  Q       V |          |          |          |
12+55       0.0693      0.12  Q       V |          |          |          |
13+ 0       0.0701      0.12  Q       V |          |          |          |
13+ 5       0.0710      0.12  Q       V |          |          |          |
13+10       0.0718      0.13  Q       V |          |          |          |
13+15       0.0727      0.13  Q       V |          |          |          |
13+20       0.0736      0.13  Q       V |          |          |          |
13+25       0.0745      0.13  Q       V |          |          |          |
13+30       0.0754      0.13  Q       V |          |          |          |
13+35       0.0763      0.13  Q        V|          |          |          |
13+40       0.0773      0.14  Q        V|          |          |          |
13+45       0.0782      0.14  Q        V|          |          |          |
13+50       0.0792      0.14  Q        V|          |          |          |
13+55       0.0802      0.14  Q        V|          |          |          |
14+ 0       0.0812      0.15  Q        V|          |          |          |
14+ 5       0.0822      0.15  Q        V|          |          |          |
14+10       0.0833      0.15  Q        V|          |          |          |
14+15       0.0844      0.16  Q        V|          |          |          |
14+20       0.0854      0.16  Q         V          |          |          |
14+25       0.0866      0.16  Q         V          |          |          |
14+30       0.0877      0.17  Q         V          |          |          |
14+35       0.0889      0.17  Q         V          |          |          |
14+40       0.0901      0.17  Q         V          |          |          |
14+45       0.0913      0.18  Q         V          |          |          |
14+50       0.0926      0.18  Q         V          |          |          |
14+55       0.0939      0.19  Q         |V         |          |          |
15+ 0       0.0953      0.20  Q         |V         |          |          |
15+ 5       0.0967      0.20  Q         |V         |          |          |
15+10       0.0981      0.21  Q         |V         |          |          |
15+15       0.0996      0.22  Q         |V         |          |          |
15+20       0.1012      0.23  Q         |V         |          |          |
15+25       0.1028      0.24  Q         | V        |          |          |
15+30       0.1045      0.24  Q         | V        |          |          |
15+35       0.1062      0.24  Q         | V        |          |          |
15+40       0.1079      0.25  |Q        | V        |          |          |
15+45       0.1098      0.27  |Q        |  V       |          |          |
15+50       0.1118      0.30  |Q        |  V       |          |          |
15+55       0.1145      0.39  |Q        |  V       |          |          |
16+ 0       0.1196      0.74  | Q       |   V      |          |          |
16+ 5       0.1337      2.05  |       Q |    V     |          |          |
16+10       0.1652      4.57  |         |       QV|          |          |
16+15       0.2041      5.64  |         |         | Q V      |          |
16+20       0.2291      3.64  |         |   Q     |      V   |          |
16+25       0.2429      2.01  |       Q |         |       V  |          |
16+30       0.2525      1.39  |    Q    |         |        V|          |
16+35       0.2601      1.10  |   Q     |         |         V          |
16+40       0.2663      0.89  |  Q      |         |          |V         |
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16+45	0.2714	0.75	| Q	|	|	| V	|
16+50	0.2758	0.63	| Q	|	|	| V	|
16+55	0.2794	0.53	| Q	|	|	| V	|
17+ 0	0.2827	0.48	|Q	|	|	| V	|
17+ 5	0.2856	0.43	|Q	|	|	| V	|
17+10	0.2882	0.37	|Q	|	|	| V	|
17+15	0.2905	0.33	|Q	|	|	| V	|
17+20	0.2925	0.30	|Q	|	|	| V	|
17+25	0.2944	0.26	|Q	|	|	| V	|
17+30	0.2960	0.24	Q	|	|	| V	|
17+35	0.2976	0.23	Q	|	|	| V	|
17+40	0.2988	0.18	Q	|	|	| V	|
17+45	0.2998	0.14	Q	|	|	| V	|
17+50	0.3007	0.13	Q	|	|	| V	|
17+55	0.3016	0.13	Q	|	|	| V	|
18+ 0	0.3025	0.13	Q	|	|	| V	|
18+ 5	0.3033	0.12	Q	|	|	| V	|
18+10	0.3042	0.12	Q	|	|	| V	|
18+15	0.3049	0.11	Q	|	|	| V	|
18+20	0.3057	0.11	Q	|	|	| V	|
18+25	0.3064	0.10	Q	|	|	| V	|
18+30	0.3071	0.10	Q	|	|	| V	|
18+35	0.3077	0.10	Q	|	|	| V	|
18+40	0.3084	0.10	Q	|	|	| V	|
18+45	0.3090	0.09	Q	|	|	| V	|
18+50	0.3097	0.09	Q	|	|	| V	|
18+55	0.3103	0.09	Q	|	|	| V	|
19+ 0	0.3109	0.09	Q	|	|	| V	|
19+ 5	0.3115	0.09	Q	|	|	| V	|
19+10	0.3120	0.08	Q	|	|	| V	|
19+15	0.3126	0.08	Q	|	|	| V	|
19+20	0.3132	0.08	Q	|	|	| V	|
19+25	0.3137	0.08	Q	|	|	| V	|
19+30	0.3143	0.08	Q	|	|	| V	|
19+35	0.3148	0.08	Q	|	|	| V	|
19+40	0.3153	0.08	Q	|	|	| V	|
19+45	0.3158	0.08	Q	|	|	| V	|
19+50	0.3164	0.07	Q	|	|	| V	|
19+55	0.3169	0.07	Q	|	|	| V	|
20+ 0	0.3174	0.07	Q	|	|	| V	|
20+ 5	0.3179	0.07	Q	|	|	| V	|
20+10	0.3183	0.07	Q	|	|	| V	|
20+15	0.3188	0.07	Q	|	|	| V	|
20+20	0.3193	0.07	Q	|	|	| V	|
20+25	0.3198	0.07	Q	|	|	| V	|
20+30	0.3202	0.07	Q	|	|	| V	|
20+35	0.3207	0.07	Q	|	|	| V	|
20+40	0.3211	0.07	Q	|	|	| V	|
20+45	0.3216	0.06	Q	|	|	| V	|
20+50	0.3220	0.06	Q	|	|	| V	|
20+55	0.3225	0.06	Q	|	|	| V	|
21+ 0	0.3229	0.06	Q	|	|	| V	|
21+ 5	0.3233	0.06	Q	|	|	| V	|
21+10	0.3237	0.06	Q	|	|	| V	|
21+15	0.3242	0.06	Q	|	|	| V	|
21+20	0.3246	0.06	Q	|	|	| V	|
21+25	0.3250	0.06	Q	|	|	| V	|
21+30	0.3254	0.06	Q	|	|	| V	|
21+35	0.3258	0.06	Q	|	|	| V	|
21+40	0.3262	0.06	Q	|	|	| V	|
21+45	0.3266	0.06	Q	|	|	| V	|
21+50	0.3270	0.06	Q	|	|	| V	|
21+55	0.3274	0.06	Q	|	|	| V	|
22+ 0	0.3278	0.06	Q	|	|	| V	|
22+ 5	0.3282	0.06	Q	|	|	| V	|
22+10	0.3285	0.06	Q	|	|	| V	|
22+15	0.3289	0.05	Q	|	|	| V	|
22+20	0.3293	0.05	Q	|	|	| V	|
22+25	0.3297	0.05	Q	|	|	| V	|
22+30	0.3300	0.05	Q	|	|	| V	|
22+35	0.3304	0.05	Q	|	|	| V	|

22+40	0.3308	0.05	Q	|	|	|	V|
22+45	0.3311	0.05	Q	|	|	|	V|
22+50	0.3315	0.05	Q	|	|	|	V|
22+55	0.3319	0.05	Q	|	|	|	V|
23+ 0	0.3322	0.05	Q	|	|	|	V|
23+ 5	0.3326	0.05	Q	|	|	|	V|
23+10	0.3329	0.05	Q	|	|	|	V|
23+15	0.3333	0.05	Q	|	|	|	V|
23+20	0.3336	0.05	Q	|	|	|	V|
23+25	0.3339	0.05	Q	|	|	|	V|
23+30	0.3343	0.05	Q	|	|	|	V|
23+35	0.3346	0.05	Q	|	|	|	V|
23+40	0.3349	0.05	Q	|	|	|	V|
23+45	0.3353	0.05	Q	|	|	|	V|
23+50	0.3356	0.05	Q	|	|	|	V|
23+55	0.3359	0.05	Q	|	|	|	V|
24+ 0	0.3363	0.05	Q	|	|	|	V|
24+ 5	0.3366	0.05	Q	|	|	|	V|
24+10	0.3368	0.04	Q	|	|	|	V|
24+15	0.3370	0.02	Q	|	|	|	V|
24+20	0.3371	0.02	Q	|	|	|	V|
24+25	0.3372	0.01	Q	|	|	|	V|
24+30	0.3372	0.01	Q	|	|	|	V|
24+35	0.3373	0.01	Q	|	|	|	V|
24+40	0.3373	0.01	Q	|	|	|	V|
24+45	0.3374	0.00	Q	|	|	|	V|
24+50	0.3374	0.00	Q	|	|	|	V|
24+55	0.3374	0.00	Q	|	|	|	V|
25+ 0	0.3374	0.00	Q	|	|	|	V|
25+ 5	0.3374	0.00	Q	|	|	|	V|
25+10	0.3374	0.00	Q	|	|	|	V|
25+15	0.3374	0.00	Q	|	|	|	V|
25+20	0.3374	0.00	Q	|	|	|	V|
25+25	0.3374	0.00	Q	|	|	|	V|
25+30	0.3375	0.00	Q	|	|	|	V|
25+35	0.3375	0.00	Q	|	|	|	V

APPENDIX F: POST-PROJECT CONDITION UNIT HYDROGRAPH HYDROLOGY

APPENDIX F.1: UNIT HYDROGRAPH ANALYSIS, AREA "A"

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

Study date 06/08/20

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

Program License Serial Number 6279

BLOOMINGTON POST-PROJECT ONSITE HYDROLOGY
UNIT HYDROGRAPH ANALYSIS, 100-YEAR STORM EVENT
FILENAME: ARAP

Storm Event Year = 100

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 100		
13.96	1	1.30
Rainfall data for year 100		
13.96	6	3.09
Rainfall data for year 100		
13.96	24	5.66

++

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

SCS curve No.(AMCII)	SCS curve NO.(AMC 2)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
32.0	32.0	13.96	1.000	0.978	0.100	0.098

Area-averaged adjusted loss rate Fm (In/Hr) = 0.098

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

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC2)	S	Pervious Yield Fr
1.40	0.100	32.0	32.0	21.25	0.016
12.56	0.900	98.0	98.0	0.20	0.958

Area-averaged catchment yield fraction, Y = 0.864
Area-averaged low loss fraction, Yb = 0.136
User entry of time of concentration = 0.200 (hours)

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Watershed area = 13.96(Ac.)
Catchment Lag time = 0.160 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 52.0833
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.098(In/Hr)
Average low loss rate fraction (Yb) = 0.136 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.481(In)
Computed peak 30-minute rainfall = 0.985(In)
Specified peak 1-hour rainfall = 1.300(In)
Computed peak 3-hour rainfall = 2.211(In)
Specified peak 6-hour rainfall = 3.090(In)
Specified peak 24-hour rainfall = 5.660(In)

Rainfall depth area reduction factors:
Using a total area of 13.96(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999 Adjusted rainfall = 0.481(In)
30-minute factor = 0.999 Adjusted rainfall = 0.985(In)
1-hour factor = 0.999 Adjusted rainfall = 1.299(In)
3-hour factor = 1.000 Adjusted rainfall = 2.210(In)
6-hour factor = 1.000 Adjusted rainfall = 3.090(In)
24-hour factor = 1.000 Adjusted rainfall = 5.660(In)

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

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 168.83 (CFS))	
1	4.951	8.358
2	32.173	45.959
3	71.993	67.228
4	91.514	32.957
5	97.565	10.215
6	98.956	2.350
7	100.000	1.762

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.4808	0.4808
2	0.6345	0.1536
3	0.7462	0.1117
4	0.8372	0.0910
5	0.9153	0.0782
6	0.9846	0.0692
7	1.0472	0.0626
8	1.1046	0.0575
9	1.1579	0.0533
10	1.2078	0.0498
11	1.2547	0.0469
12	1.2991	0.0444
13	1.3504	0.0513
14	1.3997	0.0493
15	1.4472	0.0475
16	1.4931	0.0459
17	1.5376	0.0444
18	1.5807	0.0431
19	1.6226	0.0419
20	1.6633	0.0408
21	1.7030	0.0397
22	1.7418	0.0388
23	1.7797	0.0379
24	1.8167	0.0370
25	1.8529	0.0362
26	1.8884	0.0355
27	1.9232	0.0348

28	1.9573	0.0341
29	1.9908	0.0335
30	2.0238	0.0329
31	2.0561	0.0324
32	2.0879	0.0318
33	2.1192	0.0313
34	2.1501	0.0308
35	2.1804	0.0304
36	2.2103	0.0299
37	2.2398	0.0295
38	2.2689	0.0291
39	2.2975	0.0287
40	2.3258	0.0283
41	2.3537	0.0279
42	2.3813	0.0276
43	2.4085	0.0272
44	2.4354	0.0269
45	2.4620	0.0266
46	2.4883	0.0263
47	2.5143	0.0260
48	2.5400	0.0257
49	2.5655	0.0254
50	2.5906	0.0252
51	2.6156	0.0249
52	2.6402	0.0247
53	2.6646	0.0244
54	2.6888	0.0242
55	2.7128	0.0239
56	2.7365	0.0237
57	2.7600	0.0235
58	2.7833	0.0233
59	2.8064	0.0231
60	2.8293	0.0229
61	2.8520	0.0227
62	2.8745	0.0225
63	2.8968	0.0223
64	2.9189	0.0221
65	2.9409	0.0220
66	2.9626	0.0218
67	2.9842	0.0216
68	3.0057	0.0214
69	3.0270	0.0213
70	3.0481	0.0211
71	3.0691	0.0210
72	3.0899	0.0208
73	3.1085	0.0187
74	3.1271	0.0185
75	3.1454	0.0184
76	3.1637	0.0182
77	3.1818	0.0181
78	3.1998	0.0180
79	3.2176	0.0178
80	3.2353	0.0177
81	3.2529	0.0176
82	3.2704	0.0175
83	3.2877	0.0174
84	3.3050	0.0172
85	3.3221	0.0171
86	3.3391	0.0170
87	3.3560	0.0169
88	3.3728	0.0168
89	3.3895	0.0167
90	3.4061	0.0166
91	3.4225	0.0165
92	3.4389	0.0164
93	3.4552	0.0163
94	3.4713	0.0162
95	3.4874	0.0161
96	3.5034	0.0160
97	3.5193	0.0159
98	3.5351	0.0158

99	3.5508	0.0157
100	3.5664	0.0156
101	3.5819	0.0155
102	3.5974	0.0154
103	3.6127	0.0154
104	3.6280	0.0153
105	3.6432	0.0152
106	3.6583	0.0151
107	3.6733	0.0150
108	3.6883	0.0149
109	3.7032	0.0149
110	3.7179	0.0148
111	3.7327	0.0147
112	3.7473	0.0146
113	3.7619	0.0146
114	3.7764	0.0145
115	3.7908	0.0144
116	3.8052	0.0144
117	3.8195	0.0143
118	3.8337	0.0142
119	3.8478	0.0142
120	3.8619	0.0141
121	3.8759	0.0140
122	3.8899	0.0140
123	3.9038	0.0139
124	3.9176	0.0138
125	3.9314	0.0138
126	3.9451	0.0137
127	3.9587	0.0136
128	3.9723	0.0136
129	3.9858	0.0135
130	3.9993	0.0135
131	4.0127	0.0134
132	4.0260	0.0133
133	4.0393	0.0133
134	4.0525	0.0132
135	4.0657	0.0132
136	4.0788	0.0131
137	4.0919	0.0131
138	4.1049	0.0130
139	4.1179	0.0130
140	4.1308	0.0129
141	4.1436	0.0129
142	4.1564	0.0128
143	4.1692	0.0128
144	4.1819	0.0127
145	4.1946	0.0127
146	4.2072	0.0126
147	4.2197	0.0126
148	4.2322	0.0125
149	4.2447	0.0125
150	4.2571	0.0124
151	4.2695	0.0124
152	4.2818	0.0123
153	4.2941	0.0123
154	4.3063	0.0122
155	4.3185	0.0122
156	4.3306	0.0121
157	4.3427	0.0121
158	4.3548	0.0121
159	4.3668	0.0120
160	4.3788	0.0120
161	4.3907	0.0119
162	4.4026	0.0119
163	4.4144	0.0118
164	4.4262	0.0118
165	4.4380	0.0118
166	4.4497	0.0117
167	4.4614	0.0117
168	4.4731	0.0116
169	4.4847	0.0116

170	4.4962	0.0116
171	4.5078	0.0115
172	4.5192	0.0115
173	4.5307	0.0115
174	4.5421	0.0114
175	4.5535	0.0114
176	4.5648	0.0113
177	4.5761	0.0113
178	4.5874	0.0113
179	4.5986	0.0112
180	4.6098	0.0112
181	4.6210	0.0112
182	4.6321	0.0111
183	4.6432	0.0111
184	4.6543	0.0111
185	4.6653	0.0110
186	4.6763	0.0110
187	4.6873	0.0110
188	4.6982	0.0109
189	4.7091	0.0109
190	4.7200	0.0109
191	4.7308	0.0108
192	4.7416	0.0108
193	4.7524	0.0108
194	4.7631	0.0107
195	4.7738	0.0107
196	4.7845	0.0107
197	4.7951	0.0106
198	4.8057	0.0106
199	4.8163	0.0106
200	4.8269	0.0106
201	4.8374	0.0105
202	4.8479	0.0105
203	4.8583	0.0105
204	4.8688	0.0104
205	4.8792	0.0104
206	4.8896	0.0104
207	4.8999	0.0103
208	4.9102	0.0103
209	4.9205	0.0103
210	4.9308	0.0103
211	4.9410	0.0102
212	4.9512	0.0102
213	4.9614	0.0102
214	4.9716	0.0102
215	4.9817	0.0101
216	4.9918	0.0101
217	5.0019	0.0101
218	5.0119	0.0101
219	5.0220	0.0100
220	5.0320	0.0100
221	5.0419	0.0100
222	5.0519	0.0099
223	5.0618	0.0099
224	5.0717	0.0099
225	5.0816	0.0099
226	5.0914	0.0098
227	5.1013	0.0098
228	5.1111	0.0098
229	5.1208	0.0098
230	5.1306	0.0098
231	5.1403	0.0097
232	5.1500	0.0097
233	5.1597	0.0097
234	5.1694	0.0097
235	5.1790	0.0096
236	5.1886	0.0096
237	5.1982	0.0096
238	5.2078	0.0096
239	5.2173	0.0095
240	5.2268	0.0095

