PRELIMINARY TECHNICAL DRAINAGE STUDY

KAISER PERMANENTE RIVERSIDE MEDICAL CENTER

City of Riverside, California
April 6, 2021

Prepared for:

Kaiser Permanente.
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Riverside, CA 92505
833.574-2273 ph.

Revision History	
2/24/2021	Initial City Submittal
4/6/2021	Second Submittal

CITY OF RIVERSIDE PLANNING # P19-0880
CITY OF RIVERSIDE PUBLIC WORKS # GP2021-01927

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Reason: I agree to the terms defined by the placement of my signature on this document
Date: 2021.04.06 17:06:14-07'00'

JN 174808

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I. INTRODUCTION

This drainage study for Kaiser Permanente Riverside Medical Center redevelopment. It specifically accomplishes the following:

- Determine the peak onsite 10 & 100-year runoff according to the precise grading plan.
- Define design for storm drain systems to convey the offsite and onsite flows.

1. Area Description

The project site is in the City of Riverside in the County of Riverside, California. It is located on Magnolia Ave between Park Sierra Dr and Polk Street and just north of 91 Freeway. The project site APN is 138-470-010, with current legal descriptions per Map MB 1/70. Figure 1 shows the location of this project.

2. Project Description

The proposed project will develop 15.5 acres of the existing hospital site with one (1) multi-story parking structure, multi-story patient bed tower, new D&T building, rotunda, driveways, walkways, and landscape areas. All on-site facilities will be privately maintained.

3. Surrounding Projects and Drainage Considerations

The project site is currently a Kaiser Permanente Medical Center and office along with a pharmacy. It has been a medical facility for as long back as two decades. It has moderate vegetation and it has relatively flat terrain draining from northeast to southwest to the adjacent property to the northwest. There is expected to be no offsite flow oncoming to the property as the perimeter of the worked area contains berms and measures to keep offsite flow away. There is currently storm drain network located in the site. The report was completed with a conceptual design of the project and will be updated to reflect revisions made to the grading plan or the site plan.

II. HYDROLOGIC/HYDRAULIC METHODOLOGY

The methodology presented in this study is in compliance with the RCFC&WCD 1978 Hydrology Manual (Reference 5), hereinafter referred to as the Manual).

Model Descriptions - CivilDesign hydrology program was used to generate the peak 100-year rational method onsite flows and to size all pipes and inlets. The redevelopment of the site reduced the impervious footprint of the site when compared to the current conditions. As such no onsite peak flow attenuation is needed for the 100-yr storm events.

Soil Type - The manual utilizes the Soil Conservation Service (SCS) soil classification system, which classifies soils into four (4) hydrological groups (HSG): A through D, with D being the least pervious. The soil Plates C-1.15 of the Manual showing location of project is included in Appendix A. According to this figure, this property is located within a mixture of HSG “A”, HSG “B”.

Development Type- For the proposed developed conditions the runoff was calculated considering a commercial development.

Intensity- The 10-minute / 60-minute intensity values (inches/hour) for the 10-year and 100-year storm events, obtained from Plate D-4.1 (6 of 6) of the Manual, are 1.88/2.68 and 0.70/1.00, respectively and included in the Appendix.

Drainage Areas and Flow Patterns - The drainage areas and flow patterns for existing and proposed conditions were determined using the existing topography (Cad) and the Tentative Tract Map, respectively. The areas were measured using the computer capabilities of AutoCAD.

III. HYDROLOGY/HYDRAULIC ANALYSIS

Appendix A shows the proposed onsite drainage patterns for this project. The majority of the flows will be conveyed through a storm drain system which travel through various basins to treat the runoff. Velocities in the pipes will vary from 6 fps to 9 fps and are subject to change due to the conceptual nature of the storm drain system that is subject to change. The basin outlet pipes will discharge the treated runoff into the existing storm drain systems present in Park Sierra Street and Magnolia Ave.

As mentioned earlier, the overall impervious cover for the site got reduced due to the project improvements. As such the peak flow is lower than predevelopment peak flow, thus attenuation is

not applied. Although unit hydrograph analysis was not needed to be performed because of the reduced impervious footprint, however 100-yr 1-hour unit hydrograph analysis is provided in the appendix and a summary table is shown below to prove that proposed condition flow rates will be same or less than the existing condition. Therefore, no storage facilities are required for the project for the peak flow mitigations.

Drainage ID	Drainage Area	Existing Impervious	Proposed Impervious	Existing 100-Yr 1-Hr Flow rate	Proposed 100-Yr 1-Hr Flow rate
A	3.70 ac	0.90	0.90	11.04 cfs	11.04 cfs
B	2.77 ac	0.90	0.90	8.63 cfs	8.61 cfs
C	2.95 ac	0.90	0.85	9.28 cfs	9.24 cfs
D	1.68 ac	0.90	0.85	4.92 cfs	4.89 cfs
E	4.03 ac	0.90	0.85	11.44 cfs	11.38 cfs

The water quality basins are equipped with outlet riser structures that will be sized to convey the proposed 100-yr rational flow rates calculated for their respective drainage management areas. All Hydraulic analysis for inlets, pipes will be provided in the final drainage report.

IV. CONCLUSIONS

1. Methodology used in this report is in compliance with the Riverside County Flood Control and Water Conservation District.
2. There are no anticipated negative downstream or upstream impacts.
3. The rational method flow rates for the five-drainage sub basins are listed in the table below.

Drainage ID	Drainage Area	10-Yr Flow	100-Yr Flow
A	3.70 ac	6.69 cfs	9.81 cfs
B	2.77 ac	5.18 cfs	7.56 cfs
C	2.95 ac	4.95 cfs	7.28 cfs
D	1.68 ac	3.32 cfs	4.83 cfs
E	4.03 ac	6.17 cfs	9.04 cfs

4. Bioretention basins are sized per WQMP report. All pipelines otherwise are sized to 100-year 1-hour storm event.
5. Pipe sizes were designed with CivilDesign to accommodate the peak 100-year 1-hour storm. See Appendix A for the calculations.

VI. REFERENCES

1. Riverside Flood Control District and Water Conservation District (RCFC&WCD) *Hydrology Manual*, 1978.

2. CivilDesign Engineering Software, Rational Method Model, 1989-2014, Version 9.0.

3. Riverside Flood Control District and Water Conservation District, Riverside Design Handbook or Low Impact Development, Best Management Practices, September 2011.

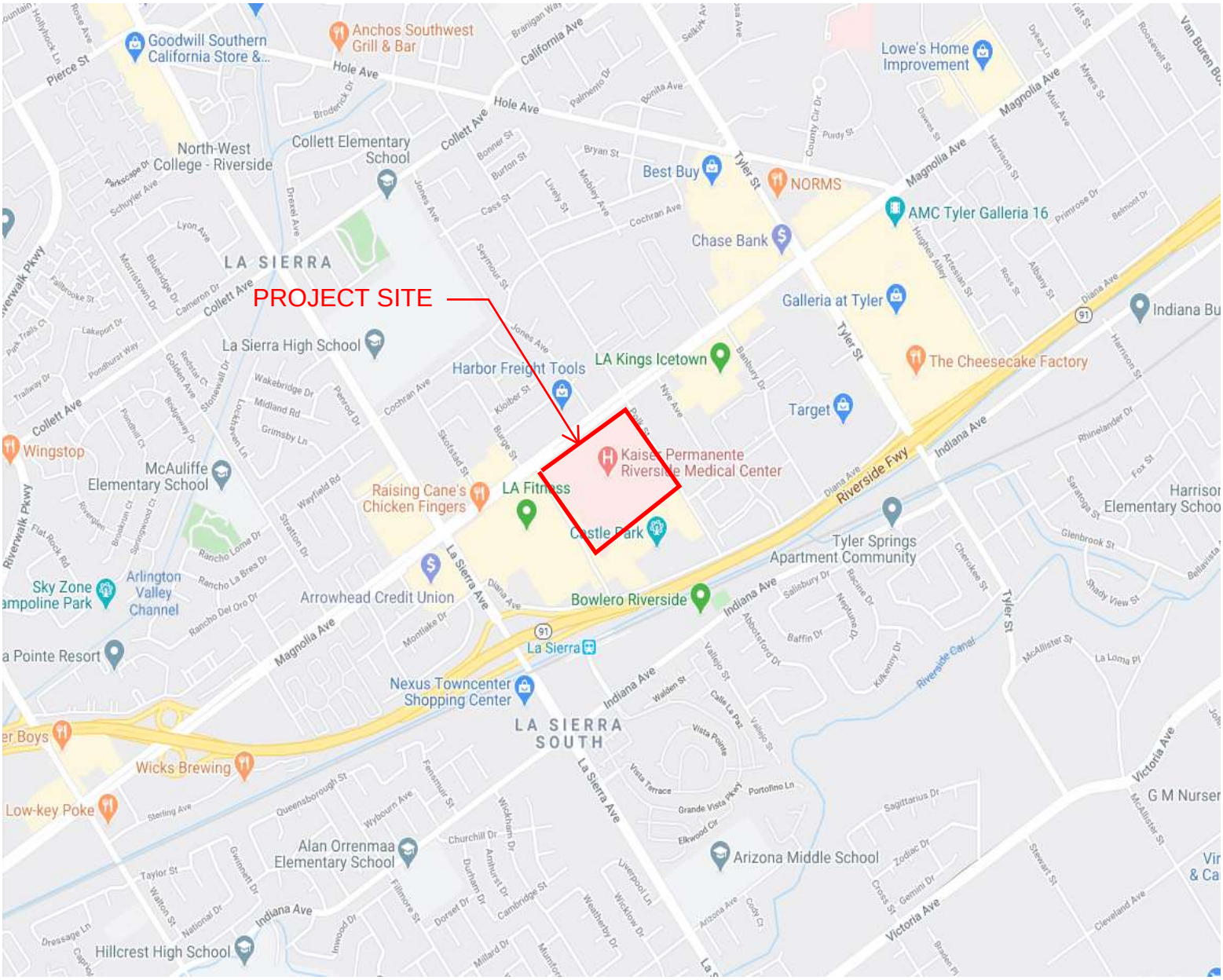


FIGURE 1

VICINITY MAP

NTS

Appendix A

Rainfall Data and Soil Map

RAINFALL INTENSITY–INCHES PER HOUR

RIVERSIDE			RIVERSIDE (FOOTHILL AREAS)			RUBIDOUX			SAN JACINTO			SUN CITY		
DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY	
	10 YEAR	100 YEAR		10 YEAR	100 YEAR		10 YEAR	100 YEAR		10 YEAR	100 YEAR		10 YEAR	100 YEAR
5	2.75	3.92	5	3.14	4.71	5	3.18	4.71	5	2.81	4.16	5	3.25	4.85
6	2.48	3.55	6	2.84	4.26	6	2.87	4.26	6	2.56	3.79	6	2.95	4.40
7	2.28	3.26	7	2.61	3.91	7	2.64	3.91	7	2.37	3.51	7	2.72	4.06
8	2.12	3.03	8	2.42	3.63	8	2.45	3.63	8	2.22	3.29	8	2.53	3.78
9	1.99	2.84	9	2.27	3.41	9	2.30	3.41	9	2.09	3.10	9	2.38	3.55
10	1.88	2.68	10	2.14	3.21	10	2.17	3.21	10	1.98	2.94	10	2.25	3.36
11	1.78	2.54	11	2.03	3.05	11	2.06	3.05	11	1.89	2.80	11	2.14	3.19
12	1.70	2.42	12	1.94	2.91	12	1.96	2.91	12	1.81	2.68	12	2.04	3.05
13	1.62	2.32	13	1.86	2.78	13	1.88	2.78	13	1.74	2.58	13	1.96	2.92
14	1.56	2.23	14	1.78	2.67	14	1.80	2.67	14	1.68	2.48	14	1.88	2.81
15	1.50	2.14	15	1.71	2.57	15	1.74	2.57	15	1.62	2.40	15	1.81	2.71
16	1.45	2.07	16	1.66	2.48	16	1.68	2.48	16	1.57	2.32	16	1.75	2.62
17	1.40	2.00	17	1.60	2.40	17	1.62	2.40	17	1.52	2.25	17	1.70	2.54
18	1.36	1.94	18	1.55	2.33	18	1.57	2.33	18	1.48	2.19	18	1.65	2.46
19	1.32	1.88	19	1.51	2.26	19	1.52	2.26	19	1.44	2.13	19	1.60	2.39
20	1.28	1.83	20	1.46	2.20	20	1.48	2.20	20	1.40	2.08	20	1.56	2.33
22	1.22	1.74	22	1.39	2.08	22	1.41	2.08	22	1.34	1.98	22	1.48	2.21
24	1.16	1.66	24	1.32	1.99	24	1.34	1.99	24	1.28	1.90	24	1.41	2.11
26	1.11	1.58	26	1.27	1.90	26	1.28	1.90	26	1.23	1.82	26	1.36	2.03
28	1.06	1.52	28	1.22	1.82	28	1.23	1.82	28	1.19	1.76	28	1.30	1.95
30	1.02	1.46	30	1.17	1.76	30	1.19	1.76	30	1.15	1.70	30	1.26	1.88
32	.99	1.41	32	1.13	1.70	32	1.14	1.70	32	1.11	1.64	32	1.21	1.81
34	.96	1.37	34	1.09	1.64	34	1.11	1.64	34	1.08	1.59	34	1.18	1.76
36	.93	1.32	36	1.06	1.59	36	1.07	1.59	36	1.05	1.55	36	1.14	1.70
38	.90	1.29	38	1.03	1.54	38	1.04	1.54	38	1.02	1.51	38	1.11	1.66
40	.87	1.25	40	1.00	1.50	40	1.01	1.50	40	.99	1.47	40	1.08	1.61
45	.82	1.17	45	.94	1.41	45	.95	1.41	45	.94	1.39	45	1.01	1.51
50	.77	1.11	50	.88	1.33	50	.90	1.33	50	.89	1.31	50	.96	1.43
55	.73	1.05	55	.84	1.26	55	.85	1.26	55	.85	1.25	55	.91	1.36
60	.70	1.00	60	.80	1.20	60	.81	1.20	60	.81	1.20	60	.87	1.30
65	.67	.96	65	.77	1.15	65	.78	1.15	65	.78	1.15	65	.83	1.25
70	.64	.92	70	.73	1.10	70	.74	1.10	70	.75	1.11	70	.80	1.20
75	.62	.88	75	.71	1.06	75	.72	1.06	75	.72	1.07	75	.77	1.15
80	.60	.85	80	.68	1.02	80	.69	1.02	80	.70	1.04	80	.75	1.12
85	.58	.83	85	.66	.99	85	.67	.99	85	.68	1.01	85	.72	1.08
SLOPE = .550			SLOPE = .550			SLOPE = .550			SLOPE = .500			SLOPE = .530		