241	5.2363	0.0095
242	5.2458	0.0095
243	5.2552	0.0095
244	5.2647	0.0094
245	5.2741	0.0094
246	5.2835	0.0094
247	5.2928	0.0094
248	5.3022	0.0093
249	5.3115	0.0093
250	5.3208	0.0093
251	5.3301	0.0093
252	5.3394	0.0093
253	5.3486	0.0092
254	5.3578	0.0092
255	5.3670	0.0092
256	5.3762	0.0092
257	5.3854	0.0092
258	5.3945	0.0091
259	5.4036	0.0091
260	5.4127	0.0091
261	5.4218	0.0091
262	5.4308	0.0091
263	5.4399	0.0090
264	5.4489	0.0090
265	5.4579	0.0090
266	5.4669	0.0090
267	5.4759	0.0090
268	5.4848	0.0089
269	5.4937	0.0089
270	5.5026	0.0089
271	5.5115	0.0089
272	5.5204	0.0089
273	5.5293	0.0089
274	5.5381	0.0088
275	5.5469	0.0088
276	5.5557	0.0088
277	5.5645	0.0088
278	5.5732	0.0088
279	5.5820	0.0087
280	5.5907	0.0087
281	5.5994	0.0087
282	5.6081	0.0087
283	5.6168	0.0087
284	5.6254	0.0087
285	5.6341	0.0086
286	5.6427	0.0086
287	5.6513	0.0086
288	5.6599	0.0086

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0086	0.0012	0.0074
2	0.0086	0.0012	0.0074
3	0.0086	0.0012	0.0075
4	0.0087	0.0012	0.0075
5	0.0087	0.0012	0.0075
6	0.0087	0.0012	0.0075
7	0.0087	0.0012	0.0076
8	0.0088	0.0012	0.0076
9	0.0088	0.0012	0.0076
10	0.0088	0.0012	0.0076
11	0.0089	0.0012	0.0076
12	0.0089	0.0012	0.0077
13	0.0089	0.0012	0.0077
14	0.0089	0.0012	0.0077
15	0.0090	0.0012	0.0077
16	0.0090	0.0012	0.0078
17	0.0090	0.0012	0.0078
18	0.0090	0.0012	0.0078

19	0.0091	0.0012	0.0078
20	0.0091	0.0012	0.0079
21	0.0091	0.0012	0.0079
22	0.0092	0.0012	0.0079
23	0.0092	0.0013	0.0079
24	0.0092	0.0013	0.0080
25	0.0093	0.0013	0.0080
26	0.0093	0.0013	0.0080
27	0.0093	0.0013	0.0081
28	0.0093	0.0013	0.0081
29	0.0094	0.0013	0.0081
30	0.0094	0.0013	0.0081
31	0.0095	0.0013	0.0082
32	0.0095	0.0013	0.0082
33	0.0095	0.0013	0.0082
34	0.0095	0.0013	0.0082
35	0.0096	0.0013	0.0083
36	0.0096	0.0013	0.0083
37	0.0097	0.0013	0.0083
38	0.0097	0.0013	0.0084
39	0.0097	0.0013	0.0084
40	0.0098	0.0013	0.0084
41	0.0098	0.0013	0.0085
42	0.0098	0.0013	0.0085
43	0.0099	0.0013	0.0085
44	0.0099	0.0013	0.0085
45	0.0099	0.0014	0.0086
46	0.0100	0.0014	0.0086
47	0.0100	0.0014	0.0087
48	0.0101	0.0014	0.0087
49	0.0101	0.0014	0.0087
50	0.0101	0.0014	0.0087
51	0.0102	0.0014	0.0088
52	0.0102	0.0014	0.0088
53	0.0103	0.0014	0.0089
54	0.0103	0.0014	0.0089
55	0.0103	0.0014	0.0089
56	0.0104	0.0014	0.0090
57	0.0104	0.0014	0.0090
58	0.0105	0.0014	0.0090
59	0.0105	0.0014	0.0091
60	0.0106	0.0014	0.0091
61	0.0106	0.0014	0.0092
62	0.0106	0.0015	0.0092
63	0.0107	0.0015	0.0092
64	0.0107	0.0015	0.0093
65	0.0108	0.0015	0.0093
66	0.0108	0.0015	0.0094
67	0.0109	0.0015	0.0094
68	0.0109	0.0015	0.0094
69	0.0110	0.0015	0.0095
70	0.0110	0.0015	0.0095
71	0.0111	0.0015	0.0096
72	0.0111	0.0015	0.0096
73	0.0112	0.0015	0.0097
74	0.0112	0.0015	0.0097
75	0.0113	0.0015	0.0098
76	0.0113	0.0015	0.0098
77	0.0114	0.0016	0.0099
78	0.0115	0.0016	0.0099
79	0.0115	0.0016	0.0100
80	0.0116	0.0016	0.0100
81	0.0116	0.0016	0.0101
82	0.0117	0.0016	0.0101
83	0.0118	0.0016	0.0102
84	0.0118	0.0016	0.0102
85	0.0119	0.0016	0.0103
86	0.0119	0.0016	0.0103
87	0.0120	0.0016	0.0104
88	0.0121	0.0016	0.0104
89	0.0121	0.0017	0.0105

90	0.0122	0.0017	0.0105
91	0.0123	0.0017	0.0106
92	0.0123	0.0017	0.0106
93	0.0124	0.0017	0.0107
94	0.0125	0.0017	0.0108
95	0.0126	0.0017	0.0108
96	0.0126	0.0017	0.0109
97	0.0127	0.0017	0.0110
98	0.0128	0.0017	0.0110
99	0.0129	0.0018	0.0111
100	0.0129	0.0018	0.0111
101	0.0130	0.0018	0.0112
102	0.0131	0.0018	0.0113
103	0.0132	0.0018	0.0114
104	0.0132	0.0018	0.0114
105	0.0133	0.0018	0.0115
106	0.0134	0.0018	0.0116
107	0.0135	0.0018	0.0117
108	0.0136	0.0019	0.0117
109	0.0137	0.0019	0.0118
110	0.0138	0.0019	0.0119
111	0.0139	0.0019	0.0120
112	0.0140	0.0019	0.0121
113	0.0141	0.0019	0.0122
114	0.0142	0.0019	0.0122
115	0.0143	0.0019	0.0123
116	0.0144	0.0020	0.0124
117	0.0145	0.0020	0.0125
118	0.0146	0.0020	0.0126
119	0.0147	0.0020	0.0127
120	0.0148	0.0020	0.0128
121	0.0149	0.0020	0.0129
122	0.0150	0.0020	0.0130
123	0.0152	0.0021	0.0131
124	0.0153	0.0021	0.0132
125	0.0154	0.0021	0.0133
126	0.0155	0.0021	0.0134
127	0.0157	0.0021	0.0136
128	0.0158	0.0022	0.0136
129	0.0160	0.0022	0.0138
130	0.0161	0.0022	0.0139
131	0.0163	0.0022	0.0141
132	0.0164	0.0022	0.0141
133	0.0166	0.0023	0.0143
134	0.0167	0.0023	0.0144
135	0.0169	0.0023	0.0146
136	0.0170	0.0023	0.0147
137	0.0172	0.0023	0.0149
138	0.0174	0.0024	0.0150
139	0.0176	0.0024	0.0152
140	0.0177	0.0024	0.0153
141	0.0180	0.0024	0.0155
142	0.0181	0.0025	0.0156
143	0.0184	0.0025	0.0159
144	0.0185	0.0025	0.0160
145	0.0208	0.0028	0.0180
146	0.0210	0.0029	0.0181
147	0.0213	0.0029	0.0184
148	0.0214	0.0029	0.0185
149	0.0218	0.0030	0.0188
150	0.0220	0.0030	0.0190
151	0.0223	0.0030	0.0193
152	0.0225	0.0031	0.0194
153	0.0229	0.0031	0.0198
154	0.0231	0.0031	0.0199
155	0.0235	0.0032	0.0203
156	0.0237	0.0032	0.0205
157	0.0242	0.0033	0.0209
158	0.0244	0.0033	0.0211
159	0.0249	0.0034	0.0215
160	0.0252	0.0034	0.0217

161	0.0257	0.0035	0.0222
162	0.0260	0.0035	0.0225
163	0.0266	0.0036	0.0230
164	0.0269	0.0037	0.0232
165	0.0276	0.0038	0.0238
166	0.0279	0.0038	0.0241
167	0.0287	0.0039	0.0248
168	0.0291	0.0040	0.0251
169	0.0299	0.0041	0.0258
170	0.0304	0.0041	0.0262
171	0.0313	0.0043	0.0270
172	0.0318	0.0043	0.0275
173	0.0329	0.0045	0.0284
174	0.0335	0.0046	0.0289
175	0.0348	0.0047	0.0301
176	0.0355	0.0048	0.0307
177	0.0370	0.0050	0.0320
178	0.0379	0.0052	0.0327
179	0.0397	0.0054	0.0343
180	0.0408	0.0056	0.0352
181	0.0431	0.0059	0.0372
182	0.0444	0.0061	0.0384
183	0.0475	0.0065	0.0410
184	0.0493	0.0067	0.0426
185	0.0444	0.0061	0.0384
186	0.0469	0.0064	0.0405
187	0.0533	0.0073	0.0460
188	0.0575	0.0078	0.0496
189	0.0692	0.0081	0.0611
190	0.0782	0.0081	0.0700
191	0.1117	0.0081	0.1036
192	0.1536	0.0081	0.1455
193	0.4808	0.0081	0.4727
194	0.0910	0.0081	0.0829
195	0.0626	0.0081	0.0545
196	0.0498	0.0068	0.0431
197	0.0513	0.0070	0.0443
198	0.0459	0.0063	0.0396
199	0.0419	0.0057	0.0362
200	0.0388	0.0053	0.0335
201	0.0362	0.0049	0.0313
202	0.0341	0.0047	0.0295
203	0.0324	0.0044	0.0279
204	0.0308	0.0042	0.0266
205	0.0295	0.0040	0.0254
206	0.0283	0.0039	0.0244
207	0.0272	0.0037	0.0235
208	0.0263	0.0036	0.0227
209	0.0254	0.0035	0.0220
210	0.0247	0.0034	0.0213
211	0.0239	0.0033	0.0207
212	0.0233	0.0032	0.0201
213	0.0227	0.0031	0.0196
214	0.0221	0.0030	0.0191
215	0.0216	0.0029	0.0187
216	0.0211	0.0029	0.0182
217	0.0187	0.0025	0.0161
218	0.0182	0.0025	0.0158
219	0.0178	0.0024	0.0154
220	0.0175	0.0024	0.0151
221	0.0171	0.0023	0.0148
222	0.0168	0.0023	0.0145
223	0.0165	0.0022	0.0142
224	0.0162	0.0022	0.0140
225	0.0159	0.0022	0.0137
226	0.0156	0.0021	0.0135
227	0.0154	0.0021	0.0133
228	0.0151	0.0021	0.0131
229	0.0149	0.0020	0.0128
230	0.0146	0.0020	0.0126
231	0.0144	0.0020	0.0125

232	0.0142	0.0019	0.0123
233	0.0140	0.0019	0.0121
234	0.0138	0.0019	0.0119
235	0.0136	0.0019	0.0118
236	0.0135	0.0018	0.0116
237	0.0133	0.0018	0.0115
238	0.0131	0.0018	0.0113
239	0.0130	0.0018	0.0112
240	0.0128	0.0017	0.0111
241	0.0127	0.0017	0.0109
242	0.0125	0.0017	0.0108
243	0.0124	0.0017	0.0107
244	0.0122	0.0017	0.0106
245	0.0121	0.0016	0.0105
246	0.0120	0.0016	0.0103
247	0.0118	0.0016	0.0102
248	0.0117	0.0016	0.0101
249	0.0116	0.0016	0.0100
250	0.0115	0.0016	0.0099
251	0.0114	0.0016	0.0098
252	0.0113	0.0015	0.0097
253	0.0112	0.0015	0.0096
254	0.0111	0.0015	0.0096
255	0.0110	0.0015	0.0095
256	0.0109	0.0015	0.0094
257	0.0108	0.0015	0.0093
258	0.0107	0.0015	0.0092
259	0.0106	0.0014	0.0091
260	0.0105	0.0014	0.0091
261	0.0104	0.0014	0.0090
262	0.0103	0.0014	0.0089
263	0.0102	0.0014	0.0088
264	0.0102	0.0014	0.0088
265	0.0101	0.0014	0.0087
266	0.0100	0.0014	0.0086
267	0.0099	0.0014	0.0086
268	0.0098	0.0013	0.0085
269	0.0098	0.0013	0.0084
270	0.0097	0.0013	0.0084
271	0.0096	0.0013	0.0083
272	0.0096	0.0013	0.0083
273	0.0095	0.0013	0.0082
274	0.0094	0.0013	0.0081
275	0.0094	0.0013	0.0081
276	0.0093	0.0013	0.0080
277	0.0092	0.0013	0.0080
278	0.0092	0.0013	0.0079
279	0.0091	0.0012	0.0079
280	0.0091	0.0012	0.0078
281	0.0090	0.0012	0.0078
282	0.0089	0.0012	0.0077
283	0.0089	0.0012	0.0077
284	0.0088	0.0012	0.0076
285	0.0088	0.0012	0.0076
286	0.0087	0.0012	0.0075
287	0.0087	0.0012	0.0075
288	0.0086	0.0012	0.0074

Total soil rain loss = 0.69(In)
Total effective rainfall = 4.97(In)
Peak flow rate in flood hydrograph = 42.16(CFS)

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

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	12.5	25.0	37.5	50.0

0+ 5	0.0004	0.06	Q				
0+10	0.0032	0.40	Q				
0+15	0.0094	0.90	Q				
0+20	0.0173	1.15	Q				
0+25	0.0258	1.23	Q				
0+30	0.0344	1.25	Q				
0+35	0.0431	1.27	VQ				
0+40	0.0519	1.27	VQ				
0+45	0.0607	1.27	VQ				
0+50	0.0695	1.28	VQ				
0+55	0.0783	1.28	VQ				
1+ 0	0.0872	1.29	VQ				
1+ 5	0.0960	1.29	VQ				
1+10	0.1050	1.29	VQ				
1+15	0.1139	1.30	VQ				
1+20	0.1229	1.30	VQ				
1+25	0.1319	1.31	VQ				
1+30	0.1409	1.31	VQ				
1+35	0.1499	1.31	|Q				
1+40	0.1590	1.32	|Q				
1+45	0.1681	1.32	|Q				
1+50	0.1773	1.33	|Q				
1+55	0.1865	1.33	|Q				
2+ 0	0.1957	1.34	|Q				
2+ 5	0.2049	1.34	|Q				
2+10	0.2142	1.35	|Q				
2+15	0.2234	1.35	|Q				
2+20	0.2328	1.35	|Q				
2+25	0.2421	1.36	|Q				
2+30	0.2515	1.36	|Q				
2+35	0.2609	1.37	|Q				
2+40	0.2704	1.37	|Q				
2+45	0.2799	1.38	|Q				
2+50	0.2894	1.38	|QV				
2+55	0.2990	1.39	|QV				
3+ 0	0.3086	1.39	|QV				
3+ 5	0.3182	1.40	|QV				
3+10	0.3278	1.40	|QV				
3+15	0.3375	1.41	|QV				
3+20	0.3473	1.41	|QV				
3+25	0.3570	1.42	|QV				
3+30	0.3668	1.42	|QV				
3+35	0.3766	1.43	|QV				
3+40	0.3865	1.43	|QV				
3+45	0.3964	1.44	|QV				
3+50	0.4064	1.44	|QV				
3+55	0.4164	1.45	|QV				
4+ 0	0.4264	1.46	|QV				
4+ 5	0.4364	1.46	|Q V				
4+10	0.4465	1.47	|Q V				
4+15	0.4567	1.47	|Q V				
4+20	0.4669	1.48	|Q V				
4+25	0.4771	1.48	|Q V				
4+30	0.4873	1.49	|Q V				
4+35	0.4976	1.50	|Q V				
4+40	0.5080	1.50	|Q V				
4+45	0.5184	1.51	|Q V				
4+50	0.5288	1.51	|Q V				
4+55	0.5393	1.52	|Q V				
5+ 0	0.5498	1.53	|Q V				
5+ 5	0.5603	1.53	|Q V				
5+10	0.5710	1.54	|Q V				
5+15	0.5816	1.55	|Q V				
5+20	0.5923	1.55	|Q V				
5+25	0.6030	1.56	|Q V				
5+30	0.6138	1.57	|Q V				
5+35	0.6247	1.57	|Q V				
5+40	0.6355	1.58	|Q V				
5+45	0.6465	1.59	|Q V				
5+50	0.6575	1.59	|Q V				