RCFC & WCD

HYDROLOGY MANUAL

STANDARD INTENSITY–DURATION CURVES DATA

PLATE D-4.1(5 of 6)

site location 0.5"

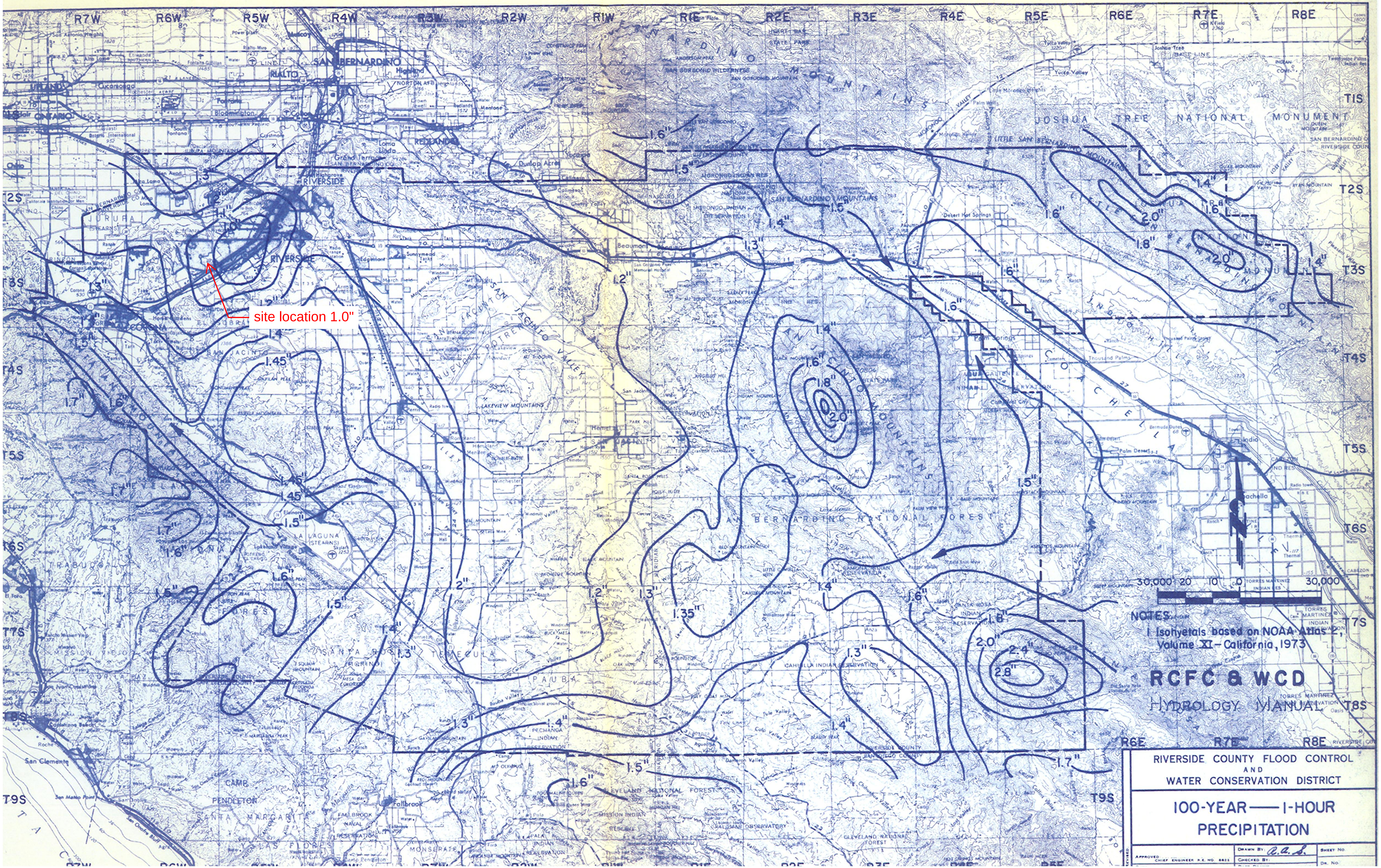
NOTES:
1. Isohyetals based on NOAA Atlas 2, Volume XI – California, 1973

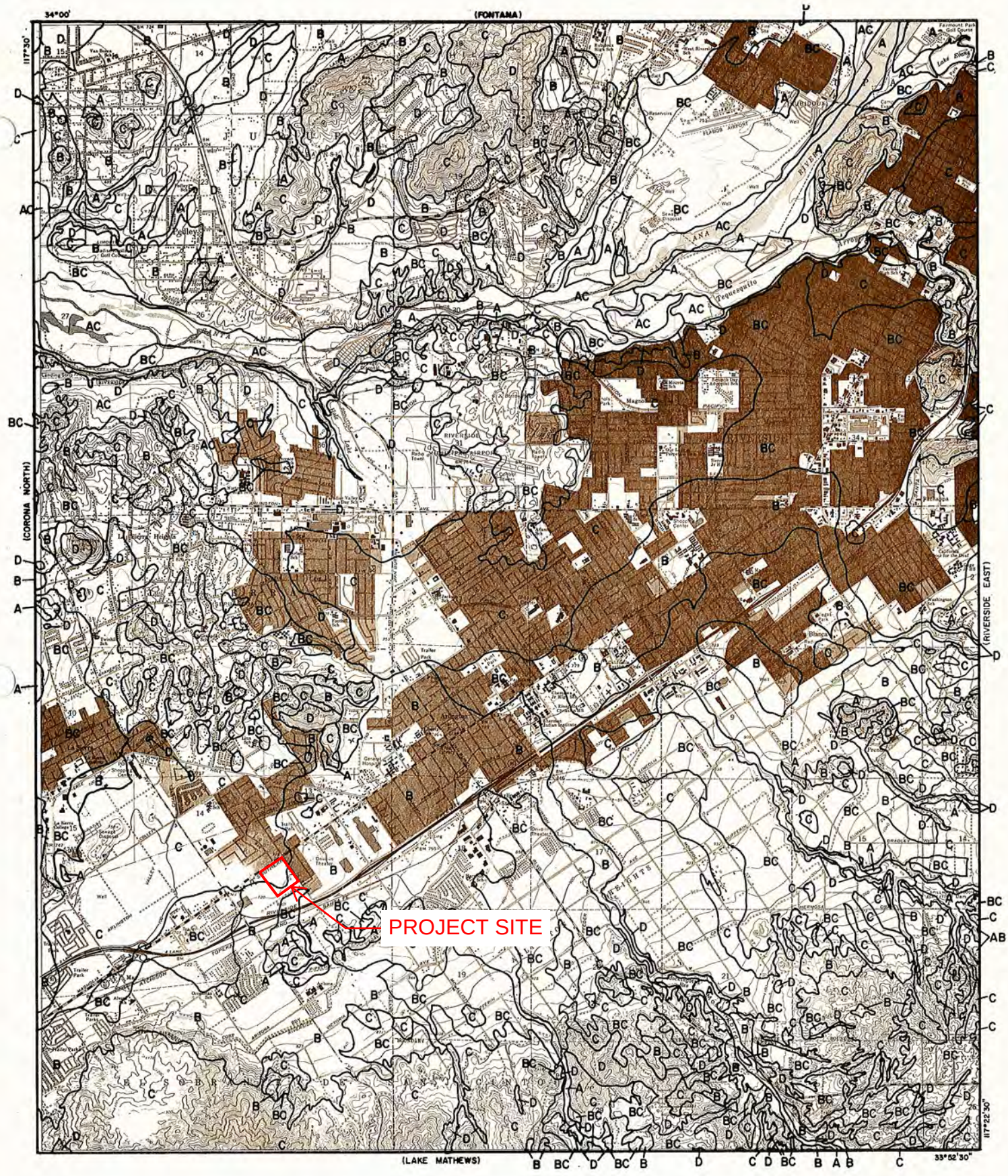
RCFC & WCD
HYDROLOGY MANUAL

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

2-YEAR — 1-HOUR PRECIPITATION

APPROVED: CHIEF ENGINEER R.E. NO. 6822	DRAWN BY: R.A.S.	SHEET NO.
DATE	CHECKED BY:	DR. NO.
	DATE DRAWN:	


site location 1.0"
NOTES
1 Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
100-YEAR — 1-HOUR
PRECIPITATION
SAN BERNARDINO
RIVERSIDE
REDLANDS
JOSHUA TREE NATIONAL MONUMENT
SAN BERNARDINO NATIONAL FOREST
CLEVELAND NATIONAL FOREST



LEGEND

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

RCFC&WCD

HYDROLOGY MANUAL

N

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HYDROLOGIC SOILS GROUP MAP FOR RIVERSIDE—WEST

PLATE C-1.15

10-yr and 100-yr Rational Method Calculations

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 04/05/21 File:PROP10YR.out

KAISER RIVERSIDE HYDROLOGY
RATIONAL METHOD ANALYSIS - PROPOSED CONDITION
10-YR DESIGN STORM, DRAINAGE SUBAREAS A, B, C, D, E
BY PRASAD KASTURI ON 4-5-2021

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

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

Program License Serial Number 6388

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

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

Standard intensity-duration curves data (Plate D-4.1)
For the [Riverside] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.700(In/Hr)
100 year storm 10 minute intensity = 2.680(In/Hr)
100 year storm 60 minute intensity = 1.000(In/Hr)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.700(In/Hr)
Slope of intensity duration curve = 0.5500

++
Process from Point/Station 10.000 to Point/Station 11.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 169.000(Ft.)
Top (of initial area) elevation = 722.500(Ft.)
Bottom (of initial area) elevation = 722.000(Ft.)
Difference in elevation = 0.500(Ft.)
Slope = 0.00296 s(percent)= 0.30
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 7.483 min.
Rainfall intensity = 2.200(In/Hr) for a 10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.871
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 56.00
Pervious area fraction = 0.100; Impervious fraction = 0.900
Initial subarea runoff = 2.241(CFS)
Total initial stream area = 1.170(Ac.)
Pervious area fraction = 0.100

++
Process from Point/Station 11.000 to Point/Station 12.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 718.120(Ft.)
Downstream point/station elevation = 717.000(Ft.)
Pipe length = 230.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 2.241(CFS)
Nearest computed pipe diameter = 12.00(In.)
Calculated individual pipe flow = 2.241(CFS)
Normal flow depth in pipe = 8.91(In.)