5+55	0.6685	1.60	Q V	|	|	|	|
6+ 0	0.6796	1.61	Q V	|	|	|	|
6+ 5	0.6907	1.62	Q V	|	|	|	|
6+10	0.7019	1.62	Q V	|	|	|	|
6+15	0.7131	1.63	Q V	|	|	|	|
6+20	0.7244	1.64	Q V	|	|	|	|
6+25	0.7358	1.65	Q V	|	|	|	|
6+30	0.7472	1.66	Q V	|	|	|	|
6+35	0.7586	1.66	Q V	|	|	|	|
6+40	0.7701	1.67	Q V	|	|	|	|
6+45	0.7817	1.68	Q V	|	|	|	|
6+50	0.7933	1.69	Q V	|	|	|	|
6+55	0.8050	1.70	Q V	|	|	|	|
7+ 0	0.8168	1.71	Q V	|	|	|	|
7+ 5	0.8286	1.71	Q V	|	|	|	|
7+10	0.8404	1.72	Q V	|	|	|	|
7+15	0.8523	1.73	Q V	|	|	|	|
7+20	0.8643	1.74	Q V	|	|	|	|
7+25	0.8764	1.75	Q V	|	|	|	|
7+30	0.8885	1.76	Q V	|	|	|	|
7+35	0.9007	1.77	Q V	|	|	|	|
7+40	0.9129	1.78	Q V	|	|	|	|
7+45	0.9253	1.79	Q V	|	|	|	|
7+50	0.9376	1.80	Q V	|	|	|	|
7+55	0.9501	1.81	Q V	|	|	|	|
8+ 0	0.9626	1.82	Q V	|	|	|	|
8+ 5	0.9752	1.83	Q V	|	|	|	|
8+10	0.9879	1.84	Q V	|	|	|	|
8+15	1.0006	1.85	Q V	|	|	|	|
8+20	1.0135	1.86	Q V	|	|	|	|
8+25	1.0264	1.87	Q V	|	|	|	|
8+30	1.0393	1.88	Q V	|	|	|	|
8+35	1.0524	1.90	Q V	|	|	|	|
8+40	1.0655	1.91	Q V	|	|	|	|
8+45	1.0787	1.92	Q V	|	|	|	|
8+50	1.0920	1.93	Q V	|	|	|	|
8+55	1.1054	1.94	Q V	|	|	|	|
9+ 0	1.1189	1.96	Q V	|	|	|	|
9+ 5	1.1325	1.97	Q V	|	|	|	|
9+10	1.1461	1.98	Q V	|	|	|	|
9+15	1.1599	2.00	Q V	|	|	|	|
9+20	1.1737	2.01	Q V	|	|	|	|
9+25	1.1876	2.02	Q V	|	|	|	|
9+30	1.2017	2.04	Q V	|	|	|	|
9+35	1.2158	2.05	Q V	|	|	|	|
9+40	1.2300	2.07	Q V	|	|	|	|
9+45	1.2443	2.08	Q V	|	|	|	|
9+50	1.2588	2.10	Q V	|	|	|	|
9+55	1.2733	2.11	Q V	|	|	|	|
10+ 0	1.2880	2.13	Q V	|	|	|	|
10+ 5	1.3027	2.14	Q V	|	|	|	|
10+10	1.3176	2.16	Q V	|	|	|	|
10+15	1.3326	2.18	Q V	|	|	|	|
10+20	1.3477	2.19	Q V	|	|	|	|
10+25	1.3629	2.21	Q V	|	|	|	|
10+30	1.3783	2.23	Q V	|	|	|	|
10+35	1.3938	2.25	Q V	|	|	|	|
10+40	1.4094	2.27	Q V	|	|	|	|
10+45	1.4251	2.29	Q V	|	|	|	|
10+50	1.4410	2.31	Q V	|	|	|	|
10+55	1.4571	2.33	Q V	|	|	|	|
11+ 0	1.4732	2.35	Q V	|	|	|	|
11+ 5	1.4895	2.37	Q V	|	|	|	|
11+10	1.5060	2.39	Q V	|	|	|	|
11+15	1.5226	2.41	Q V	|	|	|	|
11+20	1.5394	2.44	Q V	|	|	|	|
11+25	1.5563	2.46	Q V	|	|	|	|
11+30	1.5734	2.48	Q V	|	|	|	|
11+35	1.5907	2.51	Q V	|	|	|	|
11+40	1.6082	2.53	Q V	|	|	|	|
11+45	1.6258	2.56	Q V	|	|	|	|

11+50	1.6436	2.59	Q	V			
11+55	1.6617	2.62	Q	V			
12+ 0	1.6799	2.65	Q	V			
12+ 5	1.6984	2.69	Q	V			
12+10	1.7177	2.80	Q	V			
12+15	1.7380	2.95	Q	V			
12+20	1.7589	3.04	Q	V			
12+25	1.7802	3.09	Q	V			
12+30	1.8017	3.13	Q	V			
12+35	1.8236	3.17	Q	V			
12+40	1.8457	3.21	Q	V			
12+45	1.8680	3.25	Q	V			
12+50	1.8907	3.29	Q	V			
12+55	1.9136	3.33	Q	V			
13+ 0	1.9368	3.37	Q	V			
13+ 5	1.9604	3.42	Q	V			
13+10	1.9843	3.47	Q	V			
13+15	2.0085	3.52	Q	V			
13+20	2.0331	3.57	Q	V			
13+25	2.0580	3.62	Q	V			
13+30	2.0834	3.68	Q	V			
13+35	2.1091	3.74	Q	V			
13+40	2.1353	3.80	Q	V			
13+45	2.1620	3.87	Q	V			
13+50	2.1891	3.94	Q	V			
13+55	2.2167	4.01	Q	V			
14+ 0	2.2448	4.08	Q	V			
14+ 5	2.2735	4.17	Q	V			
14+10	2.3028	4.25	Q	V			
14+15	2.3327	4.35	Q	V			
14+20	2.3633	4.44	Q	V			
14+25	2.3947	4.55	Q	V			
14+30	2.4268	4.66	Q	V			
14+35	2.4597	4.78	Q	V			
14+40	2.4935	4.91	Q	V			
14+45	2.5283	5.05	Q	V			
14+50	2.5642	5.20	Q	V			
14+55	2.6012	5.37	Q	V			
15+ 0	2.6395	5.56	Q	V			
15+ 5	2.6792	5.77	Q	V			
15+10	2.7204	5.99	Q	V			
15+15	2.7635	6.25	Q	V			
15+20	2.8086	6.55	Q	V			
15+25	2.8556	6.82	Q	V			
15+30	2.9028	6.86	Q	V			
15+35	2.9497	6.81	Q	V			
15+40	2.9987	7.12	Q	V			
15+45	3.0524	7.79	Q	V			
15+50	3.1132	8.83	Q	V			
15+55	3.1852	10.46	Q	V			
16+ 0	3.2774	13.38	Q	V			
16+ 5	3.4201	20.73	Q	V			
16+10	3.6719	36.56	Q	V			
16+15	3.9623	42.16	Q	V			
16+20	4.1404	25.86	Q	V			
16+25	4.2375	14.09	Q	V			
16+30	4.3013	9.27	Q	V			
16+35	4.3571	8.11	Q	V			
16+40	4.4038	6.78	Q	V			
16+45	4.4464	6.19	Q	V			
16+50	4.4858	5.71	Q	V			
16+55	4.5225	5.34	Q	V			
17+ 0	4.5571	5.02	Q	V			
17+ 5	4.5898	4.75	Q	V			
17+10	4.6209	4.52	Q	V			
17+15	4.6507	4.32	Q	V			
17+20	4.6792	4.14	Q	V			
17+25	4.7066	3.99	Q	V			
17+30	4.7331	3.85	Q	V			
17+35	4.7587	3.72	Q	V			
17+40	4.7836	3.61	Q	V			

17+45	4.8077	3.50	Q			V	
17+50	4.8311	3.40	Q			V	
17+55	4.8540	3.32	Q			V	
18+ 0	4.8762	3.23	Q			V	
18+ 5	4.8979	3.14	Q			V	
18+10	4.9185	2.99	Q			V	
18+15	4.9378	2.81	Q			V	
18+20	4.9563	2.69	Q			V	
18+25	4.9743	2.61	Q			V	
18+30	4.9919	2.55	Q			V	
18+35	5.0091	2.50	Q			V	
18+40	5.0260	2.45	Q			V	
18+45	5.0426	2.40	Q			V	
18+50	5.0588	2.36	Q			V	
18+55	5.0748	2.32	Q			V	
19+ 0	5.0905	2.28	Q			V	
19+ 5	5.1059	2.24	Q			V	
19+10	5.1211	2.21	Q			V	
19+15	5.1361	2.17	Q			V	
19+20	5.1508	2.14	Q			V	
19+25	5.1653	2.11	Q			V	
19+30	5.1796	2.08	Q			V	
19+35	5.1937	2.05	Q			V	
19+40	5.2076	2.02	Q			V	
19+45	5.2213	1.99	Q			V	
19+50	5.2348	1.96	Q			V	
19+55	5.2482	1.94	Q			V	
20+ 0	5.2613	1.91	Q			V	
20+ 5	5.2744	1.89	Q			V	
20+10	5.2872	1.87	Q			V	
20+15	5.3000	1.85	Q			V	
20+20	5.3125	1.83	Q			V	
20+25	5.3250	1.80	Q			V	
20+30	5.3372	1.78	Q			V	
20+35	5.3494	1.77	Q			V	
20+40	5.3614	1.75	Q			V	
20+45	5.3733	1.73	Q			V	
20+50	5.3851	1.71	Q			V	
20+55	5.3968	1.69	Q			V	
21+ 0	5.4083	1.68	Q			V	
21+ 5	5.4197	1.66	Q			V	
21+10	5.4311	1.64	Q			V	
21+15	5.4423	1.63	Q			V	
21+20	5.4534	1.61	Q			V	
21+25	5.4644	1.60	Q			V	
21+30	5.4753	1.58	Q			V	
21+35	5.4861	1.57	Q			V	
21+40	5.4969	1.56	Q			V	
21+45	5.5075	1.54	Q			V	
21+50	5.5180	1.53	Q			V	
21+55	5.5285	1.52	Q			V	
22+ 0	5.5389	1.51	Q			V	
22+ 5	5.5492	1.49	Q			V	
22+10	5.5594	1.48	Q			V	
22+15	5.5695	1.47	Q			V	
22+20	5.5795	1.46	Q			V	
22+25	5.5895	1.45	Q			V	
22+30	5.5994	1.44	Q			V	
22+35	5.6092	1.43	Q			V	
22+40	5.6190	1.42	Q			V	
22+45	5.6286	1.41	Q			V	
22+50	5.6382	1.40	Q			V	
22+55	5.6478	1.39	Q			V	
23+ 0	5.6573	1.38	Q			V	
23+ 5	5.6667	1.37	Q			V	
23+10	5.6760	1.36	Q			V	
23+15	5.6853	1.35	Q			V	
23+20	5.6945	1.34	Q			V	
23+25	5.7037	1.33	Q			V	
23+30	5.7128	1.32	Q			V	
23+35	5.7218	1.31	Q			V	

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   23+40       5.7308      1.30  |Q        |         |         |        V|
   23+45       5.7397      1.30  |Q        |         |         |        V|
   23+50       5.7486      1.29  |Q        |         |         |        V|
   23+55       5.7574      1.28  |Q        |         |         |        V|
   24+ 0       5.7662      1.27  |Q        |         |         |        V|
   24+ 5       5.7745      1.20  Q         |         |         |        V|
   24+10       5.7804      0.86  Q         |         |         |        V|
   24+15       5.7828      0.35  Q         |         |         |        V|
   24+20       5.7836      0.11  Q         |         |         |        V|
   24+25       5.7838      0.03  Q         |         |         |        V|
   24+30       5.7839      0.01  Q         |         |         |         V
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APPENDIX F.2: UNIT HYDROGRAPH ANALYSIS, AREA "B"

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

Study date 06/08/20

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

Program License Serial Number 6279

BLOOMINGTON POST-PROJECT CONDITION ONSITE HYDROLOGY
UNIT HYDROGRAPH ANALYSIS, 100-YEAR STORM EVENT
FILENAME: ARBP

Storm Event Year = 100

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 100		
3.74	1	1.30
Rainfall data for year 100		
3.74	6	3.09
Rainfall data for year 100		
3.74	24	5.66

++

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

SCS curve No.(AMCII)	SCS curve NO.(AMC 2)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
32.0	32.0	3.74	1.000	0.978	0.100	0.098

Area-averaged adjusted loss rate Fm (In/Hr) = 0.098

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

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC2)	S	Pervious Yield Fr
0.37	0.100	32.0	32.0	21.25	0.016
3.37	0.900	98.0	98.0	0.20	0.958

Area-averaged catchment yield fraction, Y = 0.864
Area-averaged low loss fraction, Yb = 0.136
User entry of time of concentration = 0.180 (hours)

++

Watershed area = 3.74(Ac.)
Catchment Lag time = 0.144 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 57.8704
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.098(In/Hr)
Average low loss rate fraction (Yb) = 0.136 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.481(In)
Computed peak 30-minute rainfall = 0.985(In)
Specified peak 1-hour rainfall = 1.300(In)
Computed peak 3-hour rainfall = 2.211(In)
Specified peak 6-hour rainfall = 3.090(In)
Specified peak 24-hour rainfall = 5.660(In)

Rainfall depth area reduction factors:
Using a total area of 3.74(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.481(In)
30-minute factor = 1.000 Adjusted rainfall = 0.985(In)
1-hour factor = 1.000 Adjusted rainfall = 1.300(In)
3-hour factor = 1.000 Adjusted rainfall = 2.210(In)
6-hour factor = 1.000 Adjusted rainfall = 3.090(In)
24-hour factor = 1.000 Adjusted rainfall = 5.660(In)

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

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 45.23 (CFS))	
1	6.077	2.749
2	39.009	14.896
3	79.564	18.343
4	94.634	6.817
5	98.466	1.733
6	99.524	0.478
7	100.000	0.215

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.4811	0.4811
2	0.6348	0.1537
3	0.7465	0.1118
4	0.8376	0.0910
5	0.9158	0.0782
6	0.9850	0.0693
7	1.0477	0.0626
8	1.1052	0.0575
9	1.1585	0.0533
10	1.2084	0.0499
11	1.2553	0.0470
12	1.2998	0.0445
13	1.3510	0.0513
14	1.4003	0.0493
15	1.4478	0.0475
16	1.4937	0.0459
17	1.5381	0.0444
18	1.5812	0.0431
19	1.6230	0.0419
20	1.6638	0.0407
21	1.7035	0.0397
22	1.7422	0.0387
23	1.7801	0.0378
24	1.8171	0.0370
25	1.8533	0.0362
26	1.8887	0.0355
27	1.9235	0.0348

28	1.9576	0.0341
29	1.9911	0.0335
30	2.0240	0.0329
31	2.0563	0.0323
32	2.0881	0.0318
33	2.1194	0.0313
34	2.1502	0.0308
35	2.1806	0.0303
36	2.2105	0.0299
37	2.2399	0.0295
38	2.2690	0.0291
39	2.2977	0.0287
40	2.3259	0.0283
41	2.3539	0.0279
42	2.3814	0.0276
43	2.4087	0.0272
44	2.4356	0.0269
45	2.4622	0.0266
46	2.4884	0.0263
47	2.5144	0.0260
48	2.5402	0.0257
49	2.5656	0.0254
50	2.5908	0.0252
51	2.6157	0.0249
52	2.6403	0.0247
53	2.6647	0.0244
54	2.6889	0.0242
55	2.7129	0.0239
56	2.7366	0.0237
57	2.7601	0.0235
58	2.7834	0.0233
59	2.8065	0.0231
60	2.8294	0.0229
61	2.8521	0.0227
62	2.8746	0.0225
63	2.8969	0.0223
64	2.9190	0.0221
65	2.9410	0.0220
66	2.9627	0.0218
67	2.9843	0.0216
68	3.0058	0.0214
69	3.0271	0.0213
70	3.0482	0.0211
71	3.0692	0.0210
72	3.0900	0.0208
73	3.1086	0.0187
74	3.1271	0.0185
75	3.1455	0.0184
76	3.1638	0.0182
77	3.1819	0.0181
78	3.1999	0.0180
79	3.2177	0.0178
80	3.2354	0.0177
81	3.2530	0.0176
82	3.2705	0.0175
83	3.2878	0.0174
84	3.3051	0.0172
85	3.3222	0.0171
86	3.3392	0.0170
87	3.3561	0.0169
88	3.3729	0.0168
89	3.3896	0.0167
90	3.4062	0.0166
91	3.4226	0.0165
92	3.4390	0.0164
93	3.4553	0.0163
94	3.4714	0.0162
95	3.4875	0.0161
96	3.5035	0.0160
97	3.5194	0.0159
98	3.5352	0.0158

99	3.5509	0.0157
100	3.5665	0.0156
101	3.5820	0.0155
102	3.5975	0.0154
103	3.6128	0.0154
104	3.6281	0.0153
105	3.6433	0.0152
106	3.6584	0.0151
107	3.6734	0.0150
108	3.6884	0.0149
109	3.7032	0.0149
110	3.7180	0.0148
111	3.7328	0.0147
112	3.7474	0.0146
113	3.7620	0.0146
114	3.7765	0.0145
115	3.7909	0.0144
116	3.8053	0.0144
117	3.8196	0.0143
118	3.8338	0.0142
119	3.8479	0.0142
120	3.8620	0.0141
121	3.8760	0.0140
122	3.8900	0.0140
123	3.9039	0.0139
124	3.9177	0.0138
125	3.9315	0.0138
126	3.9452	0.0137
127	3.9588	0.0136
128	3.9724	0.0136
129	3.9859	0.0135
130	3.9994	0.0135
131	4.0128	0.0134
132	4.0261	0.0133
133	4.0394	0.0133
134	4.0526	0.0132
135	4.0658	0.0132
136	4.0789	0.0131
137	4.0920	0.0131
138	4.1050	0.0130
139	4.1180	0.0130
140	4.1309	0.0129
141	4.1437	0.0129
142	4.1565	0.0128
143	4.1693	0.0128
144	4.1820	0.0127
145	4.1947	0.0127
146	4.2073	0.0126
147	4.2198	0.0126
148	4.2323	0.0125
149	4.2448	0.0125
150	4.2572	0.0124
151	4.2696	0.0124
152	4.2819	0.0123
153	4.2942	0.0123
154	4.3064	0.0122
155	4.3186	0.0122
156	4.3307	0.0121
157	4.3428	0.0121
158	4.3549	0.0121
159	4.3669	0.0120
160	4.3789	0.0120
161	4.3908	0.0119
162	4.4027	0.0119
163	4.4145	0.0118
164	4.4263	0.0118
165	4.4381	0.0118
166	4.4498	0.0117
167	4.4615	0.0117
168	4.4731	0.0116
169	4.4848	0.0116

170	4.4963	0.0116
171	4.5078	0.0115
172	4.5193	0.0115
173	4.5308	0.0115
174	4.5422	0.0114
175	4.5536	0.0114
176	4.5649	0.0113
177	4.5762	0.0113
178	4.5875	0.0113
179	4.5987	0.0112
180	4.6099	0.0112
181	4.6211	0.0112
182	4.6322	0.0111
183	4.6433	0.0111
184	4.6544	0.0111
185	4.6654	0.0110
186	4.6764	0.0110
187	4.6874	0.0110
188	4.6983	0.0109
189	4.7092	0.0109
190	4.7201	0.0109
191	4.7309	0.0108
192	4.7417	0.0108
193	4.7524	0.0108
194	4.7632	0.0107
195	4.7739	0.0107
196	4.7846	0.0107
197	4.7952	0.0106
198	4.8058	0.0106
199	4.8164	0.0106
200	4.8270	0.0106
201	4.8375	0.0105
202	4.8480	0.0105
203	4.8584	0.0105
204	4.8689	0.0104
205	4.8793	0.0104
206	4.8896	0.0104
207	4.9000	0.0103
208	4.9103	0.0103
209	4.9206	0.0103
210	4.9309	0.0103
211	4.9411	0.0102
212	4.9513	0.0102
213	4.9615	0.0102
214	4.9717	0.0102
215	4.9818	0.0101
216	4.9919	0.0101
217	5.0020	0.0101
218	5.0120	0.0101
219	5.0221	0.0100
220	5.0321	0.0100
221	5.0420	0.0100
222	5.0520	0.0099
223	5.0619	0.0099
224	5.0718	0.0099
225	5.0817	0.0099
226	5.0915	0.0098
227	5.1013	0.0098
228	5.1111	0.0098
229	5.1209	0.0098
230	5.1307	0.0098
231	5.1404	0.0097
232	5.1501	0.0097
233	5.1598	0.0097
234	5.1694	0.0097
235	5.1791	0.0096
236	5.1887	0.0096
237	5.1983	0.0096
238	5.2078	0.0096
239	5.2174	0.0095
240	5.2269	0.0095

241	5.2364	0.0095
242	5.2459	0.0095
243	5.2553	0.0095
244	5.2648	0.0094
245	5.2742	0.0094
246	5.2835	0.0094
247	5.2929	0.0094
248	5.3023	0.0093
249	5.3116	0.0093
250	5.3209	0.0093
251	5.3302	0.0093
252	5.3394	0.0093
253	5.3487	0.0092
254	5.3579	0.0092
255	5.3671	0.0092
256	5.3763	0.0092
257	5.3854	0.0092
258	5.3946	0.0091
259	5.4037	0.0091
260	5.4128	0.0091
261	5.4219	0.0091
262	5.4309	0.0091
263	5.4400	0.0090
264	5.4490	0.0090
265	5.4580	0.0090
266	5.4670	0.0090
267	5.4759	0.0090
268	5.4849	0.0089
269	5.4938	0.0089
270	5.5027	0.0089
271	5.5116	0.0089
272	5.5205	0.0089
273	5.5293	0.0089
274	5.5382	0.0088
275	5.5470	0.0088
276	5.5558	0.0088
277	5.5646	0.0088
278	5.5733	0.0088
279	5.5821	0.0087
280	5.5908	0.0087
281	5.5995	0.0087
282	5.6082	0.0087
283	5.6169	0.0087
284	5.6255	0.0087
285	5.6342	0.0086
286	5.6428	0.0086
287	5.6514	0.0086
288	5.6600	0.0086

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0086	0.0012	0.0074
2	0.0086	0.0012	0.0074
3	0.0086	0.0012	0.0075
4	0.0087	0.0012	0.0075
5	0.0087	0.0012	0.0075
6	0.0087	0.0012	0.0075
7	0.0087	0.0012	0.0076
8	0.0088	0.0012	0.0076
9	0.0088	0.0012	0.0076
10	0.0088	0.0012	0.0076
11	0.0089	0.0012	0.0076
12	0.0089	0.0012	0.0077
13	0.0089	0.0012	0.0077
14	0.0089	0.0012	0.0077
15	0.0090	0.0012	0.0077
16	0.0090	0.0012	0.0078
17	0.0090	0.0012	0.0078
18	0.0090	0.0012	0.0078

19	0.0091	0.0012	0.0078
20	0.0091	0.0012	0.0079
21	0.0091	0.0012	0.0079
22	0.0092	0.0012	0.0079
23	0.0092	0.0013	0.0079
24	0.0092	0.0013	0.0080
25	0.0093	0.0013	0.0080
26	0.0093	0.0013	0.0080
27	0.0093	0.0013	0.0081
28	0.0093	0.0013	0.0081
29	0.0094	0.0013	0.0081
30	0.0094	0.0013	0.0081
31	0.0095	0.0013	0.0082
32	0.0095	0.0013	0.0082
33	0.0095	0.0013	0.0082
34	0.0095	0.0013	0.0082
35	0.0096	0.0013	0.0083
36	0.0096	0.0013	0.0083
37	0.0097	0.0013	0.0083
38	0.0097	0.0013	0.0084
39	0.0097	0.0013	0.0084
40	0.0098	0.0013	0.0084
41	0.0098	0.0013	0.0085
42	0.0098	0.0013	0.0085
43	0.0099	0.0013	0.0085
44	0.0099	0.0013	0.0085
45	0.0099	0.0014	0.0086
46	0.0100	0.0014	0.0086
47	0.0100	0.0014	0.0087
48	0.0101	0.0014	0.0087
49	0.0101	0.0014	0.0087
50	0.0101	0.0014	0.0087
51	0.0102	0.0014	0.0088
52	0.0102	0.0014	0.0088
53	0.0103	0.0014	0.0089
54	0.0103	0.0014	0.0089
55	0.0103	0.0014	0.0089
56	0.0104	0.0014	0.0090
57	0.0104	0.0014	0.0090
58	0.0105	0.0014	0.0090
59	0.0105	0.0014	0.0091
60	0.0106	0.0014	0.0091
61	0.0106	0.0014	0.0092
62	0.0106	0.0015	0.0092
63	0.0107	0.0015	0.0092
64	0.0107	0.0015	0.0093
65	0.0108	0.0015	0.0093
66	0.0108	0.0015	0.0094
67	0.0109	0.0015	0.0094
68	0.0109	0.0015	0.0094
69	0.0110	0.0015	0.0095
70	0.0110	0.0015	0.0095
71	0.0111	0.0015	0.0096
72	0.0111	0.0015	0.0096
73	0.0112	0.0015	0.0097
74	0.0112	0.0015	0.0097
75	0.0113	0.0015	0.0098
76	0.0113	0.0015	0.0098
77	0.0114	0.0016	0.0099
78	0.0115	0.0016	0.0099
79	0.0115	0.0016	0.0100
80	0.0116	0.0016	0.0100
81	0.0116	0.0016	0.0101
82	0.0117	0.0016	0.0101
83	0.0118	0.0016	0.0102
84	0.0118	0.0016	0.0102
85	0.0119	0.0016	0.0103
86	0.0119	0.0016	0.0103
87	0.0120	0.0016	0.0104
88	0.0121	0.0016	0.0104
89	0.0121	0.0017	0.0105

90	0.0122	0.0017	0.0105
91	0.0123	0.0017	0.0106
92	0.0123	0.0017	0.0106
93	0.0124	0.0017	0.0107
94	0.0125	0.0017	0.0108
95	0.0126	0.0017	0.0108
96	0.0126	0.0017	0.0109
97	0.0127	0.0017	0.0110
98	0.0128	0.0017	0.0110
99	0.0129	0.0018	0.0111
100	0.0129	0.0018	0.0111
101	0.0130	0.0018	0.0112
102	0.0131	0.0018	0.0113
103	0.0132	0.0018	0.0114
104	0.0132	0.0018	0.0114
105	0.0133	0.0018	0.0115
106	0.0134	0.0018	0.0116
107	0.0135	0.0018	0.0117
108	0.0136	0.0019	0.0117
109	0.0137	0.0019	0.0118
110	0.0138	0.0019	0.0119
111	0.0139	0.0019	0.0120
112	0.0140	0.0019	0.0121
113	0.0141	0.0019	0.0122
114	0.0142	0.0019	0.0122
115	0.0143	0.0019	0.0123
116	0.0144	0.0020	0.0124
117	0.0145	0.0020	0.0125
118	0.0146	0.0020	0.0126
119	0.0147	0.0020	0.0127
120	0.0148	0.0020	0.0128
121	0.0149	0.0020	0.0129
122	0.0150	0.0020	0.0130
123	0.0152	0.0021	0.0131
124	0.0153	0.0021	0.0132
125	0.0154	0.0021	0.0133
126	0.0155	0.0021	0.0134
127	0.0157	0.0021	0.0136
128	0.0158	0.0022	0.0136
129	0.0160	0.0022	0.0138
130	0.0161	0.0022	0.0139
131	0.0163	0.0022	0.0141
132	0.0164	0.0022	0.0141
133	0.0166	0.0023	0.0143
134	0.0167	0.0023	0.0144
135	0.0169	0.0023	0.0146
136	0.0170	0.0023	0.0147
137	0.0172	0.0023	0.0149
138	0.0174	0.0024	0.0150
139	0.0176	0.0024	0.0152
140	0.0177	0.0024	0.0153
141	0.0180	0.0024	0.0155
142	0.0181	0.0025	0.0156
143	0.0184	0.0025	0.0159
144	0.0185	0.0025	0.0160
145	0.0208	0.0028	0.0180
146	0.0210	0.0029	0.0181
147	0.0213	0.0029	0.0184
148	0.0214	0.0029	0.0185
149	0.0218	0.0030	0.0188
150	0.0220	0.0030	0.0190
151	0.0223	0.0030	0.0193
152	0.0225	0.0031	0.0194
153	0.0229	0.0031	0.0198
154	0.0231	0.0031	0.0199
155	0.0235	0.0032	0.0203
156	0.0237	0.0032	0.0205
157	0.0242	0.0033	0.0209
158	0.0244	0.0033	0.0211
159	0.0249	0.0034	0.0215
160	0.0252	0.0034	0.0217

161	0.0257	0.0035	0.0222
162	0.0260	0.0035	0.0225
163	0.0266	0.0036	0.0230
164	0.0269	0.0037	0.0232
165	0.0276	0.0038	0.0238
166	0.0279	0.0038	0.0241
167	0.0287	0.0039	0.0248
168	0.0291	0.0040	0.0251
169	0.0299	0.0041	0.0258
170	0.0303	0.0041	0.0262
171	0.0313	0.0043	0.0270
172	0.0318	0.0043	0.0275
173	0.0329	0.0045	0.0284
174	0.0335	0.0046	0.0289
175	0.0348	0.0047	0.0300
176	0.0355	0.0048	0.0306
177	0.0370	0.0050	0.0320
178	0.0378	0.0052	0.0327
179	0.0397	0.0054	0.0343
180	0.0407	0.0056	0.0352
181	0.0431	0.0059	0.0372
182	0.0444	0.0061	0.0384
183	0.0475	0.0065	0.0410
184	0.0493	0.0067	0.0426
185	0.0445	0.0061	0.0384
186	0.0470	0.0064	0.0406
187	0.0533	0.0073	0.0461
188	0.0575	0.0078	0.0496
189	0.0693	0.0081	0.0611
190	0.0782	0.0081	0.0700
191	0.1118	0.0081	0.1036
192	0.1537	0.0081	0.1456
193	0.4811	0.0081	0.4729
194	0.0910	0.0081	0.0829
195	0.0626	0.0081	0.0545
196	0.0499	0.0068	0.0431
197	0.0513	0.0070	0.0443
198	0.0459	0.0063	0.0396
199	0.0419	0.0057	0.0362
200	0.0387	0.0053	0.0335
201	0.0362	0.0049	0.0313
202	0.0341	0.0046	0.0295
203	0.0323	0.0044	0.0279
204	0.0308	0.0042	0.0266
205	0.0295	0.0040	0.0254
206	0.0283	0.0039	0.0244
207	0.0272	0.0037	0.0235
208	0.0263	0.0036	0.0227
209	0.0254	0.0035	0.0220
210	0.0247	0.0034	0.0213
211	0.0239	0.0033	0.0207
212	0.0233	0.0032	0.0201
213	0.0227	0.0031	0.0196
214	0.0221	0.0030	0.0191
215	0.0216	0.0029	0.0187
216	0.0211	0.0029	0.0182
217	0.0187	0.0025	0.0161
218	0.0182	0.0025	0.0158
219	0.0178	0.0024	0.0154
220	0.0175	0.0024	0.0151
221	0.0171	0.0023	0.0148
222	0.0168	0.0023	0.0145
223	0.0165	0.0022	0.0142
224	0.0162	0.0022	0.0140
225	0.0159	0.0022	0.0137
226	0.0156	0.0021	0.0135
227	0.0154	0.0021	0.0133
228	0.0151	0.0021	0.0131
229	0.0149	0.0020	0.0128
230	0.0146	0.0020	0.0126
231	0.0144	0.0020	0.0125

232	0.0142	0.0019	0.0123
233	0.0140	0.0019	0.0121
234	0.0138	0.0019	0.0119
235	0.0136	0.0019	0.0118
236	0.0135	0.0018	0.0116
237	0.0133	0.0018	0.0115
238	0.0131	0.0018	0.0113
239	0.0130	0.0018	0.0112
240	0.0128	0.0017	0.0111
241	0.0127	0.0017	0.0109
242	0.0125	0.0017	0.0108
243	0.0124	0.0017	0.0107
244	0.0122	0.0017	0.0106
245	0.0121	0.0016	0.0105
246	0.0120	0.0016	0.0103
247	0.0118	0.0016	0.0102
248	0.0117	0.0016	0.0101
249	0.0116	0.0016	0.0100
250	0.0115	0.0016	0.0099
251	0.0114	0.0016	0.0098
252	0.0113	0.0015	0.0097
253	0.0112	0.0015	0.0096
254	0.0111	0.0015	0.0096
255	0.0110	0.0015	0.0095
256	0.0109	0.0015	0.0094
257	0.0108	0.0015	0.0093
258	0.0107	0.0015	0.0092
259	0.0106	0.0014	0.0091
260	0.0105	0.0014	0.0091
261	0.0104	0.0014	0.0090
262	0.0103	0.0014	0.0089
263	0.0102	0.0014	0.0088
264	0.0102	0.0014	0.0088
265	0.0101	0.0014	0.0087
266	0.0100	0.0014	0.0086
267	0.0099	0.0014	0.0086
268	0.0098	0.0013	0.0085
269	0.0098	0.0013	0.0084
270	0.0097	0.0013	0.0084
271	0.0096	0.0013	0.0083
272	0.0096	0.0013	0.0083
273	0.0095	0.0013	0.0082
274	0.0094	0.0013	0.0081
275	0.0094	0.0013	0.0081
276	0.0093	0.0013	0.0080
277	0.0092	0.0013	0.0080
278	0.0092	0.0013	0.0079
279	0.0091	0.0012	0.0079
280	0.0091	0.0012	0.0078
281	0.0090	0.0012	0.0078
282	0.0089	0.0012	0.0077
283	0.0089	0.0012	0.0077
284	0.0088	0.0012	0.0076
285	0.0088	0.0012	0.0076
286	0.0087	0.0012	0.0075
287	0.0087	0.0012	0.0075
288	0.0086	0.0012	0.0074

Total soil rain loss = 0.69(In)
Total effective rainfall = 4.97(In)
Peak flow rate in flood hydrograph = 11.28(CFS)

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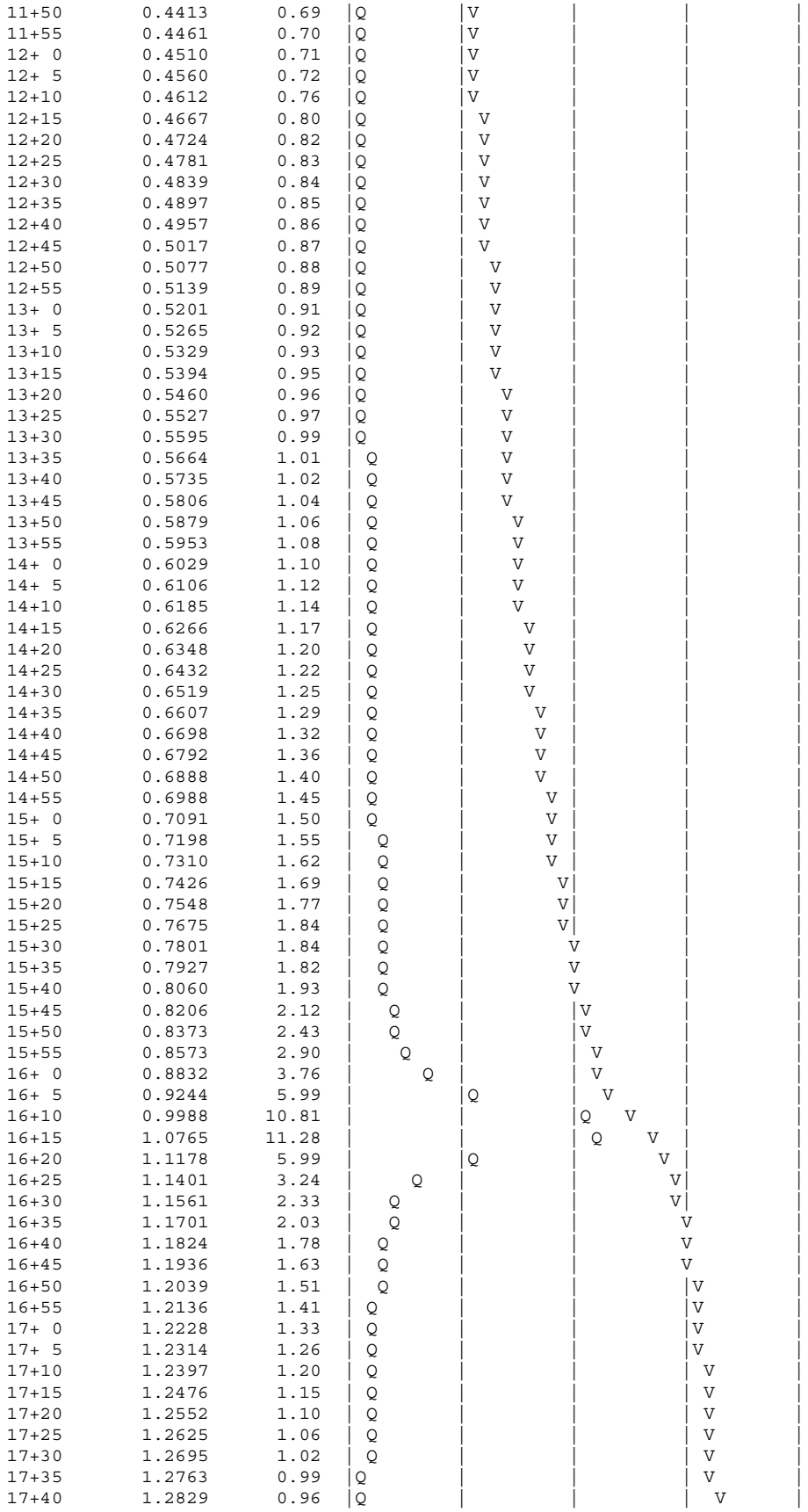
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m) Volume Ac.Ft Q(CFS) 0 5.0 10.0 15.0 20.0