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Flow top width inside pipe =   10.50(In.)
Critical Depth =    7.68(In.)
Pipe flow velocity =      3.58(Ft/s)
Travel time through pipe =    1.07 min.
Time of concentration (TC) =     8.55 min.


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Process from Point/Station       12.000 to Point/Station       12.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.870
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =     8.55 min.
Rainfall intensity =      2.044(In/Hr) for a    10.0 year storm
Subarea runoff =      2.363(CFS) for      1.330(Ac.)
Total runoff =      4.605(CFS)        Total area =       2.500(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station       13.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________________________
Upstream point/station elevation =   717.000(Ft.)
Downstream point/station elevation =   716.500(Ft.)
Pipe length  =    89.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.605(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.605(CFS)
Normal flow depth in pipe =   11.68(In.)
Flow top width inside pipe =   12.45(In.)
Critical Depth =   10.44(In.)
Pipe flow velocity =      4.49(Ft/s)
Travel time through pipe =    0.33 min.
Time of concentration (TC) =     8.88 min.


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Process from Point/Station       13.000 to Point/Station       13.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.869
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =     8.88 min.
Rainfall intensity =      2.002(In/Hr) for a    10.0 year storm
Subarea runoff =      2.087(CFS) for      1.200(Ac.)
Total runoff =      6.692(CFS)        Total area =       3.700(Ac.)


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Process from Point/Station       20.000 to Point/Station       21.000
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________________
Initial area flow distance =   290.000(Ft.)
Top (of initial area) elevation =   722.000(Ft.)
Bottom (of initial area) elevation =   719.800(Ft.)
Difference in elevation =     2.200(Ft.)
Slope =    0.00759  s(percent)=       0.76
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.693 min.
Rainfall intensity =      2.166(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.871
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
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RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.395(CFS)
Total initial stream area =        1.270(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       21.000 to Point/Station       22.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   712.100(Ft.)
Downstream point/station elevation =   711.400(Ft.)
Pipe length  =    65.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.395(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.395(CFS)
Normal flow depth in pipe =    7.03(In.)
Flow top width inside pipe =   11.82(In.)
Critical Depth =    7.95(In.)
Pipe flow velocity =      5.01(Ft/s)
Travel time through pipe =    0.22 min.
Time of concentration (TC) =     7.91 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       22.000 to Point/Station       22.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.870
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =     7.91 min.
Rainfall intensity =      2.134(In/Hr) for a    10.0 year storm
Subarea runoff =      0.929(CFS) for      0.500(Ac.)
Total runoff =      3.324(CFS)        Total area =       1.770(Ac.)


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Process from Point/Station       22.000 to Point/Station       22.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.870
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =     7.91 min.
Rainfall intensity =      2.134(In/Hr) for a    10.0 year storm
Subarea runoff =      1.857(CFS) for      1.000(Ac.)
Total runoff =      5.181(CFS)        Total area =       2.770(Ac.)


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Process from Point/Station       30.000 to Point/Station       31.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   286.000(Ft.)
Top (of initial area) elevation =   724.500(Ft.)
Bottom (of initial area) elevation =   723.600(Ft.)
Difference in elevation =     0.900(Ft.)
Slope =    0.00315  s(percent)=       0.31
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.122 min.
Rainfall intensity =      1.973(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.869
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
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RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.697(CFS)
Total initial stream area =        0.990(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       31.000 to Point/Station       32.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   720.800(Ft.)
Downstream point/station elevation =   720.500(Ft.)
Pipe length  =    71.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.697(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     1.697(CFS)
Normal flow depth in pipe =    7.63(In.)
Flow top width inside pipe =   11.55(In.)
Critical Depth =    6.65(In.)
Pipe flow velocity =      3.22(Ft/s)
Travel time through pipe =    0.37 min.
Time of concentration (TC) =     9.49 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       32.000 to Point/Station       32.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.868
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =     9.49 min.
Rainfall intensity =      1.930(In/Hr) for a    10.0 year storm
Subarea runoff =      0.888(CFS) for      0.530(Ac.)
Total runoff =      2.585(CFS)        Total area =       1.520(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       32.000 to Point/Station       32.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.868
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =     9.49 min.
Rainfall intensity =      1.930(In/Hr) for a    10.0 year storm
Subarea runoff =      2.397(CFS) for      1.430(Ac.)
Total runoff =      4.982(CFS)        Total area =       2.950(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       40.000 to Point/Station       43.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   333.000(Ft.)
Top (of initial area) elevation =   724.000(Ft.)
Bottom (of initial area) elevation =   720.100(Ft.)
Difference in elevation =     3.900(Ft.)
Slope =    0.01171  s(percent)=       1.17
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.454 min.
Rainfall intensity =      2.204(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.871
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
```

```
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.362(CFS)
Total initial stream area =        1.230(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       43.000 to Point/Station       43.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      1.230(Ac.)
Runoff from this stream =      2.362(CFS)
Time of concentration =    7.45 min.
Rainfall intensity =     2.204(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       41.000 to Point/Station       42.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   182.000(Ft.)
Top (of initial area) elevation =   724.500(Ft.)
Bottom (of initial area) elevation =   722.100(Ft.)
Difference in elevation =     2.400(Ft.)
Slope =    0.01319  s(percent)=       1.32
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    5.716 min.
Rainfall intensity =      2.551(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.874
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.003(CFS)
Total initial stream area =        0.450(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       42.000 to Point/Station       43.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   717.600(Ft.)
Downstream point/station elevation =   716.600(Ft.)
Pipe length  =   210.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.003(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.003(CFS)
Normal flow depth in pipe =    6.54(In.)
Flow top width inside pipe =    8.02(In.)
Critical Depth =    5.51(In.)
Pipe flow velocity =      2.91(Ft/s)
Travel time through pipe =    1.20 min.
Time of concentration (TC) =     6.92 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       43.000 to Point/Station       43.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.450(Ac.)
Runoff from this stream =      1.003(CFS)
Time of concentration =    6.92 min.
Rainfall intensity =     2.297(In/Hr)
Summary of stream data:

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

```
1        2.362      7.45               2.204
2        1.003      6.92               2.297
Largest stream flow has longer time of concentration
Qp =      2.362 + sum of
          Qb         Ia/Ib
           1.003 *    0.960 =      0.963
Qp =      3.324

Total of 2 main streams to confluence:
Flow rates before confluence point:
       2.362       1.003
Area of streams before confluence:
        1.230        0.450


Results of confluence:
Total flow rate =      3.324(CFS)
Time of concentration =     7.454 min.
Effective stream area after confluence  =      1.680(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       50.000 to Point/Station       51.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   458.000(Ft.)
Top (of initial area) elevation =   724.000(Ft.)
Bottom (of initial area) elevation =   721.900(Ft.)
Difference in elevation =     2.100(Ft.)
Slope =    0.00459  s(percent)=       0.46
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.214 min.
Rainfall intensity =      1.854(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.868
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      0.836(CFS)
Total initial stream area =        0.520(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       51.000 to Point/Station       52.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   717.400(Ft.)
Downstream point/station elevation =   717.000(Ft.)
Pipe length  =    66.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.836(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     0.836(CFS)
Normal flow depth in pipe =    5.29(In.)
Flow top width inside pipe =    8.86(In.)
Critical Depth =    5.01(In.)
Pipe flow velocity =      3.10(Ft/s)
Travel time through pipe =    0.35 min.
Time of concentration (TC) =    10.57 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       52.000 to Point/Station       52.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.867
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    10.57 min.
Rainfall intensity =      1.819(In/Hr) for a    10.0 year storm
Subarea runoff =      0.978(CFS) for      0.620(Ac.)
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Total runoff =      1.814(CFS)        Total area =       1.140(Ac.)


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Process from Point/Station       52.000 to Point/Station       57.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   717.000(Ft.)
Downstream point/station elevation =   716.000(Ft.)
Pipe length  =   190.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.814(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     1.814(CFS)
Normal flow depth in pipe =    7.41(In.)
Flow top width inside pipe =   11.67(In.)
Critical Depth =    6.88(In.)
Pipe flow velocity =      3.56(Ft/s)
Travel time through pipe =    0.89 min.
Time of concentration (TC) =    11.46 min.


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Process from Point/Station       57.000 to Point/Station       57.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.866
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    11.46 min.
Rainfall intensity =      1.740(In/Hr) for a    10.0 year storm
Subarea runoff =      1.040(CFS) for      0.690(Ac.)
Total runoff =      2.854(CFS)        Total area =       1.830(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       57.000 to Point/Station       57.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      1.830(Ac.)
Runoff from this stream =      2.854(CFS)
Time of concentration =   11.46 min.
Rainfall intensity =     1.740(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station       53.000 to Point/Station       54.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   390.000(Ft.)
Top (of initial area) elevation =   724.500(Ft.)
Bottom (of initial area) elevation =   723.400(Ft.)
Difference in elevation =     1.100(Ft.)
Slope =    0.00282  s(percent)=       0.28
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.556 min.
Rainfall intensity =      1.820(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.867
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.010(CFS)
Total initial stream area =        0.640(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       54.000 to Point/Station       55.000
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**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 719.900(Ft.)
Downstream point/station elevation = 719.200(Ft.)
Pipe length = 129.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.010(CFS)
Nearest computed pipe diameter = 9.00(In.)
Calculated individual pipe flow = 1.010(CFS)
Normal flow depth in pipe = 6.25(In.)
Flow top width inside pipe = 8.29(In.)
Critical Depth = 5.53(In.)
Pipe flow velocity = 3.08(Ft/s)
Travel time through pipe = 0.70 min.
Time of concentration (TC) = 11.25 min.

++
Process from Point/Station 55.000 to Point/Station 55.000
**** SUBAREA FLOW ADDITION ****

COMMERCIAL subarea type
Runoff Coefficient = 0.866
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 56.00
Pervious area fraction = 0.100; Impervious fraction = 0.900
Time of concentration = 11.25 min.
Rainfall intensity = 1.757(In/Hr) for a 10.0 year storm
Subarea runoff = 0.411(CFS) for 0.270(Ac.)
Total runoff = 1.421(CFS) Total area = 0.910(Ac.)

++
Process from Point/Station 55.000 to Point/Station 56.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 719.200(Ft.)
Downstream point/station elevation = 719.000(Ft.)
Pipe length = 54.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.421(CFS)
Nearest computed pipe diameter = 12.00(In.)
Calculated individual pipe flow = 1.421(CFS)
Normal flow depth in pipe = 7.09(In.)
Flow top width inside pipe = 11.80(In.)
Critical Depth = 6.06(In.)
Pipe flow velocity = 2.95(Ft/s)
Travel time through pipe = 0.31 min.
Time of concentration (TC) = 11.56 min.

++
Process from Point/Station 56.000 to Point/Station 56.000
**** SUBAREA FLOW ADDITION ****

COMMERCIAL subarea type
Runoff Coefficient = 0.866
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 56.00
Pervious area fraction = 0.100; Impervious fraction = 0.900
Time of concentration = 11.56 min.
Rainfall intensity = 1.732(In/Hr) for a 10.0 year storm
Subarea runoff = 1.935(CFS) for 1.290(Ac.)
Total runoff = 3.356(CFS) Total area = 2.200(Ac.)

++
Process from Point/Station 56.000 to Point/Station 57.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 716.300(Ft.)
Downstream point/station elevation = 716.000(Ft.)
Pipe length = 53.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 3.356(CFS)
Nearest computed pipe diameter = 15.00(In.)

```
Calculated individual pipe flow  =     3.356(CFS)
Normal flow depth in pipe =    9.16(In.)
Flow top width inside pipe =   14.63(In.)
Critical Depth =    8.87(In.)
Pipe flow velocity =      4.27(Ft/s)
Travel time through pipe =    0.21 min.
Time of concentration (TC) =    11.77 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       57.000 to Point/Station       57.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      2.200(Ac.)
Runoff from this stream =      3.356(CFS)
Time of concentration =   11.77 min.
Rainfall intensity =     1.715(In/Hr)
Summary of stream data:

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


1        2.854     11.46               1.740
2        3.356     11.77               1.715
Largest stream flow has longer time of concentration
Qp =      3.356 + sum of
          Qb         Ia/Ib
           2.854 *    0.986 =      2.813
Qp =      6.169

Total of 2 main streams to confluence:
Flow rates before confluence point:
       2.854       3.356
Area of streams before confluence:
        1.830        2.200


Results of confluence:
Total flow rate =      6.169(CFS)
Time of concentration =    11.765 min.
Effective stream area after confluence  =      4.030(Ac.)
End of computations, total study area =           15.13 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged RI index number =  56.0
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Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 04/05/21 File:PROP100YR.out

KAISER RIVERSIDE HYDROLOGY
RATIONAL METHOD ANALYSIS - PROPOSED CONDITION
100-YR DESIGN STORM, DRAINAGE SUBAREAS A, B, C, D, E
BY PRASAD KASTURI ON 4-5-2021

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

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

Program License Serial Number 6388

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

Storm event (year) = 100.00 Antecedent Moisture Condition = 3

Standard intensity-duration curves data (Plate D-4.1)
For the [Riverside] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.700(In/Hr)
100 year storm 10 minute intensity = 2.680(In/Hr)
100 year storm 60 minute intensity = 1.000(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.000(In/Hr)
Slope of intensity duration curve = 0.5500

++
Process from Point/Station 10.000 to Point/Station 11.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 169.000(Ft.)
Top (of initial area) elevation = 722.500(Ft.)
Bottom (of initial area) elevation = 722.000(Ft.)
Difference in elevation = 0.500(Ft.)
Slope = 0.00296 s(percent)= 0.30
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 7.483 min.
Rainfall intensity = 3.142(In/Hr) for a 100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.889
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3) = 74.80
Pervious area fraction = 0.100; Impervious fraction = 0.900
Initial subarea runoff = 3.267(CFS)
Total initial stream area = 1.170(Ac.)
Pervious area fraction = 0.100

++
Process from Point/Station 11.000 to Point/Station 12.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 718.120(Ft.)
Downstream point/station elevation = 717.000(Ft.)
Pipe length = 230.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 3.267(CFS)
Nearest computed pipe diameter = 15.00(In.)
Calculated individual pipe flow = 3.267(CFS)
Normal flow depth in pipe = 9.47(In.)

```
Flow top width inside pipe =   14.47(In.)
Critical Depth =    8.73(In.)
Pipe flow velocity =      4.00(Ft/s)
Travel time through pipe =    0.96 min.
Time of concentration (TC) =     8.44 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station       12.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.888
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  74.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =     8.44 min.
Rainfall intensity =      2.941(In/Hr) for a   100.0 year storm
Subarea runoff =      3.474(CFS) for      1.330(Ac.)
Total runoff =      6.741(CFS)        Total area =       2.500(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station       13.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________________________
Upstream point/station elevation =   717.000(Ft.)
Downstream point/station elevation =   716.500(Ft.)
Pipe length  =    89.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.741(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     6.741(CFS)
Normal flow depth in pipe =   12.82(In.)
Flow top width inside pipe =   16.30(In.)
Critical Depth =   12.05(In.)
Pipe flow velocity =      5.01(Ft/s)
Travel time through pipe =    0.30 min.
Time of concentration (TC) =     8.74 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       13.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.888
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  74.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =     8.74 min.
Rainfall intensity =      2.886(In/Hr) for a   100.0 year storm
Subarea runoff =      3.075(CFS) for      1.200(Ac.)
Total runoff =      9.816(CFS)        Total area =       3.700(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       20.000 to Point/Station       21.000
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________________
Initial area flow distance =   290.000(Ft.)
Top (of initial area) elevation =   722.000(Ft.)
Bottom (of initial area) elevation =   719.800(Ft.)
Difference in elevation =     2.200(Ft.)
Slope =    0.00759  s(percent)=       0.76
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.693 min.
Rainfall intensity =      3.095(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.889
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
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```
RI index for soil(AMC 3)  =  74.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      3.493(CFS)
Total initial stream area =        1.270(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       21.000 to Point/Station       22.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   712.100(Ft.)
Downstream point/station elevation =   711.400(Ft.)
Pipe length  =    65.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.493(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     3.493(CFS)
Normal flow depth in pipe =    9.28(In.)
Flow top width inside pipe =   10.05(In.)
Critical Depth =    9.58(In.)
Pipe flow velocity =      5.35(Ft/s)
Travel time through pipe =    0.20 min.
Time of concentration (TC) =     7.89 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       22.000 to Point/Station       22.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.888
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  74.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =     7.89 min.
Rainfall intensity =      3.051(In/Hr) for a   100.0 year storm
Subarea runoff =      1.355(CFS) for      0.500(Ac.)
Total runoff =      4.848(CFS)        Total area =       1.770(Ac.)


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Process from Point/Station       22.000 to Point/Station       22.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.888
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  74.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =     7.89 min.
Rainfall intensity =      3.051(In/Hr) for a   100.0 year storm
Subarea runoff =      2.711(CFS) for      1.000(Ac.)
Total runoff =      7.559(CFS)        Total area =       2.770(Ac.)


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Process from Point/Station       30.000 to Point/Station       31.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   286.000(Ft.)
Top (of initial area) elevation =   724.500(Ft.)
Bottom (of initial area) elevation =   723.600(Ft.)
Difference in elevation =     0.900(Ft.)
Slope =    0.00315  s(percent)=       0.31
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.122 min.
Rainfall intensity =      2.818(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.888
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
```

```
RI index for soil(AMC 3)  =  74.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.476(CFS)
Total initial stream area =        0.990(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       31.000 to Point/Station       32.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   720.800(Ft.)
Downstream point/station elevation =   720.500(Ft.)
Pipe length  =    71.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.476(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     2.476(CFS)
Normal flow depth in pipe =    8.29(In.)
Flow top width inside pipe =   14.92(In.)
Critical Depth =    7.56(In.)
Pipe flow velocity =      3.56(Ft/s)
Travel time through pipe =    0.33 min.
Time of concentration (TC) =     9.45 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       32.000 to Point/Station       32.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.887
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  74.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =     9.45 min.
Rainfall intensity =      2.763(In/Hr) for a   100.0 year storm
Subarea runoff =      1.300(CFS) for      0.530(Ac.)
Total runoff =      3.776(CFS)        Total area =       1.520(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       32.000 to Point/Station       32.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.887
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  74.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =     9.45 min.
Rainfall intensity =      2.763(In/Hr) for a   100.0 year storm
Subarea runoff =      3.506(CFS) for      1.430(Ac.)
Total runoff =      7.282(CFS)        Total area =       2.950(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       40.000 to Point/Station       43.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   333.000(Ft.)
Top (of initial area) elevation =   724.000(Ft.)
Bottom (of initial area) elevation =   720.100(Ft.)
Difference in elevation =     3.900(Ft.)
Slope =    0.01171  s(percent)=       1.17
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.454 min.
Rainfall intensity =      3.149(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.889
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
```

```
RI index for soil(AMC 3)  =  74.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      3.442(CFS)
Total initial stream area =        1.230(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       43.000 to Point/Station       43.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      1.230(Ac.)
Runoff from this stream =      3.442(CFS)
Time of concentration =    7.45 min.
Rainfall intensity =     3.149(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       41.000 to Point/Station       42.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   182.000(Ft.)
Top (of initial area) elevation =   724.500(Ft.)
Bottom (of initial area) elevation =   722.100(Ft.)
Difference in elevation =     2.400(Ft.)
Slope =    0.01319  s(percent)=       1.32
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    5.716 min.
Rainfall intensity =      3.644(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.890
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  74.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.460(CFS)
Total initial stream area =        0.450(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       42.000 to Point/Station       43.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   717.600(Ft.)
Downstream point/station elevation =   716.600(Ft.)
Pipe length  =   210.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.460(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     1.460(CFS)
Normal flow depth in pipe =    6.66(In.)
Flow top width inside pipe =   11.93(In.)
Critical Depth =    6.14(In.)
Pipe flow velocity =      3.26(Ft/s)
Travel time through pipe =    1.07 min.
Time of concentration (TC) =     6.79 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       43.000 to Point/Station       43.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.450(Ac.)
Runoff from this stream =      1.460(CFS)
Time of concentration =    6.79 min.
Rainfall intensity =     3.315(In/Hr)
Summary of stream data:

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

```
1        3.442      7.45               3.149
2        1.460      6.79               3.315
Largest stream flow has longer time of concentration
Qp =      3.442 + sum of
          Qb         Ia/Ib
           1.460 *    0.950 =      1.386
Qp =      4.829

Total of 2 main streams to confluence:
Flow rates before confluence point:
       3.442       1.460
Area of streams before confluence:
        1.230        0.450


Results of confluence:
Total flow rate =      4.829(CFS)
Time of concentration =     7.454 min.
Effective stream area after confluence  =      1.680(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       50.000 to Point/Station       51.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   458.000(Ft.)
Top (of initial area) elevation =   724.000(Ft.)
Bottom (of initial area) elevation =   721.900(Ft.)
Difference in elevation =     2.100(Ft.)
Slope =    0.00459  s(percent)=       0.46
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.214 min.
Rainfall intensity =      2.648(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.887
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  74.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.221(CFS)
Total initial stream area =        0.520(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       51.000 to Point/Station       52.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   717.400(Ft.)
Downstream point/station elevation =   717.000(Ft.)
Pipe length  =    66.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.221(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.221(CFS)
Normal flow depth in pipe =    6.98(In.)
Flow top width inside pipe =    7.50(In.)
Critical Depth =    6.10(In.)
Pipe flow velocity =      3.32(Ft/s)
Travel time through pipe =    0.33 min.
Time of concentration (TC) =    10.55 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       52.000 to Point/Station       52.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.887
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  74.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    10.55 min.
Rainfall intensity =      2.602(In/Hr) for a   100.0 year storm
Subarea runoff =      1.430(CFS) for      0.620(Ac.)
```

```
Total runoff =      2.652(CFS)       Total area =       1.140(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       52.000 to Point/Station       57.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   717.000(Ft.)
Downstream point/station elevation =   716.000(Ft.)
Pipe length  =   190.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.652(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     2.652(CFS)
Normal flow depth in pipe =    8.07(In.)
Flow top width inside pipe =   14.96(In.)
Critical Depth =    7.84(In.)
Pipe flow velocity =      3.94(Ft/s)
Travel time through pipe =    0.80 min.
Time of concentration (TC) =    11.35 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       57.000 to Point/Station       57.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.886
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  74.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    11.35 min.
Rainfall intensity =      2.499(In/Hr) for a   100.0 year storm
Subarea runoff =      1.528(CFS) for      0.690(Ac.)
Total runoff =      4.180(CFS)       Total area =       1.830(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       57.000 to Point/Station       57.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      1.830(Ac.)
Runoff from this stream =      4.180(CFS)
Time of concentration =   11.35 min.
Rainfall intensity =     2.499(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       53.000 to Point/Station       54.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   390.000(Ft.)
Top (of initial area) elevation =   724.500(Ft.)
Bottom (of initial area) elevation =   723.400(Ft.)
Difference in elevation =     1.100(Ft.)
Slope =    0.00282  s(percent)=       0.28
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.556 min.
Rainfall intensity =      2.601(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.887
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  74.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.476(CFS)
Total initial stream area =        0.640(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       54.000 to Point/Station       55.000
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**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 719.900(Ft.)
Downstream point/station elevation = 719.200(Ft.)
Pipe length = 129.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.476(CFS)
Nearest computed pipe diameter = 12.00(In.)
Calculated individual pipe flow = 1.476(CFS)
Normal flow depth in pipe = 6.43(In.)
Flow top width inside pipe = 11.97(In.)
Critical Depth = 6.18(In.)
Pipe flow velocity = 3.44(Ft/s)
Travel time through pipe = 0.63 min.
Time of concentration (TC) = 11.18 min.

++
Process from Point/Station 55.000 to Point/Station 55.000
**** SUBAREA FLOW ADDITION ****

COMMERCIAL subarea type
Runoff Coefficient = 0.886
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3) = 74.80
Pervious area fraction = 0.100; Impervious fraction = 0.900
Time of concentration = 11.18 min.
Rainfall intensity = 2.520(In/Hr) for a 100.0 year storm
Subarea runoff = 0.603(CFS) for 0.270(Ac.)
Total runoff = 2.079(CFS) Total area = 0.910(Ac.)

++
Process from Point/Station 55.000 to Point/Station 56.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 719.200(Ft.)
Downstream point/station elevation = 719.000(Ft.)
Pipe length = 54.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 2.079(CFS)
Nearest computed pipe diameter = 12.00(In.)
Calculated individual pipe flow = 2.079(CFS)
Normal flow depth in pipe = 9.42(In.)
Flow top width inside pipe = 9.86(In.)
Critical Depth = 7.39(In.)
Pipe flow velocity = 3.14(Ft/s)
Travel time through pipe = 0.29 min.
Time of concentration (TC) = 11.47 min.

++
Process from Point/Station 56.000 to Point/Station 56.000
**** SUBAREA FLOW ADDITION ****

COMMERCIAL subarea type
Runoff Coefficient = 0.886
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3) = 74.80
Pervious area fraction = 0.100; Impervious fraction = 0.900
Time of concentration = 11.47 min.
Rainfall intensity = 2.485(In/Hr) for a 100.0 year storm
Subarea runoff = 2.841(CFS) for 1.290(Ac.)
Total runoff = 4.919(CFS) Total area = 2.200(Ac.)