0+ 5	0.0001	0.02	Q				
0+10	0.0010	0.13	Q				
0+15	0.0029	0.27	Q				
0+20	0.0051	0.32	Q				
0+25	0.0074	0.33	Q				
0+30	0.0097	0.34	Q				
0+35	0.0120	0.34	Q				
0+40	0.0144	0.34	Q				
0+45	0.0167	0.34	Q				
0+50	0.0191	0.34	Q				
0+55	0.0215	0.34	Q				
1+ 0	0.0238	0.34	Q				
1+ 5	0.0262	0.35	Q				
1+10	0.0286	0.35	Q				
1+15	0.0310	0.35	Q				
1+20	0.0334	0.35	Q				
1+25	0.0358	0.35	Q				
1+30	0.0382	0.35	Q				
1+35	0.0407	0.35	QV				
1+40	0.0431	0.35	QV				
1+45	0.0455	0.35	QV				
1+50	0.0480	0.36	QV				
1+55	0.0504	0.36	QV				
2+ 0	0.0529	0.36	QV				
2+ 5	0.0554	0.36	QV				
2+10	0.0579	0.36	QV				
2+15	0.0604	0.36	QV				
2+20	0.0629	0.36	QV				
2+25	0.0654	0.36	QV				
2+30	0.0679	0.37	QV				
2+35	0.0704	0.37	QV				
2+40	0.0730	0.37	QV				
2+45	0.0755	0.37	QV				
2+50	0.0780	0.37	Q V				
2+55	0.0806	0.37	Q V				
3+ 0	0.0832	0.37	Q V				
3+ 5	0.0858	0.37	Q V				
3+10	0.0883	0.38	Q V				
3+15	0.0909	0.38	Q V				
3+20	0.0936	0.38	Q V				
3+25	0.0962	0.38	Q V				
3+30	0.0988	0.38	Q V				
3+35	0.1014	0.38	Q V				
3+40	0.1041	0.38	Q V				
3+45	0.1067	0.39	Q V				
3+50	0.1094	0.39	Q V				
3+55	0.1121	0.39	Q V				
4+ 0	0.1148	0.39	Q V				
4+ 5	0.1175	0.39	Q V				
4+10	0.1202	0.39	Q V				
4+15	0.1229	0.39	Q V				
4+20	0.1256	0.40	Q V				
4+25	0.1284	0.40	Q V				
4+30	0.1311	0.40	Q V				
4+35	0.1339	0.40	Q V				
4+40	0.1366	0.40	Q V				
4+45	0.1394	0.40	Q V				
4+50	0.1422	0.41	Q V				
4+55	0.1450	0.41	Q V				
5+ 0	0.1479	0.41	Q V				
5+ 5	0.1507	0.41	Q V				
5+10	0.1535	0.41	Q V				
5+15	0.1564	0.41	Q V				
5+20	0.1593	0.42	Q V				
5+25	0.1621	0.42	Q V				
5+30	0.1650	0.42	Q V				
5+35	0.1679	0.42	Q V				
5+40	0.1709	0.42	Q V				
5+45	0.1738	0.43	Q V				
5+50	0.1767	0.43	Q V				

5+55	0.1797	0.43	Q	V	|	|	|	|
6+ 0	0.1827	0.43	Q	V	|	|	|	|
6+ 5	0.1856	0.43	Q	V	|	|	|	|
6+10	0.1886	0.44	Q	V	|	|	|	|
6+15	0.1917	0.44	Q	V	|	|	|	|
6+20	0.1947	0.44	Q	V	|	|	|	|
6+25	0.1977	0.44	Q	V	|	|	|	|
6+30	0.2008	0.44	Q	V	|	|	|	|
6+35	0.2039	0.45	Q	V	|	|	|	|
6+40	0.2069	0.45	Q	V	|	|	|	|
6+45	0.2100	0.45	Q	V	|	|	|	|
6+50	0.2132	0.45	Q	V	|	|	|	|
6+55	0.2163	0.45	Q	V	|	|	|	|
7+ 0	0.2194	0.46	Q	V	|	|	|	|
7+ 5	0.2226	0.46	Q	V	|	|	|	|
7+10	0.2258	0.46	Q	V	|	|	|	|
7+15	0.2290	0.46	Q	V	|	|	|	|
7+20	0.2322	0.47	Q	V	|	|	|	|
7+25	0.2354	0.47	Q	V	|	|	|	|
7+30	0.2387	0.47	Q	V	|	|	|	|
7+35	0.2420	0.47	Q	V	|	|	|	|
7+40	0.2452	0.48	Q	V	|	|	|	|
7+45	0.2485	0.48	Q	V	|	|	|	|
7+50	0.2519	0.48	Q	V	|	|	|	|
7+55	0.2552	0.49	Q	V	|	|	|	|
8+ 0	0.2586	0.49	Q	V	|	|	|	|
8+ 5	0.2619	0.49	Q	V	|	|	|	|
8+10	0.2653	0.49	Q	V	|	|	|	|
8+15	0.2688	0.50	Q	V	|	|	|	|
8+20	0.2722	0.50	Q	V	|	|	|	|
8+25	0.2757	0.50	Q	V	|	|	|	|
8+30	0.2791	0.51	Q	V	|	|	|	|
8+35	0.2826	0.51	Q	V	|	|	|	|
8+40	0.2862	0.51	Q	V	|	|	|	|
8+45	0.2897	0.51	Q	V	|	|	|	|
8+50	0.2933	0.52	Q	V	|	|	|	|
8+55	0.2969	0.52	Q	V	|	|	|	|
9+ 0	0.3005	0.52	Q	V	|	|	|	|
9+ 5	0.3041	0.53	Q	V	|	|	|	|
9+10	0.3078	0.53	Q	V	|	|	|	|
9+15	0.3115	0.54	Q	V	|	|	|	|
9+20	0.3152	0.54	Q	V	|	|	|	|
9+25	0.3189	0.54	Q	V	|	|	|	|
9+30	0.3227	0.55	Q	V	|	|	|	|
9+35	0.3265	0.55	Q	V	|	|	|	|
9+40	0.3303	0.55	Q	V	|	|	|	|
9+45	0.3341	0.56	Q	V	|	|	|	|
9+50	0.3380	0.56	Q	V	|	|	|	|
9+55	0.3419	0.57	Q	V	|	|	|	|
10+ 0	0.3458	0.57	Q	V	|	|	|	|
10+ 5	0.3498	0.58	Q	V	|	|	|	|
10+10	0.3538	0.58	Q	V	|	|	|	|
10+15	0.3578	0.58	Q	V	|	|	|	|
10+20	0.3619	0.59	Q	V	|	|	|	|
10+25	0.3660	0.59	Q	V	|	|	|	|
10+30	0.3701	0.60	Q	V	|	|	|	|
10+35	0.3742	0.60	Q	V	|	|	|	|
10+40	0.3784	0.61	Q	V	|	|	|	|
10+45	0.3827	0.61	Q	V	|	|	|	|
10+50	0.3869	0.62	Q	V	|	|	|	|
10+55	0.3912	0.62	Q	V	|	|	|	|
11+ 0	0.3956	0.63	Q	V	|	|	|	|
11+ 5	0.3999	0.64	Q	V	|	|	|	|
11+10	0.4044	0.64	Q	V	|	|	|	|
11+15	0.4088	0.65	Q	V	|	|	|	|
11+20	0.4133	0.65	Q	V	|	|	|	|
11+25	0.4179	0.66	Q	V	|	|	|	|
11+30	0.4225	0.67	Q	V	|	|	|	|
11+35	0.4271	0.67	Q	V	|	|	|	|
11+40	0.4318	0.68	Q	V	|	|	|	|
11+45	0.4365	0.69	Q	V	|	|	|	|


11+50 0.4413 0.69
11+55 0.4461 0.70
12+ 0 0.4510 0.71
12+ 5 0.4560 0.72
12+10 0.4612 0.76
12+15 0.4667 0.80
12+20 0.4724 0.82
12+25 0.4781 0.83
12+30 0.4839 0.84
12+35 0.4897 0.85
12+40 0.4957 0.86
12+45 0.5017 0.87
12+50 0.5077 0.88
12+55 0.5139 0.89
13+ 0 0.5201 0.91
13+ 5 0.5265 0.92
13+10 0.5329 0.93
13+15 0.5394 0.95
13+20 0.5460 0.96
13+25 0.5527 0.97
13+30 0.5595 0.99
13+35 0.5664 1.01
13+40 0.5735 1.02
13+45 0.5806 1.04
13+50 0.5879 1.06
13+55 0.5953 1.08
14+ 0 0.6029 1.10
14+ 5 0.6106 1.12
14+10 0.6185 1.14
14+15 0.6266 1.17
14+20 0.6348 1.20
14+25 0.6432 1.22
14+30 0.6519 1.25
14+35 0.6607 1.29
14+40 0.6698 1.32
14+45 0.6792 1.36
14+50 0.6888 1.40
14+55 0.6988 1.45
15+ 0 0.7091 1.50
15+ 5 0.7198 1.55
15+10 0.7310 1.62
15+15 0.7426 1.69
15+20 0.7548 1.77
15+25 0.7675 1.84
15+30 0.7801 1.84
15+35 0.7927 1.82
15+40 0.8060 1.93
15+45 0.8206 2.12
15+50 0.8373 2.43
15+55 0.8573 2.90
16+ 0 0.8832 3.76
16+ 5 0.9244 5.99
16+10 0.9988 10.81
16+15 1.0765 11.28
16+20 1.1178 5.99
16+25 1.1401 3.24
16+30 1.1561 2.33
16+35 1.1701 2.03
16+40 1.1824 1.78
16+45 1.1936 1.63
16+50 1.2039 1.51
16+55 1.2136 1.41
17+ 0 1.2228 1.33
17+ 5 1.2314 1.26
17+10 1.2397 1.20
17+15 1.2476 1.15
17+20 1.2552 1.10
17+25 1.2625 1.06
17+30 1.2695 1.02
17+35 1.2763 0.99
17+40 1.2829 0.96

17+45	1.2894	0.93	|Q	|	|	| V	|
17+50	1.2956	0.91	|Q	|	|	| V	|
17+55	1.3017	0.88	|Q	|	|	| V	|
18+ 0	1.3076	0.86	|Q	|	|	| V	|
18+ 5	1.3134	0.84	|Q	|	|	| V	|
18+10	1.3188	0.79	|Q	|	|	| V	|
18+15	1.3240	0.74	|Q	|	|	| V	|
18+20	1.3289	0.71	|Q	|	|	| V	|
18+25	1.3337	0.70	|Q	|	|	| V	|
18+30	1.3384	0.68	|Q	|	|	| V	|
18+35	1.3430	0.67	|Q	|	|	| V	|
18+40	1.3475	0.65	|Q	|	|	| V	|
18+45	1.3519	0.64	|Q	|	|	| V	|
18+50	1.3562	0.63	|Q	|	|	| V	|
18+55	1.3605	0.62	|Q	|	|	| V	|
19+ 0	1.3647	0.61	|Q	|	|	| V	|
19+ 5	1.3688	0.60	|Q	|	|	| V	|
19+10	1.3729	0.59	|Q	|	|	| V	|
19+15	1.3768	0.58	|Q	|	|	| V	|
19+20	1.3808	0.57	|Q	|	|	| V	|
19+25	1.3846	0.56	|Q	|	|	| V	|
19+30	1.3885	0.55	|Q	|	|	| V	|
19+35	1.3922	0.55	|Q	|	|	| V	|
19+40	1.3959	0.54	|Q	|	|	| V	|
19+45	1.3996	0.53	|Q	|	|	| V	|
19+50	1.4032	0.52	|Q	|	|	| V	|
19+55	1.4068	0.52	|Q	|	|	| V	|
20+ 0	1.4103	0.51	|Q	|	|	| V	|
20+ 5	1.4138	0.51	|Q	|	|	| V	|
20+10	1.4172	0.50	Q	|	|	| V	|
20+15	1.4206	0.49	Q	|	|	| V	|
20+20	1.4240	0.49	Q	|	|	| V	|
20+25	1.4273	0.48	Q	|	|	| V	|
20+30	1.4306	0.48	Q	|	|	| V	|
20+35	1.4338	0.47	Q	|	|	| V	|
20+40	1.4371	0.47	Q	|	|	| V	|
20+45	1.4402	0.46	Q	|	|	| V	|
20+50	1.4434	0.46	Q	|	|	| V	|
20+55	1.4465	0.45	Q	|	|	| V	|
21+ 0	1.4496	0.45	Q	|	|	| V	|
21+ 5	1.4527	0.44	Q	|	|	| V	|
21+10	1.4557	0.44	Q	|	|	| V	|
21+15	1.4587	0.44	Q	|	|	| V	|
21+20	1.4617	0.43	Q	|	|	| V	|
21+25	1.4646	0.43	Q	|	|	| V	|
21+30	1.4675	0.42	Q	|	|	| V	|
21+35	1.4704	0.42	Q	|	|	| V	|
21+40	1.4733	0.42	Q	|	|	| V	|
21+45	1.4761	0.41	Q	|	|	| V	|
21+50	1.4789	0.41	Q	|	|	| V	|
21+55	1.4817	0.41	Q	|	|	| V	|
22+ 0	1.4845	0.40	Q	|	|	| V	|
22+ 5	1.4873	0.40	Q	|	|	| V	|
22+10	1.4900	0.40	Q	|	|	| V	|
22+15	1.4927	0.39	Q	|	|	| V	|
22+20	1.4954	0.39	Q	|	|	| V	|
22+25	1.4981	0.39	Q	|	|	| V	|
22+30	1.5007	0.38	Q	|	|	| V	|
22+35	1.5033	0.38	Q	|	|	| V	|
22+40	1.5059	0.38	Q	|	|	| V	|
22+45	1.5085	0.38	Q	|	|	| V	|
22+50	1.5111	0.37	Q	|	|	| V	|
22+55	1.5136	0.37	Q	|	|	| V	|
23+ 0	1.5162	0.37	Q	|	|	| V	|
23+ 5	1.5187	0.37	Q	|	|	| V	|
23+10	1.5212	0.36	Q	|	|	| V	|
23+15	1.5237	0.36	Q	|	|	| V	|
23+20	1.5261	0.36	Q	|	|	| V	|
23+25	1.5286	0.36	Q	|	|	| V	|
23+30	1.5310	0.35	Q	|	|	| V	|
23+35	1.5335	0.35	Q	|	|	| V	|

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   23+40       1.5359      0.35  Q         |         |         |        V|
   23+45       1.5382      0.35  Q         |         |         |        V|
   23+50       1.5406      0.34  Q         |         |         |        V|
   23+55       1.5430      0.34  Q         |         |         |        V|
   24+ 0       1.5453      0.34  Q         |         |         |        V|
   24+ 5       1.5475      0.32  Q         |         |         |        V|
   24+10       1.5489      0.21  Q         |         |         |        V|
   24+15       1.5494      0.07  Q         |         |         |        V|
   24+20       1.5495      0.02  Q         |         |         |        V|
   24+25       1.5496      0.01  Q         |         |         |        V|
   24+30       1.5496      0.00  Q         |         |         |         V
-------------------------------------------------------------------------
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APPENDIX G: PRELIMINARY STORM DRAIN SIZING CALCULATIONS

APPENDIX G.1: LINE A STORM DRAIN SYSTEMS

LINE A

PIPE OUTFLOW (SOFFIT CONTROL)

DS WSE	SYSTEM	PIPE DIA.	PIPE LENGTH	Q (cfs)	K	PIPE SLOPE	DS INVERT	US INVERT	FRICTION SLOPE	VELOCITY	VELOCITY HEAD	LOSS COEFFICIENT	LOSSES	US WSE
1005.85	LINE A	24	63.77	13.96	226.2	0.0030	1004.00	1004.19	0.0038	4.4494	0.3069	1.50	0.4603	1006.55
1006.55	LINE A	24	77.69	13.96	226.2	0.0030	1004.19	1004.42	0.0038	4.4494	0.3069	1.50	0.4603	1007.31
1007.31	LINE A	24	310.31	13.96	226.2	0.0050	1004.42	1005.98	0.0038	4.4494	0.3069	1.50	0.4603	1008.95

APPENDIX G.2: LINE B STORM DRAIN SYSTEM

LINE B

PIPE OUTFLOW (SOFFIT CONTROL)

DS WSE	SYSTEM	PIPE DIA.	PIPE LENGTH	Q (cfs)	K	PIPE SLOPE	DS INVERT	US INVERT	FRICTION SLOPE	VELOCITY	VELOCITY HEAD	LOSS COEFFICIENT	LOSSES	US WSE
1005.85	LINE B	36	51.16	27.54	667.0	0.0050	1005.00	1005.26	0.0017	3.9012	0.2359	1.50	0.3539	1006.29

APPENDIX G.3: LINE C STORM DRAIN SYSTEM

LINE C

PIPE OUTFLOW (SOFFIT CONTROL)

DS WSE	SYSTEM	PIPE DIA.	PIPE LENGTH	Q (cfs)	K	PIPE SLOPE	DS INVERT	US INVERT	FRICTION SLOPE	VELOCITY	VELOCITY HEAD	LOSS COEFFICIENT	LOSSES	US WSE
1013.80	LINE C	24	63.31	11.90	226.2	0.0030	1011.00	1011.19	0.0028	3.7928	0.2230	1.50	0.3345	1014.31
1014.31	LINE C	24	69.04	11.90	226.2	0.0030	1011.19	1011.40	0.0028	3.7928	0.2230	1.50	0.3345	1014.84
1014.84	LINE C	24	443.11	11.90	226.2	0.0030	1011.40	1012.73	0.0028	3.7928	0.2230	1.50	0.3345	1016.40

APPENDIX G.4: PRELIMINARY BASIN OUTLET PARKWAY DRAIN SIZING

Pre-Treatment Drainage Basin A

100-YEAR BASIN OUTLET STRUCTURE SIZING

WEIR INVERT ELEVATION= 1005

MAXIMUM DEPTH 100-YEAR CAN POND= 1006.5

RESULTING MAXIMUM H = 1.5 ft

WEIR EQUATION: $Q = CLH^{(3/2)}$

SOLVING FOR L: $L = \frac{Q}{CH^{(3/2)}}$

Q = 14.09 ft^3/s

H = 1.5 ft

C = 3

L_{MIN} = 2.56 ft

100-YEAR WSE CALCULATION

WEIR EQUATION: $Q = CLH^{(3/2)}$

SOLVING FOR H: $H = \frac{Q}{CL}^{(2/3)}$

Q = 14.09 ft^3/s

L = 6 ft

C = 3

H = 0.85 ft

WEIR INVERT = 1005

100-YEAR WSE = **1005.85**

Pre-Treatment Drainage Basin B

100-YEAR BASIN OUTLET STRUCTURE SIZING

WEIR INVERT ELEVATION= 1013.5
MAXIMUM DEPTH 100-YEAR CAN POND= 1014.5
RESULTING MAXIMUM H = 1 ft

WEIR EQUATION: $Q = CLH^{(3/2)}$

SOLVING FOR L: $L = \frac{Q}{CH^{(3/2)}}$

Q = 3.02 ft^3/s
H = 1 ft
C = 3

L_{MIN} = 1.01 ft

100-YEAR WSE CALCULATION

WEIR EQUATION: $Q = CLH^{(3/2)}$

SOLVING FOR H: $H = \frac{Q}{CL}^{(2/3)}$

Q = 3.02 ft^3/s
L = 6 ft
C = 3

H = 0.30 ft

WEIR INVERT = 1013.5
100-YEAR WSE = **1013.80**

1304.71	1304.11	0.6
	1303.86	0.85
	1303.59	1.12
	1303.41	1.3

APPENDIX H: INCREASED RUNOFF MITIGATION

APPENDIX H.1: SUBSURFACE SYSTEM STORAGE VOLUME TABLE

Subsurface System Volume Calculations - Subsurface System A - 2,877 LF of 96" Storm Drain

Increased Runoff Storage Volume

Elevation	96" Pipe Area Each (ft^2)	96" Pipe Total Gross Volume at Elev. (ft^3)	Gravel Area Per Pipe* (ft^2)	Gravel Total Volume ** (ft^3)	Cumulative Subsurface System Volume (ft^3)
0	0	0	0	0	0.00
1	0	0	10	11508	11508.00
2	3.63	10443.51	16.37	18838.596	29282.11
3	9.83	28280.91	20.17	23211.636	51492.55
4	17.22	49541.94	22.78	26215.224	75757.16
5	25.13	72299.01	24.87	28620.396	100919.41
6	33.05	95084.85	26.95	31014.06	126098.91
7	44.04	126703.08	25.96	29874.768	156577.85
8	46.64	134183.28	33.36	38390.688	172573.97
9	50.27	144626.79	39.73	45721.284	190348.07
10	50.27	144626.79	49.73	57229.284	201856.07

* Gravel area per pipe includes 1 foot of gravel on each side of the storm drain. The gross area of the pipe and gravel is calculated and then the area of the pipe is subtracted. Width of each row of pipe, including gravel, is 10 feet.