++
Process from Point/Station 56.000 to Point/Station 57.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 716.300(Ft.)
Downstream point/station elevation = 716.000(Ft.)
Pipe length = 53.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 4.919(CFS)
Nearest computed pipe diameter = 18.00(In.)

```
Calculated individual pipe flow  =     4.919(CFS)
Normal flow depth in pipe =   10.29(In.)
Flow top width inside pipe =   17.81(In.)
Critical Depth =   10.24(In.)
Pipe flow velocity =      4.72(Ft/s)
Travel time through pipe =    0.19 min.
Time of concentration (TC) =    11.65 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       57.000 to Point/Station       57.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      2.200(Ac.)
Runoff from this stream =      4.919(CFS)
Time of concentration =   11.65 min.
Rainfall intensity =     2.463(In/Hr)
Summary of stream data:

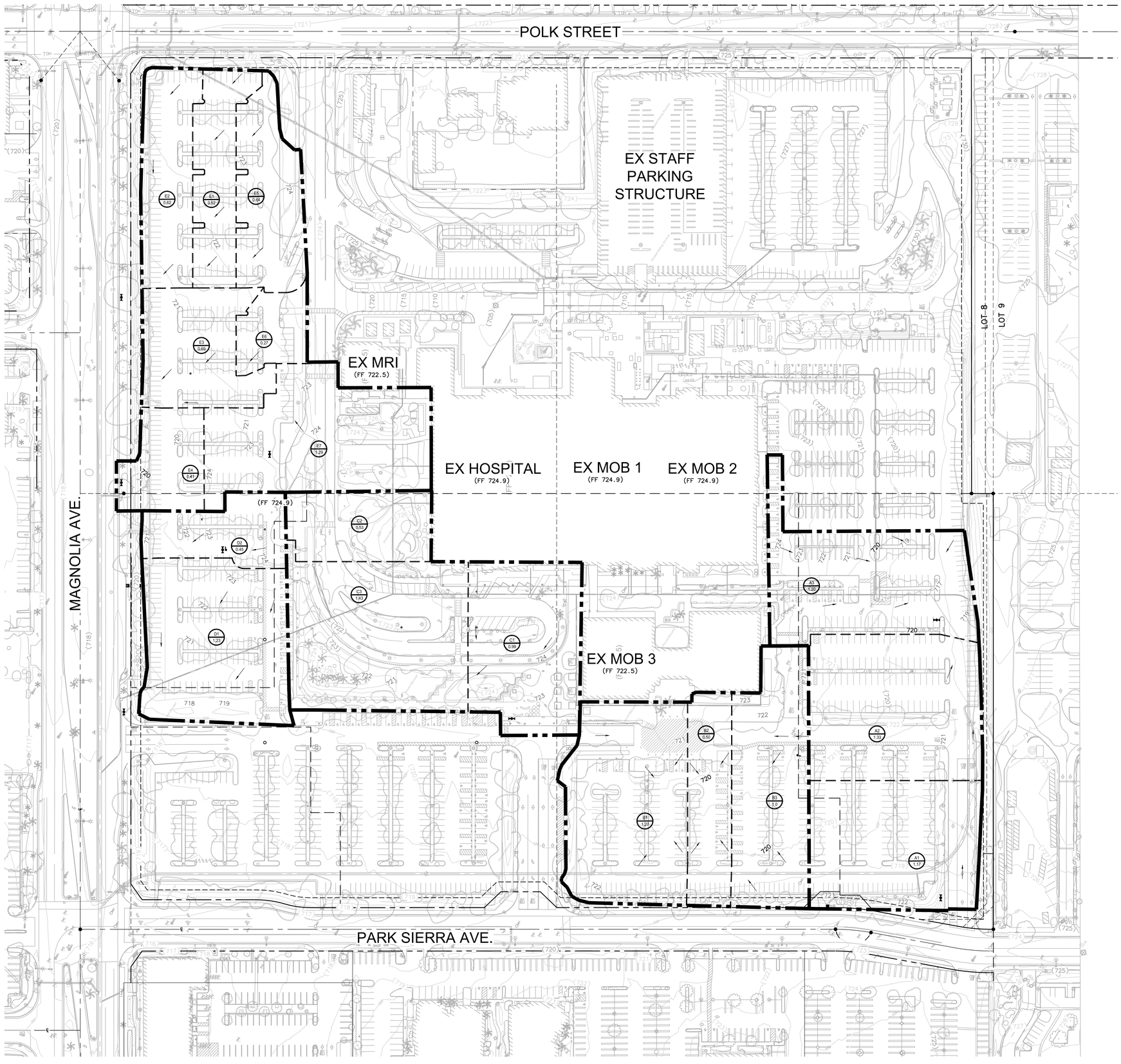
Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)

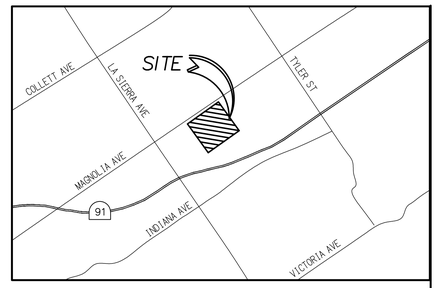

1        4.180     11.35               2.499
2        4.919     11.65               2.463
Largest stream flow has longer time of concentration
Qp =      4.919 + sum of
          Qb         Ia/Ib
           4.180 *    0.986 =      4.120
Qp =      9.039

Total of 2 main streams to confluence:
Flow rates before confluence point:
       4.180       4.919
Area of streams before confluence:
        1.830        2.200


Results of confluence:
Total flow rate =      9.039(CFS)
Time of concentration =    11.654 min.
Effective stream area after confluence  =      4.030(Ac.)
End of computations, total study area =           15.13 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged RI index number =  56.0
```





VICINITY MAP

LEGEND

C1 1.47	DRAIANGE SUBAREA NUMBER AREA IN ACRES
	DRAINAGE SUBAREA BOUNDARY
	PROJECT/DRAINAGE LIMITS

NOTE:

THE EXHIBIT IS SHOWN FOR INFORMATIONAL PURPOSES ONLY. PROPOSED DRAINAGE BOUNDARIES ARE SHOWN ON THIS EXHIBIT SINCE THE DRAINAGE PATTERNS ARE SIMILAR IN EXISTING CONDITIONS. AS EXISTING IMPERVIOUS AREA IS SLIGHTLY LESS THAN PROPOSED IMPERVIOUS AREA, NO RATIONAL METHOD Qs ARE CALCULATED. PEAK FLOWS ARE MITIGATED IN THE BASINS PROPOSED FOR EACH DMA AREA.

THE REPORT PROVIDES UNIT HYDROGRAPH CALCULATIONS FOR THE FIVE DMA AREAS FOR EXISTING AND PROPOSED CONDITION. THE RESULTS SHOW THAT THE PROJECT DOES NOT INCREASE PEAK FLOWS IN THE PROPOSED CONDITION.

SCALE 1"=60'

60 30 0 60 120 180

SCALE: 1"=60'

CO ARCHITECTS

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OSHPD PROJECT #XXXXXXX-XX-XX
OSHPD FACILITY #XXXXX

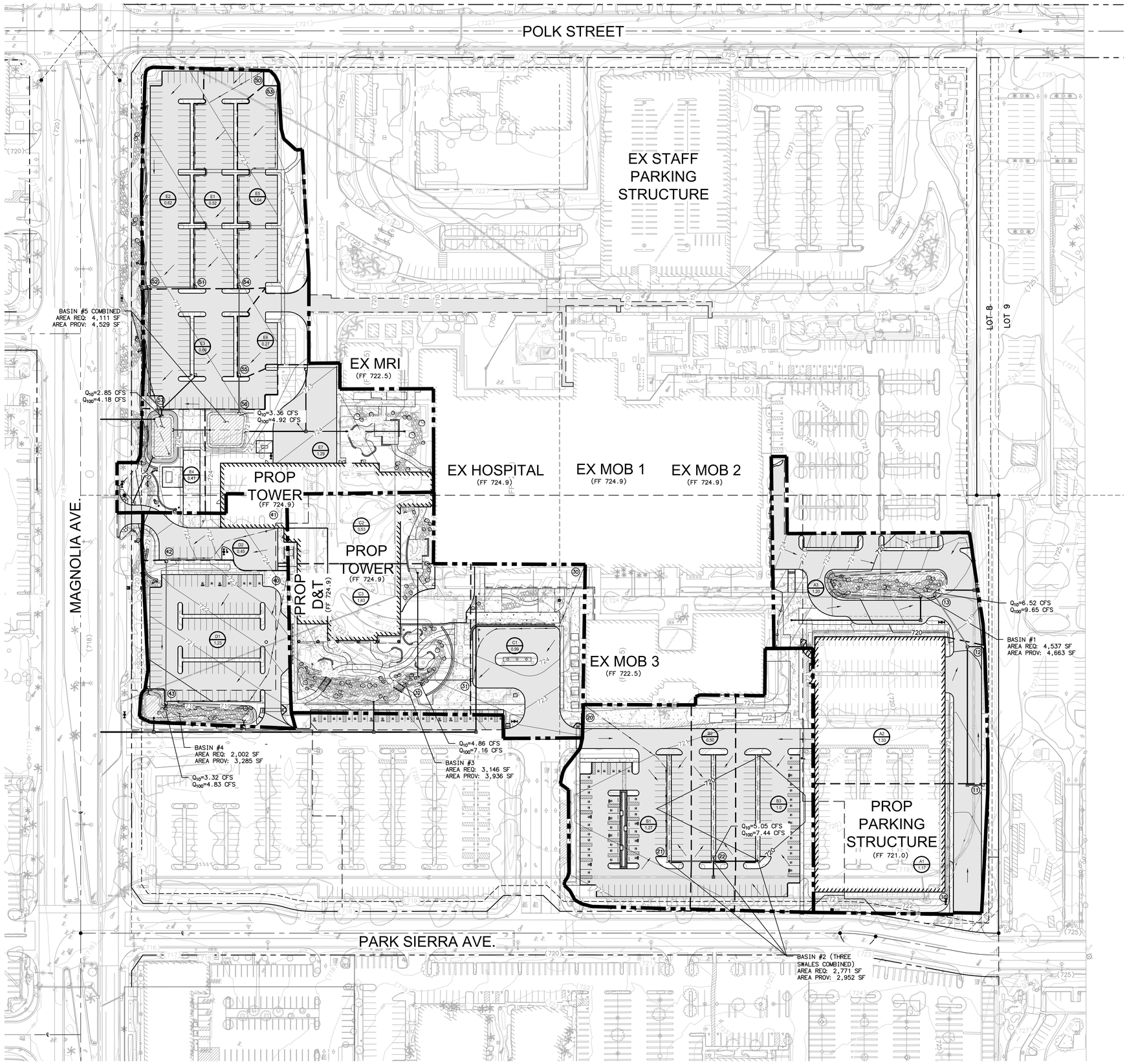
KEY PLAN

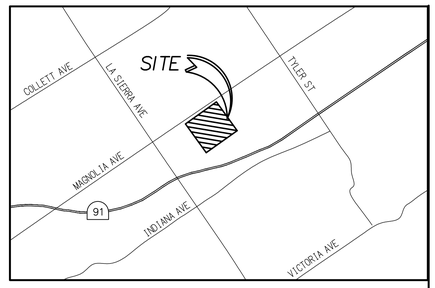
N

EXISTING CONDITION HYDROLOGY MAP

SCALE:
DATE OF ISSUE: MARCH 06, 2020

CO PROJECT NO.: 18030.000





VICINITY MAP

LEGEND

- C1 / 1.47 — DRAIANGE SUBAREA NUMBER / AREA IN ACRES
- DRAINAGE SUBAREA BOUNDARY
- PROJECT/DRAINAGE LIMITS
- BIORETENTION BASIN

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RIVERSIDE, CALIFORNIA 92505

OSHPD PROJECT #XXXXXX-XX-XX
OSHPD FACILITY #XXXXX

KEY PLAN

N

SCALE 1"=60'

60 30 0 60 120 180
SCALE: 1"=60'

PROPOSED CONDITION HYDROLOGY MAP

SCALE:
DATE OF ISSUE: MARCH 06, 2020

CO PROJECT NO.: 18030.000

100-yr 1-hr Unit Hydrograph Calculations

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

Study date 04/05/21 File: UHEXA1001100.out

++

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

Program License Serial Number 6388

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

English Units used in output format

KAISER RIVERSIDE PROJECT
UNIT HYDROGRAPH ANALYSIS - EXISTING CONDITION
100-YR 1-HOUR STORM, DMA AREA A
BY PRASAD KASTURI ON 4-5-20201

Drainage Area = 3.70(Ac.) = 0.006 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 3.70(Ac.) = 0.006 Sq. Mi.
Length along longest watercourse = 471.00(Ft.)
Length along longest watercourse measured to centroid = 271.00(Ft.)
Length along longest watercourse = 0.089 Mi.
Length along longest watercourse measured to centroid = 0.051 Mi.
Difference in elevation = 6.00(Ft.)
Slope along watercourse = 67.2611 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.021 Hr.
Lag time = 1.25 Min.
25% of lag time = 0.31 Min.
40% of lag time = 0.50 Min.
Unit time = 5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
3.70	0.50	1.85

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
3.70	1.00	3.70

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 0.500(In)
Area Averaged 100-Year Rainfall = 1.000(In)

Point rain (area averaged) = 1.000(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 1.000(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
3.700	56.00	0.900

Total Area Entered = 3.70(Ac.)

RI AMC2	RI AMC-3	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
56.0	74.8	0.305	0.900	0.058	1.000	0.058
					Sum (F) =	0.058

Area averaged mean soil loss (F) (In/Hr) = 0.058
Minimum soil loss rate ((In/Hr)) = 0.029

(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.180

Slope of intensity-duration curve for a 1 hour storm =0.5500

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %		Unit Hydrograph (CFS)
1	0.083	398.765	65.000		2.424
2	0.167	797.530	32.238		1.202
3	0.250	1196.295	2.762		0.103
			Sum = 100.000	Sum=	3.729

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

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max		Low	Effective (In/Hr)
1	0.08	3.30	0.396	0.058	(	0.071)	0.338
2	0.17	4.20	0.504	0.058	(	0.091)	0.446
3	0.25	4.40	0.528	0.058	(	0.095)	0.470
4	0.33	4.80	0.576	0.058	(	0.104)	0.518
5	0.42	5.20	0.624	0.058	(	0.112)	0.566
6	0.50	6.20	0.744	0.058	(	0.134)	0.686
7	0.58	6.80	0.816	0.058	(	0.147)	0.758
8	0.67	8.80	1.056	0.058	(	0.190)	0.998
9	0.75	13.90	1.668	0.058	(	0.300)	1.610
10	0.83	31.40	3.768	0.058	(	0.678)	3.710
11	0.92	7.20	0.864	0.058	(	0.156)	0.806
12	1.00	3.80	0.456	0.058	(	0.082)	0.398
		(Loss Rate Not Used)					
Sum =		100.0				Sum =	11.3

Flood volume = Effective rainfall 0.94(In)
times area 3.7(Ac.)/[(In)/(Ft.)] = 0.3(Ac.Ft)
Total soil loss = 0.06(In)
Total soil loss = 0.018(Ac.Ft)
Total rainfall = 1.00(In)
Flood volume = 12651.3 Cubic Feet
Total soil loss = 779.2 Cubic Feet

Peak flow rate of this hydrograph = 11.036(CFS)

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1 - 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	0.0056	0.82	VQ	|	|	|	|
0+10	0.0159	1.49	| Q	|	|	|	|
0+15	0.0277	1.71	| Q	|	|	|	|
0+20	0.0405	1.87	| Q V	|	|	|	|
0+25	0.0546	2.04	| Q V	|	|	|	|
0+30	0.0711	2.40	| Q V|	|	|	|	|
0+35	0.0899	2.72	| Q | V	|	|	|	|
0+40	0.1133	3.40	| Q | V	|	|	|	|
0+45	0.1490	5.18	| Q V	|	|	|	|
0+50	0.2250	11.04	| | | Q V	|	|	|	|
0+55	0.2703	6.58	| | Q |	|	|	| V |	|
1+ 0	0.2863	2.32	| Q |	|	|	| V|	|
1+ 5	0.2902	0.56	|Q |	|	|	| V|	|
1+10	0.2904	0.04	Q |	|	|	| V	|

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

Study date 04/05/21 File: UHEXB1001100.out

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

Program License Serial Number 6388

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

English Units used in output format

KAISER RIVERSIDE PROJECT
UNIT HYDROGRAPH ANALYSIS - EXISTING CONDITION
100-YR 1-HOUR STORM, DMA AREA B
BY PRASAD KASTURI ON 4-5-20201

Drainage Area = 2.77(Ac.) = 0.004 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 2.77(Ac.) = 0.004 Sq. Mi.
Length along longest watercourse = 289.00(Ft.)
Length along longest watercourse measured to centroid = 168.00(Ft.)
Length along longest watercourse = 0.055 Mi.
Length along longest watercourse measured to centroid = 0.032 Mi.
Difference in elevation = 1.50(Ft.)
Slope along watercourse = 27.4048 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.017 Hr.
Lag time = 1.03 Min.
25% of lag time = 0.26 Min.
40% of lag time = 0.41 Min.
Unit time = 5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
2.77	0.50	1.39

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
2.77	1.00	2.77

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 0.500(In)
Area Averaged 100-Year Rainfall = 1.000(In)

Point rain (area averaged) = 1.000(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 1.000(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
2.770	56.00	0.900

Total Area Entered = 2.77(Ac.)

RI AMC2	RI AMC-3	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
56.0	74.8	0.305	0.900	0.058	1.000	0.058
					Sum (F) =	0.058

Area averaged mean soil loss (F) (In/Hr) = 0.058
Minimum soil loss rate ((In/Hr)) = 0.029

(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.180

Slope of intensity-duration curve for a 1 hour storm =0.5500

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	485.452	70.184	1.959
2	0.167	970.905	29.816	0.832
			Sum = 100.000 Sum=	2.792

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

Unit Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	3.30	0.396	0.058	(0.071) 0.338
2	0.17	4.20	0.504	0.058	(0.091) 0.446
3	0.25	4.40	0.528	0.058	(0.095) 0.470
4	0.33	4.80	0.576	0.058	(0.104) 0.518
5	0.42	5.20	0.624	0.058	(0.112) 0.566
6	0.50	6.20	0.744	0.058	(0.134) 0.686
7	0.58	6.80	0.816	0.058	(0.147) 0.758
8	0.67	8.80	1.056	0.058	(0.190) 0.998
9	0.75	13.90	1.668	0.058	(0.300) 1.610
10	0.83	31.40	3.768	0.058	(0.678) 3.710
11	0.92	7.20	0.864	0.058	(0.156) 0.806
12	1.00	3.80	0.456	0.058	(0.082) 0.398
		(Loss Rate Not Used)			
Sum =		100.0			Sum = 11.3

Flood volume = Effective rainfall 0.94(In)
times area 2.8(Ac.)/[(In)/(Ft.)] = 0.2(Ac.Ft)
Total soil loss = 0.06(In)
Total soil loss = 0.013(Ac.Ft)
Total rainfall = 1.00(In)
Flood volume = 9471.5 Cubic Feet
Total soil loss = 583.4 Cubic Feet

Peak flow rate of this hydrograph = 8.613(CFS)

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1 - 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	0.0046	0.66	V Q
0+10	0.0125	1.16	V Q
0+15	0.0214	1.29	V Q
0+20	0.0311	1.41	Q
0+25	0.0417	1.54	QV
0+30	0.0542	1.82	Q V
0+35	0.0684	2.06	Q V
0+40	0.0862	2.59	Q V
0+45	0.1137	3.99	Q V
0+50	0.1730	8.61	V Q
0+55	0.2052	4.67	Q V
1+ 0	0.2152	1.45	Q V
1+ 5	0.2174	0.33	Q V

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

Study date 04/05/21 File: UHEXC1001100.out

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

Program License Serial Number 6388

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

English Units used in output format

KAISER RIVERSIDE PROJECT
UNIT HYDROGRAPH ANALYSIS - EXISTING CONDITION
100-YR 1-HOUR STORM, DMA AREA C
BY PRASAD KASTURI ON 4-5-20201

Drainage Area = 2.95(Ac.) = 0.005 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 2.95(Ac.) = 0.005 Sq. Mi.
Length along longest watercourse = 286.00(Ft.)
Length along longest watercourse measured to centroid = 142.00(Ft.)
Length along longest watercourse = 0.054 Mi.
Length along longest watercourse measured to centroid = 0.027 Mi.
Difference in elevation = 1.50(Ft.)
Slope along watercourse = 27.6923 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.016 Hr.
Lag time = 0.96 Min.
25% of lag time = 0.24 Min.
40% of lag time = 0.38 Min.
Unit time = 5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
2.95	0.50	1.48

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
2.95	1.00	2.95

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 0.500(In)
Area Averaged 100-Year Rainfall = 1.000(In)

Point rain (area averaged) = 1.000(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 1.000(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
2.950	56.00	0.900

Total Area Entered = 2.95(Ac.)

RI AMC2	RI AMC-3	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
56.0	74.8	0.305	0.900	0.058	1.000	0.058
					Sum (F) =	0.058

Area averaged mean soil loss (F) (In/Hr) = 0.058
Minimum soil loss rate ((In/Hr)) = 0.029

(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.180

Slope of intensity-duration curve for a 1 hour storm =0.5500

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	520.568	71.915	2.138
2	0.167	1041.136	28.085	0.835
			Sum = 100.000 Sum=	2.973

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

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	3.30	0.396	0.058	(0.071)	0.338
2	0.17	4.20	0.504	0.058	(0.091)	0.446
3	0.25	4.40	0.528	0.058	(0.095)	0.470
4	0.33	4.80	0.576	0.058	(0.104)	0.518
5	0.42	5.20	0.624	0.058	(0.112)	0.566
6	0.50	6.20	0.744	0.058	(0.134)	0.686
7	0.58	6.80	0.816	0.058	(0.147)	0.758
8	0.67	8.80	1.056	0.058	(0.190)	0.998
9	0.75	13.90	1.668	0.058	(0.300)	1.610
10	0.83	31.40	3.768	0.058	(0.678)	3.710
11	0.92	7.20	0.864	0.058	(0.156)	0.806
12	1.00	3.80	0.456	0.058	(0.082)	0.398
		(Loss Rate Not Used)				
Sum =		100.0			Sum =	11.3

Flood volume = Effective rainfall 0.94(In)
times area 3.0(Ac.)/[(In)/(Ft.)] = 0.2(Ac.Ft)
Total soil loss = 0.06(In)
Total soil loss = 0.014(Ac.Ft)
Total rainfall = 1.00(In)
Flood volume = 10086.9 Cubic Feet
Total soil loss = 621.3 Cubic Feet

Peak flow rate of this hydrograph = 9.281(CFS)

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1 - 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	0.0050	0.72	V Q				
0+10	0.0135	1.24	| V Q				
0+15	0.0230	1.38	| V Q				
0+20	0.0333	1.50	| VQ				
0+25	0.0446	1.64	| QV				
0+30	0.0580	1.94	| Q V				
0+35	0.0731	2.19	| Q | V				
0+40	0.0922	2.77	| |Q V				
0+45	0.1216	4.28	| | Q |V				
0+50	0.1856	9.28	| | |			V Q	
0+55	0.2188	4.82	| | Q|			V |	
1+ 0	0.2293	1.52	| Q |			V|	
1+ 5	0.2316	0.33	|Q |			V	

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

Study date 04/05/21 File: UHEXD1001100.out

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

Program License Serial Number 6388

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

English Units used in output format

KAISER RIVERSIDE PROJECT
UNIT HYDROGRAPH ANALYSIS - EXISTING CONDITION
100-YR 1-HOUR STORM, DMA AREA D
BY PRASAD KASTURI ON 4-5-20201

Drainage Area = 1.68(Ac.) = 0.003 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 1.68(Ac.) = 0.003 Sq. Mi.
Length along longest watercourse = 332.00(Ft.)
Length along longest watercourse measured to centroid = 287.00(Ft.)
Length along longest watercourse = 0.063 Mi.
Length along longest watercourse measured to centroid = 0.054 Mi.
Difference in elevation = 1.50(Ft.)
Slope along watercourse = 23.8554 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.023 Hr.
Lag time = 1.37 Min.
25% of lag time = 0.34 Min.
40% of lag time = 0.55 Min.
Unit time = 5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
1.68	0.50	0.84

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
1.68	1.00	1.68

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 0.500(In)
Area Averaged 100-Year Rainfall = 1.000(In)

Point rain (area averaged) = 1.000(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 1.000(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
1.680	56.00	0.900

Total Area Entered = 1.68(Ac.)