** The total gravel volume is the Gravel Area Per Pipe multiplied by the Linear footage of the system, multiplied by a 0.40 void ratio

*** The total gross pipe volume is equal to the pipe area multiplied by the total length of 96" pipe for the system (2,877 feet).

Subsurface System Volume Calculations - Subsurface System B - 725 LF of 96" Storm Drain

Increased Runoff Storage Volume

Elevation	96" Pipe Area Each (ft^2)	96" Pipe Total Gross Volume at Elev. (ft^3)	Gravel Area Per Pipe* (ft^2)	Gravel Total Volume ** (ft^3)	Cumulative Subsurface System Volume (ft^3)
0	0	0	0	0	0.00
1	0	0	10	2900	2900.00
2	3.63	2631.75	16.37	4747.3	7379.05
3	9.83	7126.75	20.17	5849.3	12976.05
4	17.22	12484.5	22.78	6606.2	19090.70
5	25.13	18219.25	24.87	7212.3	25431.55
6	33.05	23961.25	26.95	7815.5	31776.75
7	44.04	31929	25.96	7528.4	39457.40
8	46.64	33814	33.36	9674.4	43488.40
9	50.27	36445.75	39.73	11521.7	47967.45
10	50.27	36445.75	49.73	14421.7	50867.45

* Gravel area per pipe includes 1 foot of gravel on each side of the storm drain. The gross area of the pipe and gravel is calculated and then the area of the pipe is subtracted. Width of each row of pipe, including gravel, is 10 feet.

** The total gravel volume is the Gravel Area Per Pipe multiplied by the Linear footage of the system, multiplied by a 0.40 void ratio

*** The total gross pipe volume is equal to the pipe area multiplied by the total length of 96" pipe for the system (725 feet).

APPENDIX H.2: REQUIRED STORAGE VOLUMES TO MITIGATE INCREASED RUNOFF

Area A Required Mitigation Volume Calculation

Q_{EX} =	14.15 cfs
Q_{POST}=	42.16 cfs

Locations on both sides of the post project hydrograph where the closest flow rate to the existing condition flow rate (without being greater) occurs:

Time	Volume	Flow Rate
16+25	4.2375	14.09

184585.5

Maximum Peak Outflow =	14.09 cfs
Total Available Volume =	4.634 ac-ft

Area B Required Mitigation Volume Calculation

Q_{EX} =	3.02 cfs
Q_{POST}=	11.28 cfs

Locations on both sides of the post project hydrograph where the closest flow rate to the existing condition flow rate (without being greater) occurs:

Time	Volume	Flow Rate
16+30	1.1561	2.33

Maximum Peak Outflow =	2.33 cfs
Total Available Volume =	1.1678 ac-ft

EXCERPTS

EXCERPT A: SAN BERNARDINO COUNTY LAND USE PLAN

See FH21 A

See FH28 A

See FH30 A

CITY OF FONTANA

CITY OF RIALTO

CITY OF FONTANA

SPEEDWAY RDA

SPEEDWAY RDA

SPEEDWAY RDA

Kaiser Hospital

Green Acres Memorial Gardens

Green Acres Lake

Jurupa Mountains

HISTORIC ROUTE 66 HWY

ARROW RTE

See FH29A - Inset 1

See FH29A - Inset 2

See FH29A - Inset 3

See FH29A - Inset 4

R6W R5W

T1N T1S T2S

Land Use Zoning Districts

AG – Agriculture
CG – General Commercial
CH – Highway Commercial
CN – Neighborhood Commercial
CO – Office Commercial
CR – Rural Commercial
CS – Service Commercial
FW – Floodway
IC – Community Industrial
IN – Institutional
IR – Regional Industrial
OS – Open Space
RC – Resource Conservation
RL – Rural Living
RM – Multiple Residential
RS – Single Residential
SD – Special Development
SP – Specific Plan

County designated Land Use Zoning Districts do not apply to Federal or State owned property.

San Bernardino County Land Use Plan
GENERAL PLAN
Land Use Zoning Districts

SCALE 1:14,400

1,250 625 0 1,250 2,500 3,750 5,000 Feet

0.5 0.25 0 0.5 1 Miles

Legend

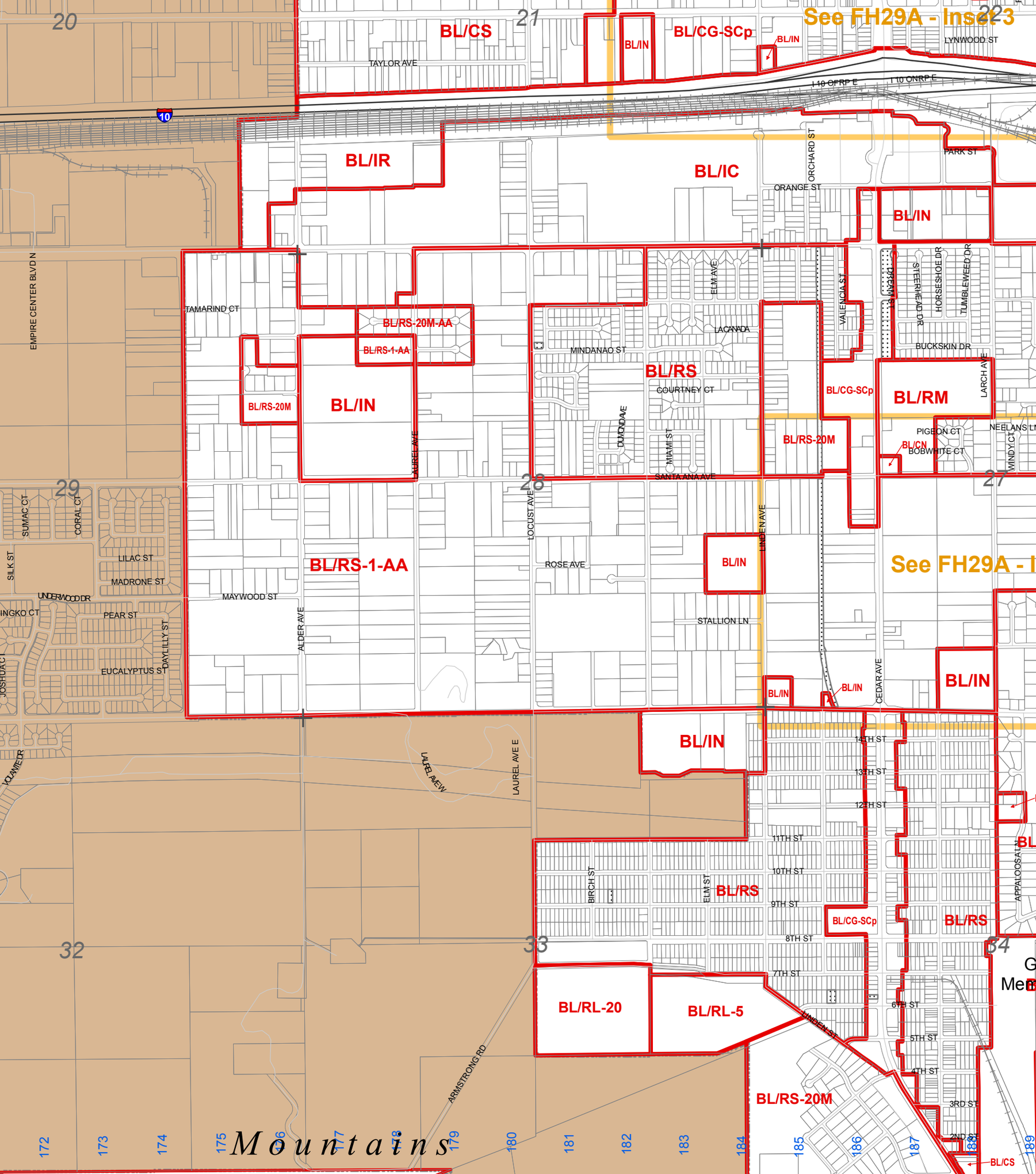
- BLM
- National Park
- National Forest
- Military
- State
- Indian Land
- Other Federal Government
- County
- Private Unincorporated
- RDA

Jurisdictional Control data is for informational purposes only and is not part of the General Plan Land Use Zoning. The depiction of the various land ownership categories is the best available information but cannot be guaranteed accurate. For current land ownership information please contact the San Bernardino County Assessor's Office.

SAN BERNARDINO COUNTY MAP LOCATION

FH29 A
Fontana

Z:\Projects\Work\Flatt\GenPlan\LUDs\Maps\New LUDs_Detail3.mxd
Map Date: 04/22/2010


See FH29A - Inset
BL/CS
BL/IN
BL/CG-SCp
BL/IR
BL/IC
BL/RS-20M-AA
BL/RS-1-AA
BL/RS-20M
BL/RS
BL/RM
BL/CN
BL/RS-1-AA
BL/RL-20
BL/RL-5
See FH29A - I
TAYLOR AVE
LYNWOOD ST
I-10 OFRP E
I-10 ONRP E
PARK ST
ORCHARD ST
ORANGE ST
EMPIRE CENTER BLVD N
TAMARIND CT
ELM AVE
VALENCIA ST
DREAM ST
STEEPLECHASE DR
HORSESHOE DR
TUMBLEWEED DR
LACANADA
MINDANAO ST
BUCKSKIN DR
COURTNEY CT
LARCH AVE
LAUREL AVE
DUONDA AVE
MIAMI ST
PIGEON CT
BOBWHITE CT
WINDY CT
NEELANS LN
SANTA ANA AVE
SUMAC CT
CORAL CT
LILAC ST
MADRONE ST
SILK ST
UNDERWOOD DR
PEAR ST
EUCALYPTUS ST
DAYLILLY ST
JOSHUA CT
MAYWOOD ST
ALDER AVE
LOCUST AVE
ROSE AVE
LINDEN AVE
STALLION LN
CEDAR AVE
VOLUNTEER
LAUREL AVE E
LAUREL AVE
14TH ST
13TH ST
12TH ST
11TH ST
10TH ST
9TH ST
8TH ST
7TH ST
6TH ST
5TH ST
4TH ST
3RD ST
2ND ST
BIRCH ST
ELM ST
APPALOOSA LN
ARMSTRONG RD
LINDEN ST
Mountains
20
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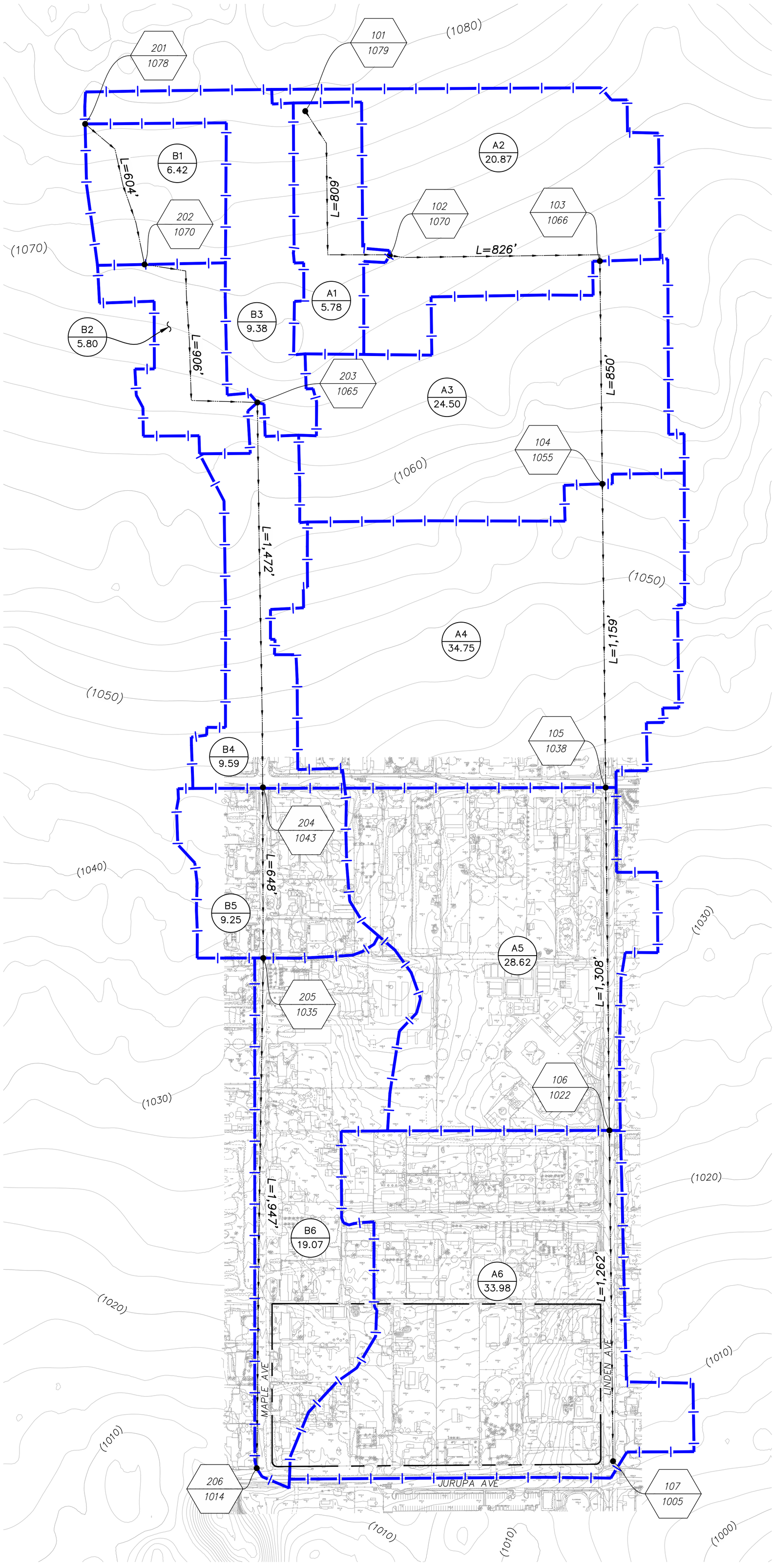
EXHIBITS

EXHIBIT A: **PRE-PROJECT CONDITION ONSITE AND OFFSITE RATIONAL METHOD HYDROLOGY MAP**

BLOOMINGTON COMMERCE CENTER SP4

COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA

PRE-PROJECT OFFSITE HYDROLOGY MAP



LEGEND:

X.X / X.X	NODE/CONCENTRATION POINT / FLOWLINE ELEVATION
XXXX.X	APPROXIMATE INVERT ELEVATION
XXX / X.X	SUB AREA / ACRES
L=XXX'	FLOW DISTANCE
	FLOW PATH
	WATERSHED BOUNDARY

N

GRAPHIC SCALE
200' 0 100' 200' 400'
1" = 200'

EXHIBIT "A"

BLOOMINGTON SP4

PRE-PROJECT CONDITION OFFSITE HYDROLOGY MAP

JLC Engineering & Consulting, Inc.
41660 IVY STREET, SUITE A
MURRIETA, CA 92562
PH. 951.304.9552 FAX 951.304.3568