RI AMC2	RI AMC-3	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
56.0	74.8	0.305	0.900	0.058	1.000	0.058
					Sum (F) =	0.058

Area averaged mean soil loss (F) (In/Hr) = 0.058
Minimum soil loss rate ((In/Hr)) = 0.029

(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.180

Slope of intensity-duration curve for a 1 hour storm =0.5500

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %		Unit Hydrograph (CFS)
1	0.083	365.959	62.586		1.060
2	0.167	731.917	33.743		0.571
3	0.250	1097.876	3.671		0.062
			Sum = 100.000	Sum=	1.693

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

Unit Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	3.30	0.396	0.058	(0.071)	0.338
2	0.17	4.20	0.504	0.058	(0.091)	0.446
3	0.25	4.40	0.528	0.058	(0.095)	0.470
4	0.33	4.80	0.576	0.058	(0.104)	0.518
5	0.42	5.20	0.624	0.058	(0.112)	0.566
6	0.50	6.20	0.744	0.058	(0.134)	0.686
7	0.58	6.80	0.816	0.058	(0.147)	0.758
8	0.67	8.80	1.056	0.058	(0.190)	0.998
9	0.75	13.90	1.668	0.058	(0.300)	1.610
10	0.83	31.40	3.768	0.058	(0.678)	3.710
11	0.92	7.20	0.864	0.058	(0.156)	0.806
12	1.00	3.80	0.456	0.058	(0.082)	0.398
		(Loss Rate Not Used)			
Sum =		100.0			Sum = 11.3

Flood volume = Effective rainfall 0.94(In)
times area 1.7(Ac.)/[(In)/(Ft.)] = 0.1(Ac.Ft)
Total soil loss = 0.06(In)
Total soil loss = 0.008(Ac.Ft)
Total rainfall = 1.00(In)
Flood volume = 5744.5 Cubic Feet
Total soil loss = 353.8 Cubic Feet

Peak flow rate of this hydrograph = 4.916(CFS)

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1 - 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	0.0025	0.36	VQ				
0+10	0.0071	0.67	| Q				
0+15	0.0124	0.77	| Q				
0+20	0.0182	0.85	| Q V				
0+25	0.0246	0.93	| Q V				
0+30	0.0320	1.08	| Q V|				
0+35	0.0405	1.23	| Q | V				
0+40	0.0511	1.53	| Q | V				
0+45	0.0671	2.32	| Q| V				
0+50	0.1009	4.92	| | Q| V				
0+55	0.1221	3.08	| | Q | | V |
1+ 0	0.1298	1.11	| Q | | | V|
1+ 5	0.1317	0.28	|Q | | | V|
1+10	0.1319	0.02	Q | | | V|

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

Study date 04/05/21 File: UHEXE1001100.out

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

Program License Serial Number 6388

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

English Units used in output format

KAISER RIVERSIDE PROJECT
UNIT HYDROGRAPH ANALYSIS - EXISTING CONDITION
100-YR 1-HOUR STORM, DMA AREA E
BY PRASAD KASTURI ON 4-5-20201

Drainage Area = 4.03(Ac.) = 0.006 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 4.03(Ac.) = 0.006 Sq. Mi.
Length along longest watercourse = 657.00(Ft.)
Length along longest watercourse measured to centroid = 235.00(Ft.)
Length along longest watercourse = 0.124 Mi.
Length along longest watercourse measured to centroid = 0.045 Mi.
Difference in elevation = 4.00(Ft.)
Slope along watercourse = 32.1461 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.026 Hr.
Lag time = 1.55 Min.
25% of lag time = 0.39 Min.
40% of lag time = 0.62 Min.
Unit time = 5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
4.03	0.50	2.02

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
4.03	1.00	4.03

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 0.500(In)
Area Averaged 100-Year Rainfall = 1.000(In)

Point rain (area averaged) = 1.000(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 1.000(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
4.030	56.00	0.900

Total Area Entered = 4.03(Ac.)

RI AMC2	RI AMC-3	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
56.0	74.8	0.305	0.900	0.058	1.000	0.058
					Sum (F) =	0.058

Area averaged mean soil loss (F) (In/Hr) = 0.058
Minimum soil loss rate ((In/Hr)) = 0.029

(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.180

Slope of intensity-duration curve for a 1 hour storm =0.5500

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	322.398	58.868	2.391
2	0.167	644.795	35.930	1.459
3	0.250	967.193	5.202	0.211
			Sum = 100.000 Sum=	4.061

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

Unit Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	3.30	0.396	0.058	(0.071)	0.338
2	0.17	4.20	0.504	0.058	(0.091)	0.446
3	0.25	4.40	0.528	0.058	(0.095)	0.470
4	0.33	4.80	0.576	0.058	(0.104)	0.518
5	0.42	5.20	0.624	0.058	(0.112)	0.566
6	0.50	6.20	0.744	0.058	(0.134)	0.686
7	0.58	6.80	0.816	0.058	(0.147)	0.758
8	0.67	8.80	1.056	0.058	(0.190)	0.998
9	0.75	13.90	1.668	0.058	(0.300)	1.610
10	0.83	31.40	3.768	0.058	(0.678)	3.710
11	0.92	7.20	0.864	0.058	(0.156)	0.806
12	1.00	3.80	0.456	0.058	(0.082)	0.398
		(Loss Rate Not Used)			
Sum =		100.0			Sum = 11.3

Flood volume = Effective rainfall 0.94(In)
times area 4.0(Ac.)/[(In)/(Ft.)] = 0.3(Ac.Ft)
Total soil loss = 0.06(In)
Total soil loss = 0.019(Ac.Ft)
Total rainfall = 1.00(In)
Flood volume = 13779.6 Cubic Feet
Total soil loss = 848.7 Cubic Feet

Peak flow rate of this hydrograph = 11.436(CFS)

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1 - 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	0.0056	0.81	VQ				
0+10	0.0163	1.56	| VQ				
0+15	0.0290	1.85	| Q				
0+20	0.0429	2.02	| QV				
0+25	0.0582	2.21	| Q V				
0+30	0.0759	2.58	| Q V|				
0+35	0.0961	2.93	| Q | V				
0+40	0.1212	3.64	| Q | V				
0+45	0.1588	5.47	| Q V				
0+50	0.2376	11.44	| | | Q V				
0+55	0.2905	7.68	| | Q | | V |				
1+ 0	0.3106	2.91	| Q | | V|				
1+ 5	0.3158	0.75	|Q | | | V|				
1+10	0.3163	0.08	Q | | | V				

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

Study date 04/05/21 File: UHPROP1001100.out

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

Program License Serial Number 6388

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

English Units used in output format

KAISER RIVERSIDE PROJECT
UNIT HYDROGRAPH ANALYSIS - PROPOSED CONDITION
100-YR 1-HOUR STORM, DMA AREA A
BY PRASAD KASTURI ON 4-5-20201

Drainage Area = 3.70(Ac.) = 0.006 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 3.70(Ac.) = 0.006 Sq. Mi.
Length along longest watercourse = 471.00(Ft.)
Length along longest watercourse measured to centroid = 271.00(Ft.)
Length along longest watercourse = 0.089 Mi.
Length along longest watercourse measured to centroid = 0.051 Mi.
Difference in elevation = 6.00(Ft.)
Slope along watercourse = 67.2611 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.021 Hr.
Lag time = 1.25 Min.
25% of lag time = 0.31 Min.
40% of lag time = 0.50 Min.
Unit time = 5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
3.70	0.50	1.85

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
3.70	1.00	3.70

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 0.500(In)
Area Averaged 100-Year Rainfall = 1.000(In)

Point rain (area averaged) = 1.000(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 1.000(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
3.700	56.00	0.900

Total Area Entered = 3.70(Ac.)

RI AMC2	RI AMC-3	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
56.0	74.8	0.305	0.900	0.058	1.000	0.058
					Sum (F) =	0.058

Area averaged mean soil loss (F) (In/Hr) = 0.058
Minimum soil loss rate ((In/Hr)) = 0.029

(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.180

Slope of intensity-duration curve for a 1 hour storm =0.5500

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %		Unit Hydrograph (CFS)
1	0.083	398.765	65.000		2.424
2	0.167	797.530	32.238		1.202
3	0.250	1196.295	2.762		0.103
			Sum = 100.000	Sum=	3.729

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

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max		Low	Effective (In/Hr)
1	0.08	3.30	0.396	0.058	(	0.071)	0.338
2	0.17	4.20	0.504	0.058	(	0.091)	0.446
3	0.25	4.40	0.528	0.058	(	0.095)	0.470
4	0.33	4.80	0.576	0.058	(	0.104)	0.518
5	0.42	5.20	0.624	0.058	(	0.112)	0.566
6	0.50	6.20	0.744	0.058	(	0.134)	0.686
7	0.58	6.80	0.816	0.058	(	0.147)	0.758
8	0.67	8.80	1.056	0.058	(	0.190)	0.998
9	0.75	13.90	1.668	0.058	(	0.300)	1.610
10	0.83	31.40	3.768	0.058	(	0.678)	3.710
11	0.92	7.20	0.864	0.058	(	0.156)	0.806
12	1.00	3.80	0.456	0.058	(	0.082)	0.398
		(Loss Rate Not Used)					
Sum =		100.0				Sum =	11.3

Flood volume = Effective rainfall 0.94(In)
times area 3.7(Ac.)/[(In)/(Ft.)] = 0.3(Ac.Ft)
Total soil loss = 0.06(In)
Total soil loss = 0.018(Ac.Ft)
Total rainfall = 1.00(In)
Flood volume = 12651.3 Cubic Feet
Total soil loss = 779.2 Cubic Feet

Peak flow rate of this hydrograph = 11.036(CFS)

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1 - 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	0.0056	0.82	VQ	|	|	|	|
0+10	0.0159	1.49	| Q	|	|	|	|
0+15	0.0277	1.71	| Q	|	|	|	|
0+20	0.0405	1.87	| Q V	|	|	|	|
0+25	0.0546	2.04	| Q V	|	|	|	|
0+30	0.0711	2.40	| Q V|	|	|	|	|
0+35	0.0899	2.72	| Q | V	|	|	|	|
0+40	0.1133	3.40	| Q | V	|	|	|	|
0+45	0.1490	5.18	| Q V	|	|	|	|
0+50	0.2250	11.04	| | | Q V	|	|	|	|
0+55	0.2703	6.58	| | Q |	|	|	| V |	|
1+ 0	0.2863	2.32	| Q |	|	|	| V|	|
1+ 5	0.2902	0.56	|Q |	|	|	| V|	|
1+10	0.2904	0.04	Q |	|	|	| V	|

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

Study date 04/05/21 File: UHPROPB1001100.out

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

Program License Serial Number 6388

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

English Units used in output format

KAISER RIVERSIDE PROJECT
UNIT HYDROGRAPH ANALYSIS - PROPOSED CONDITION
100-YR 1-HOUR STORM, DMA AREA B
BY PRASAD KASTURI ON 4-5-20201

Drainage Area = 2.77(Ac.) = 0.004 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 2.77(Ac.) = 0.004 Sq. Mi.
Length along longest watercourse = 289.00(Ft.)
Length along longest watercourse measured to centroid = 168.00(Ft.)
Length along longest watercourse = 0.055 Mi.
Length along longest watercourse measured to centroid = 0.032 Mi.
Difference in elevation = 1.50(Ft.)
Slope along watercourse = 27.4048 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.017 Hr.
Lag time = 1.03 Min.
25% of lag time = 0.26 Min.
40% of lag time = 0.41 Min.
Unit time = 5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
2.77	0.50	1.39

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
2.77	1.00	2.77

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 0.500(In)
Area Averaged 100-Year Rainfall = 1.000(In)

Point rain (area averaged) = 1.000(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 1.000(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
2.770	56.00	0.900

Total Area Entered = 2.77(Ac.)