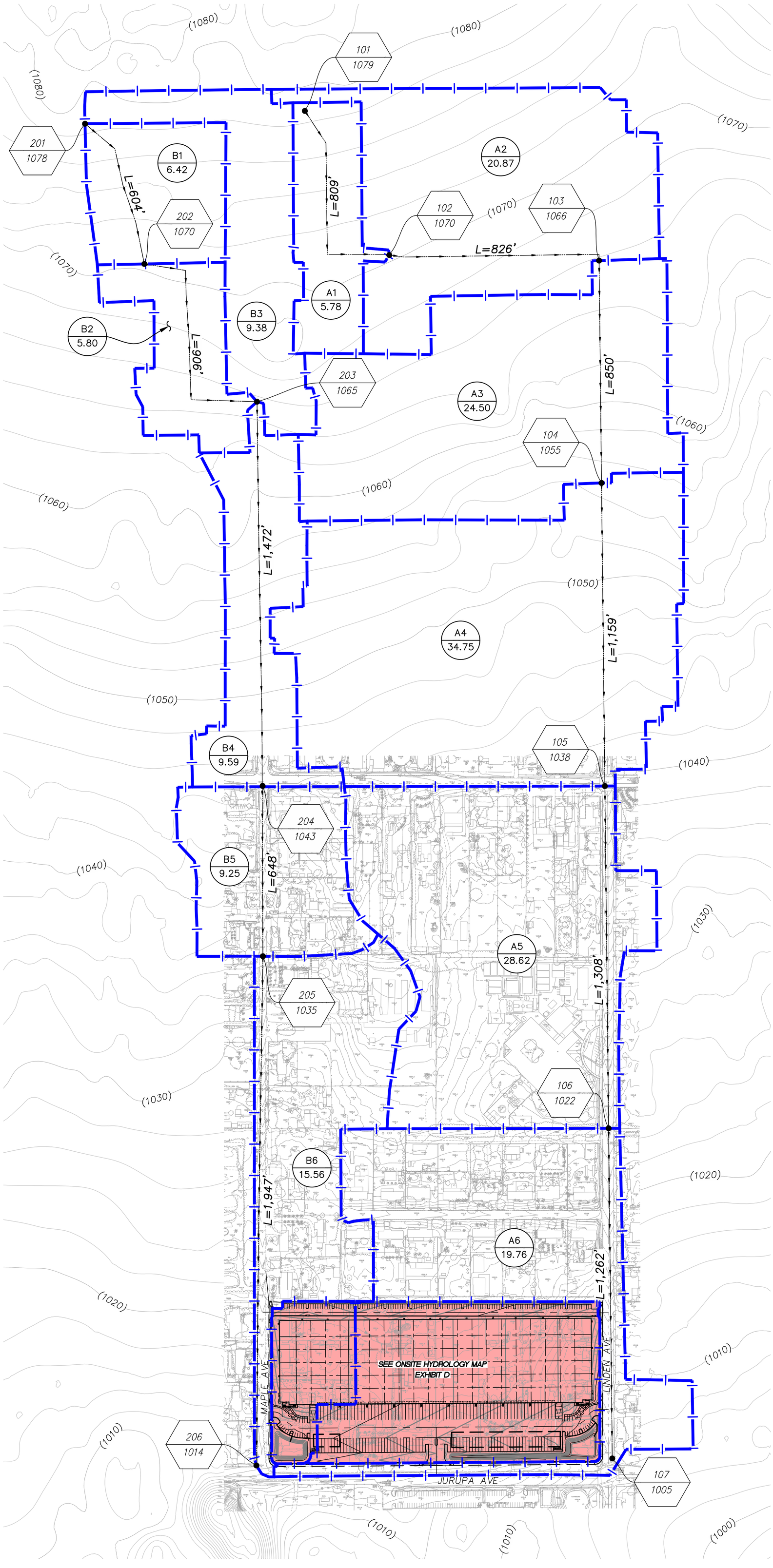
Drawing Name: O:\257.08.20\Engineering\Hydrology_Plan\Exhibits\Pre-Project Condition Hydrology_ExhibitA.dwg
Last Opened: Jun 23, 2020 - 11:58am by jcarver

EXHIBIT B: **POST-PROJECT CONDITION OFFSITE RATIONAL METHOD HYDROLOGY MAP**

BLOOMINGTON COMMERCE CENTER SP4

COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA

POST-PROJECT OFFSITE HYDROLOGY MAP



LEGEND:

X.X / X.X	NODE/CONCENTRATION POINT / FLOWLINE ELEVATION
XXXX.X	APPROXIMATE INVERT ELEVATION
XXX / X.X	SUB AREA / ACRES
L=XXX'	FLOW DISTANCE
	FLOW PATH
	WATERSHED BOUNDARY

NOTE:
AREA AA AND BB WILL BE DIRECTED INTO SUBSURFACE INFILTRATION BASIN TO RETAIN THE ONSITE FLOWS TO A LEVEL THAT IS LESS THAN THE PRE-PROJECT CONDITION.

SEE ONSITE UNIT HYDROGRAPH FOR AREA AA AND BB

N

GRAPHIC SCALE
200' 0 100' 200' 400'
1" = 200'

EXHIBIT "B"

JLC Engineering & Consulting, Inc.
41660 IVY STREET, SUITE A
MURRIETA, CA 92562
PH. 951.304.9552 FAX 951.304.3568

BLOOMINGTON SP4

POST-PROJECT CONDITION
OFFSITE HYDROLOGY MAP

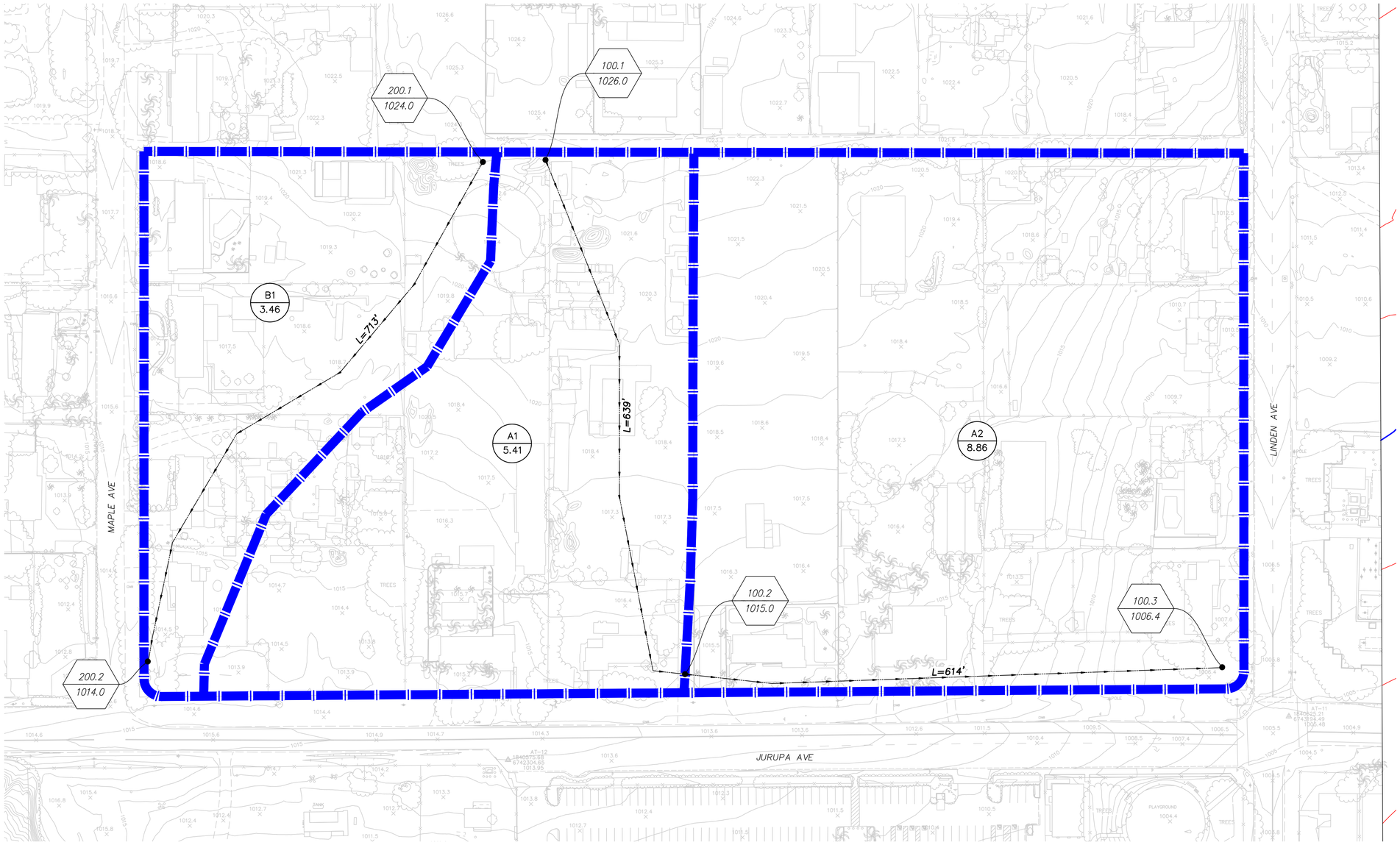
Drawing Name: O:\257.08.20\Engineering\Hydrology_Plan\Exhibits\Post Condition Hydrology_ExhibitB.dwg
Last Opened: Jun 24, 2020 - 11:26am by jcarver

EXHIBIT C: **PRE-PROJECT CONDITION ONSITE RATIONAL METHOD HYDROLOGY MAP**

BLOOMINGTON COMMERCE CENTER SP4

IN THE COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA

PRE-PROJECT CONDITION ONSITE HYDROLOGY MAP



LEGEND:

X.X / X.X	NODE/CONCENTRATION POINT / FLOWLINE ELEVATION
XXXX.X	APPROXIMATE INVERT ELEVATION
XXX / X.X	SUB AREA / ACRES
L=XXX'	FLOW DISTANCE
	FLOW PATH
	WATERSHED BOUNDARY

N

GRAPHIC SCALE
60' 0 30' 60' 120'
1" = 60'

EXHIBIT "C"

BLOOMINGTON SP4

POST-PROJECT CONDITION ON SITE HYDROLOGY MAP

JLC Engineering & Consulting, Inc.
41660 IVY STREET, SUITE A
MURRIETA, CA 92562
PH. 951.304.9552 FAX 951.304.3568

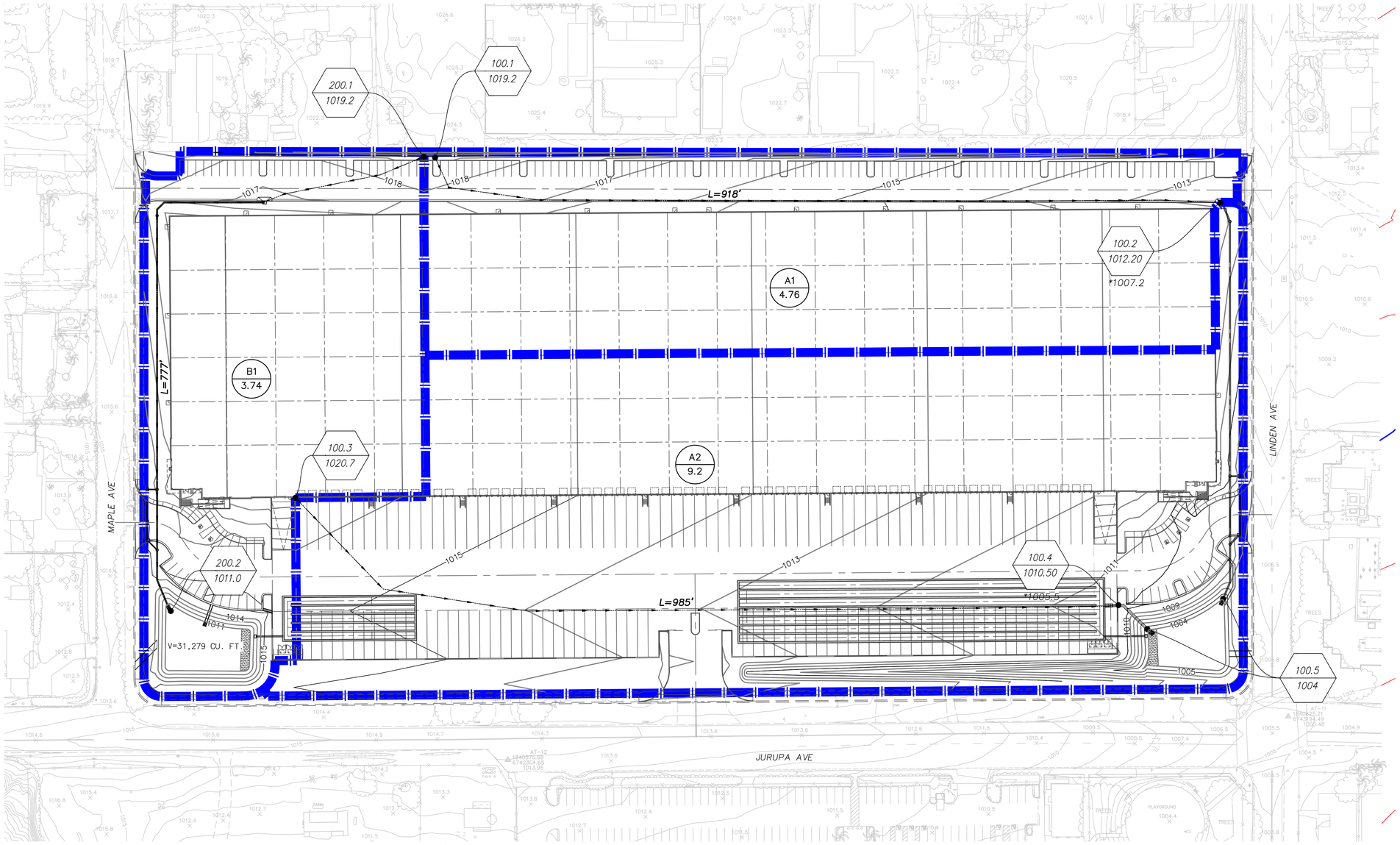
Drawing Name: G:\257.08.20\Engineering\Hydrology_Plan\Exhibits\OnsiteHydroExhibitC.dwg
Last Opened: Jun 24, 2020 - 11:20am by jsoret

EXHIBIT D: **POST-PROJECT CONDITION ONSITE RATIONAL METHOD HYDROLOGY MAP**

BLOOMINGTON COMMERCE CENTER SP4

IN THE COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA

POST-PROJECT CONDITION ONSITE HYDROLOGY MAP



LEGEND:

- X.X / X.X — NODE/CONCENTRATION POINT / FLOWLINE ELEVATION
- XXXX.X — APPROXIMATE INVERT ELEVATION
- XXX / X.X — SUB AREA / ACRES
- L=XXX' — FLOW DISTANCE
- FLOW PATH
- WATERSHED BOUNDARY

N

GRAPHIC SCALE
60' 0 30' 60' 120'
1" = 60'

EXHIBIT "D"

BLOOMINGTON SP4

POST-PROJECT CONDITION ONSITE HYDROLOGY MAP

JLC Engineering & Consulting, Inc.
41660 IVY STREET, SUITE A
MURRIETA, CA 92562
PH. 951.304.9552 FAX 951.304.3568

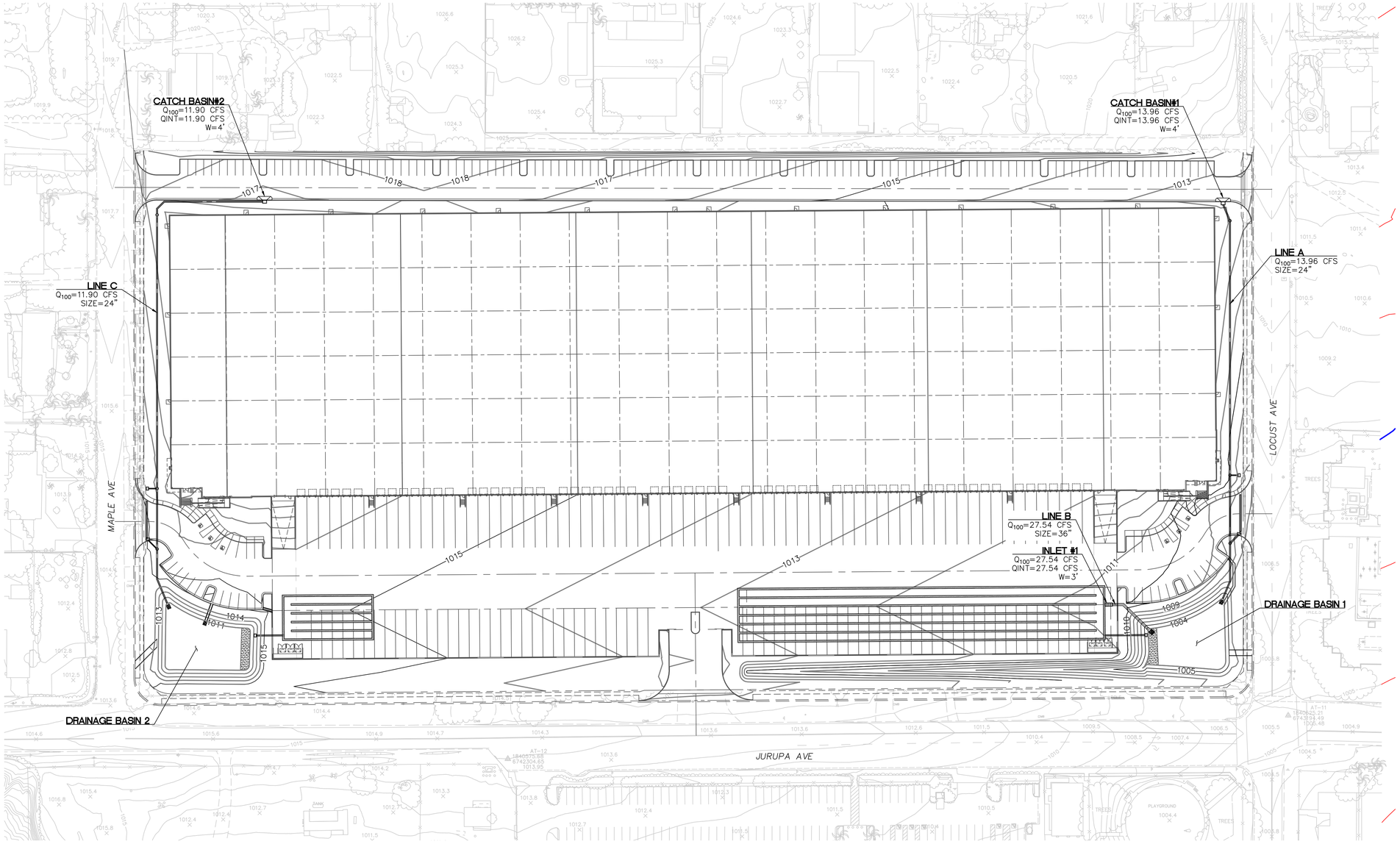
Drawing Name: G:\257.08.20\Engineering\Hydrology_Plan\Exhibits\Onsitehydro_Exhibit0.dwg
Last Opened: Jun 24, 2020 - 11:29am by jsaver

EXHIBIT E: DRAINAGE FACILITIES MAP

BLOOMINGTON COMMERCE CENTER SP4

IN THE COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA

DRAINAGE FACILITIES MAP



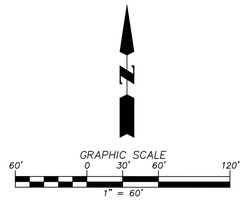


EXHIBIT "E"

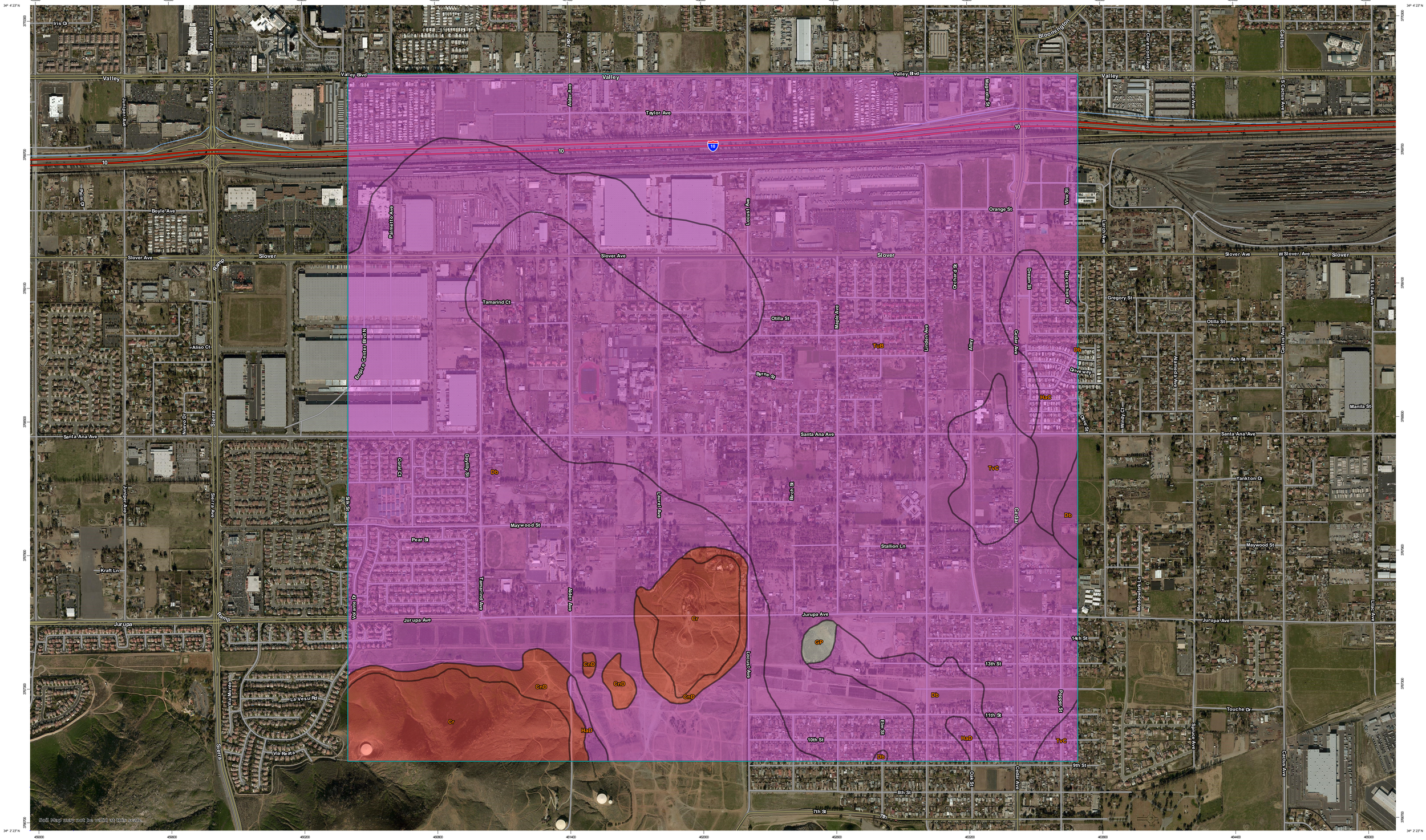
BLOOMINGTON SP4

DRAINAGE FACILITIES MAP

JLC Engineering & Consulting, Inc.
41660 IVY STREET, SUITE A
MURRIETA, CA 92562
PH. 951.304.9552 FAX 951.304.3568

Drawing Name: O:\257.08.20\Engineering\Hydrology_Plan\Exhibits\Drainage Facilities Map.dwg
Last Opened: Jun 22, 2020 11:59am by jgarner

EXHIBIT F: HYDROLOGIC SOILS MAP



Map Scale: 1:7,670 if printed on D landscape (34" x 22") sheet.

Meters: 0 100 200 400 600

Feet: 0 350 700 1400 2100

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: San Bernardino County Southwestern Part, California
Survey Area Data: Version 9, Sep 11, 2017

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

Date(s) aerial images were photographed: May 25, 2010—Jan 18, 2015

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
CnD	Cieneba sandy loam, 9 to 15 percent slopes	D	50.9	2.0%
Cr	Cieneba-Rock outcrop complex, 30 to 50 percent slopes, MLRA 20	D	135.0	5.4%
Db	Delhi fine sand	A	800.6	31.8%
GP	Quarries and Pits soils		5.7	0.2%
HaC	Hanford coarse sandy loam, 2 to 9 percent slopes	A	61.6	2.4%
HaD	Hanford coarse sandy loam, 9 to 15 percent slopes	A	10.1	0.4%
TuB	Tujunga loamy sand, 0 to 5 percent slopes	A	1,397.1	55.5%
TvC	Tujunga gravelly loamy sand, 0 to 9 percent slopes	A	55.6	2.2%
Totals for Area of Interest			**2,516.6**	**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

EXHIBIT G: RAINFALL

NOAA Atlas 14, Volume 6, Version 2
Location name: Bloomington, California, USA*
Latitude: 34.0569°, Longitude: -117.3909°
Elevation: 1031.07 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.108 (0.090–0.131)	0.140 (0.117–0.170)	0.183 (0.151–0.222)	0.218 (0.179–0.268)	0.267 (0.212–0.339)	0.306 (0.238–0.397)	0.346 (0.262–0.460)	0.388 (0.286–0.532)	0.447 (0.316–0.640)	0.495 (0.337–0.735)
10-min	0.155 (0.129–0.188)	0.201 (0.167–0.244)	0.262 (0.217–0.318)	0.312 (0.257–0.383)	0.383 (0.304–0.486)	0.438 (0.341–0.569)	0.495 (0.376–0.660)	0.556 (0.410–0.762)	0.641 (0.453–0.918)	0.710 (0.484–1.05)
15-min	0.188 (0.156–0.227)	0.243 (0.202–0.295)	0.316 (0.263–0.385)	0.378 (0.311–0.464)	0.463 (0.368–0.588)	0.530 (0.412–0.688)	0.599 (0.454–0.798)	0.673 (0.496–0.922)	0.776 (0.548–1.11)	0.859 (0.585–1.27)
30-min	0.280 (0.233–0.339)	0.362 (0.301–0.440)	0.472 (0.392–0.575)	0.563 (0.464–0.692)	0.690 (0.549–0.877)	0.790 (0.614–1.03)	0.894 (0.678–1.19)	1.00 (0.739–1.38)	1.16 (0.817–1.66)	1.28 (0.873–1.90)
60-min	0.407 (0.340–0.494)	0.528 (0.439–0.640)	0.688 (0.571–0.837)	0.821 (0.675–1.01)	1.00 (0.799–1.28)	1.15 (0.895–1.49)	1.30 (0.987–1.73)	1.46 (1.08–2.00)	1.69 (1.19–2.41)	1.87 (1.27–2.77)
2-hr	0.595 (0.496–0.721)	0.764 (0.635–0.927)	0.986 (0.818–1.20)	1.17 (0.962–1.43)	1.42 (1.13–1.80)	1.61 (1.25–2.10)	1.81 (1.38–2.42)	2.02 (1.49–2.77)	2.31 (1.63–3.31)	2.55 (1.73–3.77)
3-hr	0.740 (0.617–0.897)	0.948 (0.789–1.15)	1.22 (1.01–1.49)	1.44 (1.19–1.77)	1.75 (1.39–2.22)	1.98 (1.54–2.57)	2.22 (1.68–2.96)	2.47 (1.82–3.39)	2.81 (1.99–4.03)	3.09 (2.10–4.58)
6-hr	1.04 (0.869–1.26)	1.34 (1.11–1.62)	1.72 (1.43–2.09)	2.03 (1.67–2.49)	2.44 (1.94–3.11)	2.77 (2.15–3.59)	3.09 (2.35–4.12)	3.43 (2.53–4.70)	3.89 (2.74–5.56)	4.25 (2.89–6.30)
12-hr	1.39 (1.16–1.68)	1.79 (1.49–2.17)	2.30 (1.91–2.80)	2.72 (2.24–3.34)	3.28 (2.61–4.16)	3.70 (2.88–4.81)	4.13 (3.13–5.50)	4.57 (3.37–6.27)	5.17 (3.65–7.40)	5.63 (3.84–8.35)
24-hr	1.85 (1.64–2.14)	2.41 (2.13–2.78)	3.13 (2.76–3.62)	3.71 (3.24–4.32)	4.48 (3.80–5.40)	5.07 (4.21–6.24)	5.66 (4.59–7.14)	6.27 (4.94–8.12)	7.08 (5.36–9.55)	7.71 (5.64–10.8)
2-day	2.25 (1.99–2.60)	2.98 (2.64–3.44)	3.93 (3.47–4.55)	4.70 (4.11–5.48)	5.74 (4.86–6.92)	6.54 (5.42–8.04)	7.35 (5.95–9.25)	8.18 (6.44–10.6)	9.30 (7.04–12.5)	10.2 (7.45–14.2)
3-day	2.41 (2.13–2.78)	3.25 (2.87–3.75)	4.34 (3.82–5.01)	5.23 (4.57–6.10)	6.45 (5.46–7.77)	7.39 (6.13–9.09)	8.36 (6.77–10.5)	9.36 (7.38–12.1)	10.7 (8.12–14.5)	11.8 (8.64–16.5)
4-day	2.59 (2.29–2.99)	3.52 (3.11–4.06)	4.74 (4.18–5.49)	5.75 (5.03–6.71)	7.13 (6.04–8.59)	8.21 (6.81–10.1)	9.31 (7.55–11.7)	10.5 (8.25–13.6)	12.0 (9.12–16.2)	13.3 (9.73–18.6)
7-day	2.96 (2.62–3.42)	4.07 (3.60–4.70)	5.53 (4.88–6.40)	6.74 (5.89–7.86)	8.40 (7.11–10.1)	9.70 (8.05–11.9)	11.0 (8.95–13.9)	12.5 (9.82–16.1)	14.4 (10.9–19.4)	15.9 (11.7–22.2)
10-day	3.22 (2.85–3.71)	4.45 (3.93–5.13)	6.07 (5.35–7.03)	7.42 (6.49–8.65)	9.28 (7.86–11.2)	10.7 (8.91–13.2)	12.3 (9.93–15.4)	13.9 (10.9–17.9)	16.1 (12.2–21.7)	17.8 (13.0–24.9)
20-day	3.90 (3.45–4.50)	5.43 (4.80–6.26)	7.47 (6.59–8.65)	9.18 (8.03–10.7)	11.6 (9.78–13.9)	13.4 (11.1–16.5)	15.4 (12.5–19.4)	17.5 (13.8–22.6)	20.4 (15.4–27.5)	22.8 (16.7–31.8)
30-day	4.62 (4.09–5.32)	6.43 (5.69–7.42)	8.87 (7.82–10.3)	10.9 (9.55–12.7)	13.8 (11.7–16.6)	16.1 (13.3–19.8)	18.5 (15.0–23.3)	21.0 (16.6–27.2)	24.7 (18.7–33.3)	27.6 (20.2–38.5)
45-day	5.52 (4.89–6.36)	7.63 (6.75–8.81)	10.5 (9.25–12.1)	12.9 (11.3–15.0)	16.3 (13.8–19.6)	19.0 (15.8–23.4)	21.9 (17.7–27.6)	25.0 (19.7–32.4)	29.4 (22.3–39.7)	33.1 (24.2–46.1)
60-day	6.45 (5.71–7.44)	8.83 (7.81–10.2)	12.1 (10.6–14.0)	14.8 (12.9–17.3)	18.7 (15.8–22.5)	21.8 (18.1–26.8)	25.1 (20.4–31.7)	28.7 (22.6–37.2)	33.9 (25.7–45.7)	38.2 (27.9–53.2)

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

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

Please refer to NOAA Atlas 14 document for more information.

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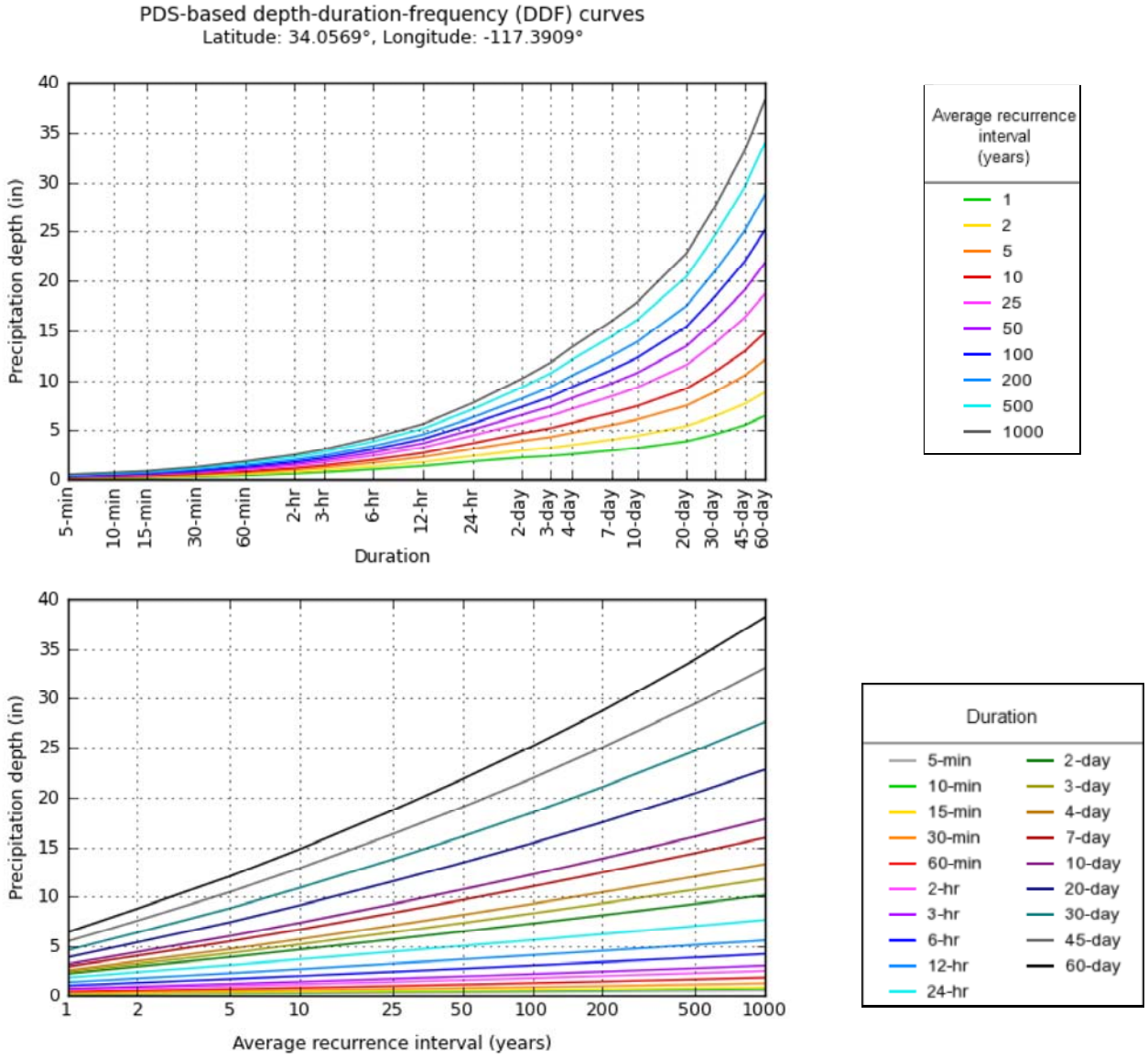
PF graphical



NOAA Atlas 14, Volume 6, Version 2 Created (GMT): Mon Feb 5 17:14:56 2018

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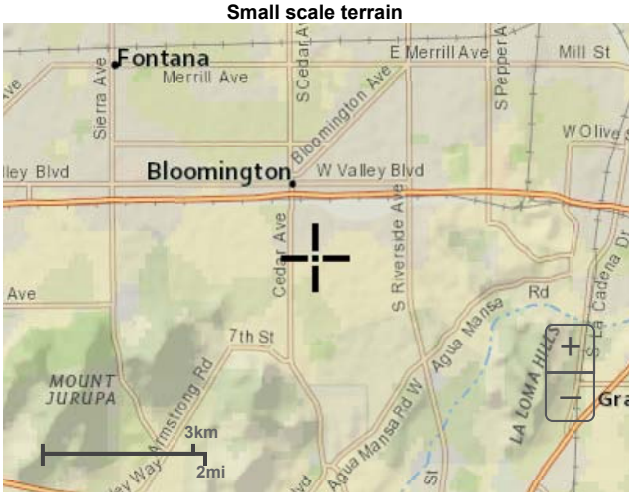
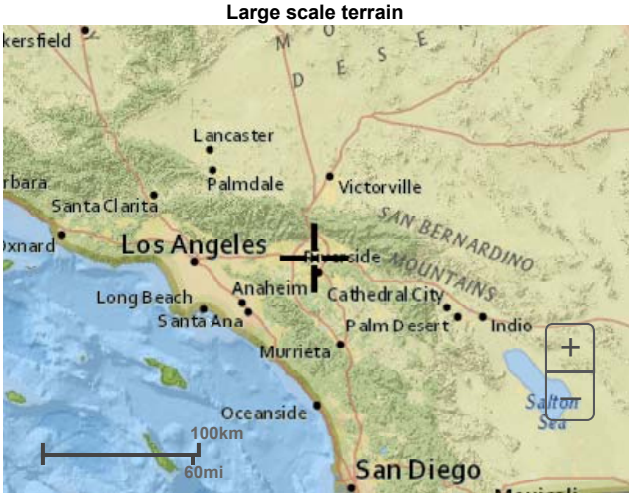
Maps & aerials

Small scale terrain



Large scale terrain



Large scale map

Large scale aerial

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