RI AMC2	RI AMC-3	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
56.0	74.8	0.305	0.900	0.058	1.000	0.058
					Sum (F) =	0.058

Area averaged mean soil loss (F) (In/Hr) = 0.058
Minimum soil loss rate ((In/Hr)) = 0.029

(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.180

Slope of intensity-duration curve for a 1 hour storm =0.5500

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	485.452	70.184	1.959
2	0.167	970.905	29.816	0.832
			Sum = 100.000 Sum=	2.792

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

Unit Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	3.30	0.396	0.058	(0.071) 0.338
2	0.17	4.20	0.504	0.058	(0.091) 0.446
3	0.25	4.40	0.528	0.058	(0.095) 0.470
4	0.33	4.80	0.576	0.058	(0.104) 0.518
5	0.42	5.20	0.624	0.058	(0.112) 0.566
6	0.50	6.20	0.744	0.058	(0.134) 0.686
7	0.58	6.80	0.816	0.058	(0.147) 0.758
8	0.67	8.80	1.056	0.058	(0.190) 0.998
9	0.75	13.90	1.668	0.058	(0.300) 1.610
10	0.83	31.40	3.768	0.058	(0.678) 3.710
11	0.92	7.20	0.864	0.058	(0.156) 0.806
12	1.00	3.80	0.456	0.058	(0.082) 0.398
		(Loss Rate Not Used)			
Sum =		100.0			Sum = 11.3

Flood volume = Effective rainfall 0.94(In)
times area 2.8(Ac.)/[(In)/(Ft.)] = 0.2(Ac.Ft)
Total soil loss = 0.06(In)
Total soil loss = 0.013(Ac.Ft)
Total rainfall = 1.00(In)
Flood volume = 9471.5 Cubic Feet
Total soil loss = 583.4 Cubic Feet

Peak flow rate of this hydrograph = 8.613(CFS)

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1 - 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	0.0046	0.66	V Q
0+10	0.0125	1.16	V Q
0+15	0.0214	1.29	V Q
0+20	0.0311	1.41	Q
0+25	0.0417	1.54	QV
0+30	0.0542	1.82	Q V
0+35	0.0684	2.06	Q V
0+40	0.0862	2.59	Q V
0+45	0.1137	3.99	Q V
0+50	0.1730	8.61	V Q
0+55	0.2052	4.67	Q V
1+ 0	0.2152	1.45	Q V
1+ 5	0.2174	0.33	Q V

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

Study date 04/05/21 File: UHPROPC1001100.out

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

Program License Serial Number 6388

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

English Units used in output format

KAISER RIVERSIDE PROJECT
UNIT HYDROGRAPH ANALYSIS - PROPOSED CONDITION
100-YR 1-HOUR STORM, DMA AREA C
BY PRASAD KASTURI ON 4-5-20201

Drainage Area = 2.95(Ac.) = 0.005 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 2.95(Ac.) = 0.005 Sq. Mi.
Length along longest watercourse = 286.00(Ft.)
Length along longest watercourse measured to centroid = 142.00(Ft.)
Length along longest watercourse = 0.054 Mi.
Length along longest watercourse measured to centroid = 0.027 Mi.
Difference in elevation = 1.50(Ft.)
Slope along watercourse = 27.6923 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.016 Hr.
Lag time = 0.96 Min.
25% of lag time = 0.24 Min.
40% of lag time = 0.38 Min.
Unit time = 5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
2.95	0.50	1.48

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
2.95	1.00	2.95

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 0.500(In)
Area Averaged 100-Year Rainfall = 1.000(In)

Point rain (area averaged) = 1.000(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 1.000(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
2.950	56.00	0.850

Total Area Entered = 2.95(Ac.)

RI AMC2	RI AMC-3	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
56.0	74.8	0.305	0.850	0.072	1.000	0.072
					Sum (F) =	0.072

Area averaged mean soil loss (F) (In/Hr) = 0.072
Minimum soil loss rate ((In/Hr)) = 0.036

(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.220

Slope of intensity-duration curve for a 1 hour storm =0.5500

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	520.568	71.915	2.138
2	0.167	1041.136	28.085	0.835
			Sum = 100.000 Sum=	2.973

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

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	3.30	0.396	0.072	(0.087)	0.324
2	0.17	4.20	0.504	0.072	(0.111)	0.432
3	0.25	4.40	0.528	0.072	(0.116)	0.456
4	0.33	4.80	0.576	0.072	(0.127)	0.504
5	0.42	5.20	0.624	0.072	(0.137)	0.552
6	0.50	6.20	0.744	0.072	(0.164)	0.672
7	0.58	6.80	0.816	0.072	(0.180)	0.744
8	0.67	8.80	1.056	0.072	(0.232)	0.984
9	0.75	13.90	1.668	0.072	(0.367)	1.596
10	0.83	31.40	3.768	0.072	(0.829)	3.696
11	0.92	7.20	0.864	0.072	(0.190)	0.792
12	1.00	3.80	0.456	0.072	(0.100)	0.384
		(Loss Rate Not Used)				
Sum =		100.0			Sum =	11.1

Flood volume = Effective rainfall 0.93(In)
times area 3.0(Ac.)/[(In)/(Ft.)] = 0.2(Ac.Ft)
Total soil loss = 0.07(In)
Total soil loss = 0.018(Ac.Ft)
Total rainfall = 1.00(In)
Flood volume = 9939.8 Cubic Feet
Total soil loss = 768.4 Cubic Feet

Peak flow rate of this hydrograph = 9.240(CFS)

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1 - 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	0.0048	0.69	V Q				
0+10	0.0130	1.20	V Q				
0+15	0.0222	1.34	V Q				
0+20	0.0323	1.46	Q				
0+25	0.0433	1.60	QV				
0+30	0.0564	1.90	Q V				
0+35	0.0712	2.15	Q V				
0+40	0.0900	2.73	Q V				
0+45	0.1192	4.24	Q V				
0+50	0.1828	9.24	Q			V Q	
0+55	0.2158	4.78	Q			V	
1+ 0	0.2260	1.48	Q			V	
1+ 5	0.2282	0.32	Q			V	

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

Study date 04/05/21 File: UHPROPD1001100.out

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

Program License Serial Number 6388

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

English Units used in output format

KAISER RIVERSIDE PROJECT
UNIT HYDROGRAPH ANALYSIS - PROPOSED CONDITION
100-YR 1-HOUR STORM, DMA AREA D
BY PRASAD KASTURI ON 4-5-20201

Drainage Area = 1.68(Ac.) = 0.003 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 1.68(Ac.) = 0.003 Sq. Mi.
Length along longest watercourse = 332.00(Ft.)
Length along longest watercourse measured to centroid = 287.00(Ft.)
Length along longest watercourse = 0.063 Mi.
Length along longest watercourse measured to centroid = 0.054 Mi.
Difference in elevation = 1.50(Ft.)
Slope along watercourse = 23.8554 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.023 Hr.
Lag time = 1.37 Min.
25% of lag time = 0.34 Min.
40% of lag time = 0.55 Min.
Unit time = 5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
1.68	0.50	0.84

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
1.68	1.00	1.68

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 0.500(In)
Area Averaged 100-Year Rainfall = 1.000(In)

Point rain (area averaged) = 1.000(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 1.000(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
1.680	56.00	0.850

Total Area Entered = 1.68(Ac.)

RI AMC2	RI AMC-3	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
56.0	74.8	0.305	0.850	0.072	1.000	0.072
					Sum (F) =	0.072

Area averaged mean soil loss (F) (In/Hr) = 0.072
Minimum soil loss rate ((In/Hr)) = 0.036

(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.220

Slope of intensity-duration curve for a 1 hour storm =0.5500

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	365.959	62.586	1.060
2	0.167	731.917	33.743	0.571
3	0.250	1097.876	3.671	0.062
			Sum = 100.000 Sum=	1.693

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

Unit Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	3.30	0.396	0.072	(0.087)	0.324
2	0.17	4.20	0.504	0.072	(0.111)	0.432
3	0.25	4.40	0.528	0.072	(0.116)	0.456
4	0.33	4.80	0.576	0.072	(0.127)	0.504
5	0.42	5.20	0.624	0.072	(0.137)	0.552
6	0.50	6.20	0.744	0.072	(0.164)	0.672
7	0.58	6.80	0.816	0.072	(0.180)	0.744
8	0.67	8.80	1.056	0.072	(0.232)	0.984
9	0.75	13.90	1.668	0.072	(0.367)	1.596
10	0.83	31.40	3.768	0.072	(0.829)	3.696
11	0.92	7.20	0.864	0.072	(0.190)	0.792
12	1.00	3.80	0.456	0.072	(0.100)	0.384
		(Loss Rate Not Used)			
Sum =		100.0			Sum = 11.1

Flood volume = Effective rainfall 0.93(In)
times area 1.7(Ac.)/[(In)/(Ft.)] = 0.1(Ac.Ft)
Total soil loss = 0.07(In)
Total soil loss = 0.010(Ac.Ft)
Total rainfall = 1.00(In)
Flood volume = 5660.7 Cubic Feet
Total soil loss = 437.6 Cubic Feet

Peak flow rate of this hydrograph = 4.892(CFS)

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1 - 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	0.0024	0.34	VQ				
0+10	0.0068	0.64	| Q				
0+15	0.0120	0.75	| Q				
0+20	0.0176	0.82	| Q V				
0+25	0.0238	0.90	| Q V				
0+30	0.0311	1.06	| Q V|				
0+35	0.0395	1.21	| Q | V				
0+40	0.0499	1.51	| Q | V				
0+45	0.0657	2.30	| Q| V				
0+50	0.0994	4.89	| | Q| V				
0+55	0.1204	3.05	| | Q | | V |				
1+ 0	0.1279	1.09	| Q | | V|				
1+ 5	0.1298	0.27	|Q | | V|				
1+10	0.1300	0.02	Q | | V				

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

Study date 04/05/21 File: UHPROPE1001100.out

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

Program License Serial Number 6388

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

English Units used in output format

KAISER RIVERSIDE PROJECT
UNIT HYDROGRAPH ANALYSIS - PROPOSED CONDITION
100-YR 1-HOUR STORM, DMA AREA E
BY PRASAD KASTURI ON 4-5-20201

Drainage Area = 4.03(Ac.) = 0.006 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 4.03(Ac.) = 0.006 Sq. Mi.
Length along longest watercourse = 657.00(Ft.)
Length along longest watercourse measured to centroid = 235.00(Ft.)
Length along longest watercourse = 0.124 Mi.
Length along longest watercourse measured to centroid = 0.045 Mi.
Difference in elevation = 4.00(Ft.)
Slope along watercourse = 32.1461 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.026 Hr.
Lag time = 1.55 Min.
25% of lag time = 0.39 Min.
40% of lag time = 0.62 Min.
Unit time = 5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
4.03	0.50	2.02

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
4.03	1.00	4.03

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 0.500(In)
Area Averaged 100-Year Rainfall = 1.000(In)

Point rain (area averaged) = 1.000(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 1.000(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
4.030	56.00	0.850

Total Area Entered = 4.03(Ac.)

RI AMC2	RI AMC-3	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
56.0	74.8	0.305	0.850	0.072	1.000	0.072
					Sum (F) =	0.072

Area averaged mean soil loss (F) (In/Hr) = 0.072
Minimum soil loss rate ((In/Hr)) = 0.036

(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.220

Slope of intensity-duration curve for a 1 hour storm =0.5500

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	322.398	58.868	2.391
2	0.167	644.795	35.930	1.459
3	0.250	967.193	5.202	0.211
			Sum = 100.000 Sum=	4.061

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

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	3.30	0.396	0.072	(0.087)	0.324
2	0.17	4.20	0.504	0.072	(0.111)	0.432
3	0.25	4.40	0.528	0.072	(0.116)	0.456
4	0.33	4.80	0.576	0.072	(0.127)	0.504
5	0.42	5.20	0.624	0.072	(0.137)	0.552
6	0.50	6.20	0.744	0.072	(0.164)	0.672
7	0.58	6.80	0.816	0.072	(0.180)	0.744
8	0.67	8.80	1.056	0.072	(0.232)	0.984
9	0.75	13.90	1.668	0.072	(0.367)	1.596
10	0.83	31.40	3.768	0.072	(0.829)	3.696
11	0.92	7.20	0.864	0.072	(0.190)	0.792
12	1.00	3.80	0.456	0.072	(0.100)	0.384
		(Loss Rate Not Used)				
Sum =		100.0			Sum =	11.1

Flood volume = Effective rainfall 0.93(In)
times area 4.0(Ac.)/[(In)/(Ft.)] = 0.3(Ac.Ft)
Total soil loss = 0.07(In)
Total soil loss = 0.024(Ac.Ft)
Total rainfall = 1.00(In)
Flood volume = 13578.6 Cubic Feet
Total soil loss = 1049.8 Cubic Feet

Peak flow rate of this hydrograph = 11.380(CFS)

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1 - 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	0.0053	0.78	VQ				
0+10	0.0157	1.51	| VQ				
0+15	0.0281	1.79	| Q				
0+20	0.0416	1.96	| Q V				
0+25	0.0564	2.15	| Q V				
0+30	0.0738	2.52	| Q V|				
0+35	0.0936	2.88	| Q | V				
0+40	0.1183	3.58	| Q | V				
0+45	0.1556	5.41	| Q V|				
0+50	0.2339	11.38	| | | Q V				
0+55	0.2865	7.63	| | Q | | V |				
1+ 0	0.3061	2.86	| Q | | | V|				
1+ 5	0.3112	0.73	|Q | | | V|				
1+10	0.3117	0.08	Q | | | V				
