PRELIMINARY HYDROLOGY & HYDRAULIC STUDY

FOR

VALLE RESEDA
TRACT 38066
N.RAMONA BLVD, SANJACINTO, CA 92582

Prepared For Owner/Developer:

GOLDEN OCEAN REALTY, LLC
608 Deodar Lane,
Bradbury, CA 91108
Ph: (626) 817-1107

Prepared By:

W&W LAND DESIGN CONSULTANTS

2335 W. Foothill Blvd., Suite #1
Upland, CA 91786
(909) 608-7118

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Project job No.1932

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Section I Introduction

The following hydrology study has been prepared for Valle Reseda development project, which is located at the N. Ramona Blvd, San Jacinto, County of Riverside, California. The subject site is approximately 37.88 acres' site. An onsite storm drain systems including multiple swales, HPDE pipes and curb gutters will be constructed to convey the runoff produced by the proposed development project. Two onsite storm water quality bioretentions with pretreatment will be constructed to treat onsite storm water runoffs. The general location of the site is illustrated on the Vicinity Map in the Appendix A of this report.

Section II Methodology

For both, the existing and proposed conditions, the peak storm discharge for the drainage sub-areas (see hydrology maps in the Appendix C of this report) was calculated using the Riverside County Hydrology Manual (1978 April). The rational Method Equation, using CIVILD Software, was used to calculate the 10-year and 100-year storm event. The peak 10-year storm runoff is calculated to size the catch basin; parkway culverts and storm drain pipes. The peak 100-year storm runoff is calculated to demonstrate the runoff from 100-year storm event is contained within the street right-of-way. The street capacities calculations are calculated by using Flowmaster software. The stormwater Quality BMPs was calculated by using Riverside County Storm Water Quality Best Management Practice Design Handbook (2011, July)

Section III Project Description

Existing Site Conditions

The existing tributary area is approximately 37.88-acre site tributary area of natural dirt area. There are two distinct drainage areas in which both subarea E and F draining towards the northwest corner of the project site. Refer to the "Existing Hydrology Map" in Appendix C for an illustration of the existing drainage zones.

The following table illustrates the data and results for the existing 10-year and 100-year storm events. All calculations can be found in Appendix D of this report.

Drainage Area	Area (Ac.)	10 Year Peak Flow (CFS)	100 Year Peak Flow (CFS)	Time of Concentration (Min.)
E-1	8.14	4.19	9.17	36.29
E-2	8.05	4.05	8.88	37.59
E-3	8.05	4.01	8.82	38.02
F-1	3.64	2.26	4.78	27.95
F-2	10.00	4.84	10.70	39.57
Total	37.88	19.35	42.35	-

Proposed site Conditions

In the proposed condition, the project site can be broken down into Four distinct drainage zones with total 37.88 acres of disturbed areas. Sub area A-1 to A-9 will drain to proposed water quality bio retentions BMP #1 on the north side of the project through a proposed onsite drainage system.Subarea B-1 and B-7 will drain to the BMP #2 and overflow from the basin will be discharged to proposed bio retentions BMP #1 on the north corner of the site.. Storm water runoff from subarea G-1 & H-1 will drain via curb and gutter to Ranch View lane. All the storm water from Subarea A & B will be treated in the two proposed bio retention system before it discharges to the proposed storm drain on the Ramona Blvd. Refer to the "Proposed Hydrology Map" in Appendix C for an illustration of the proposed drainage zones.

The following table illustrates the data and results for the proposed 10-year and100-year storm events. All calculations can be found in Appendix E of this report.

Drainage Area	Area (Ac.)	10 Year Peak Flow (CFS)	100 Year Peak Flow (CFS)	Time of Concentration (Min.)
A-1	1.25	2.25	3.41	9.17
A-2	1.62	4.82	7.33	11.6
A-3	2.49	4.07	6.17	11.09
Confluence A-1, A-2, A-3	5.36	8.76	13.36	11.60
A-4	2.35	4.14	6.27	9.59
Confluence A-1,A-2, A-3 & A-4	7.71	12.48	19.06	11.62
A-5	2.15	4.15	6.27	8.03
A-6	3.02	5.78	8.74	8.15
Confluence A-1,A-2,A-3, A-4, A-5 & A-6	12.88	19.95	30.53	13.90
A-8	1.15	2.48	3.75	6.44
A-9	3.94	6.50	10.29	24.43
A-7	3.10	5.16	7.82	10.71
Confluence A-7, A-8 & A-9	8.19	9.70	15.47	13.99
Main Confluence Area A	21.07	24.73	38.93	14.06
B-1	3.57	5.69	8.62	11.68
B-2	0.89	1.77	2.67	7.60
B-3	5.60	10.07	15.54	12.85
Confluence B-1, B-2 & B-3	10.06	15.41	23.79	13.46
B-4	0.74	1.41	2.13	8.26
B-5	1.28	2.39	3.62	8.55

Confluence B-4 & B-5	2.02	3.77	5.71	8.61
B-6	0.28	0.51	0.77	9.07
B-7	1.35	1.81	2.81	29.27
Confluence B-6 & B-7	1.63	1.81	2.81	29.32
Main Confluence Area B	13.71	20.99	32.31	---
G-1	1.65	2.71	4.10	11.02
H-1	1.45	2.61	3.95	9.21
A, B , G & H (Total Area)	37.88	51.04	79.29	---

Findings

After development, more impervious surface will cover the proposed site than before. Two proposed onsite storm drain systems will be constructed to convey the runoff produced by the proposed development project. Two onsite storm water quality bioretentions will be constructed; it will treat the first flush of runoff. Calculation of bioretentions can be found in P-WQMP report. The calculations within this report substantiate that the development can be constructed as shown on the proposed plans with no detrimental effect to surrounding properties.

APPENDIX A

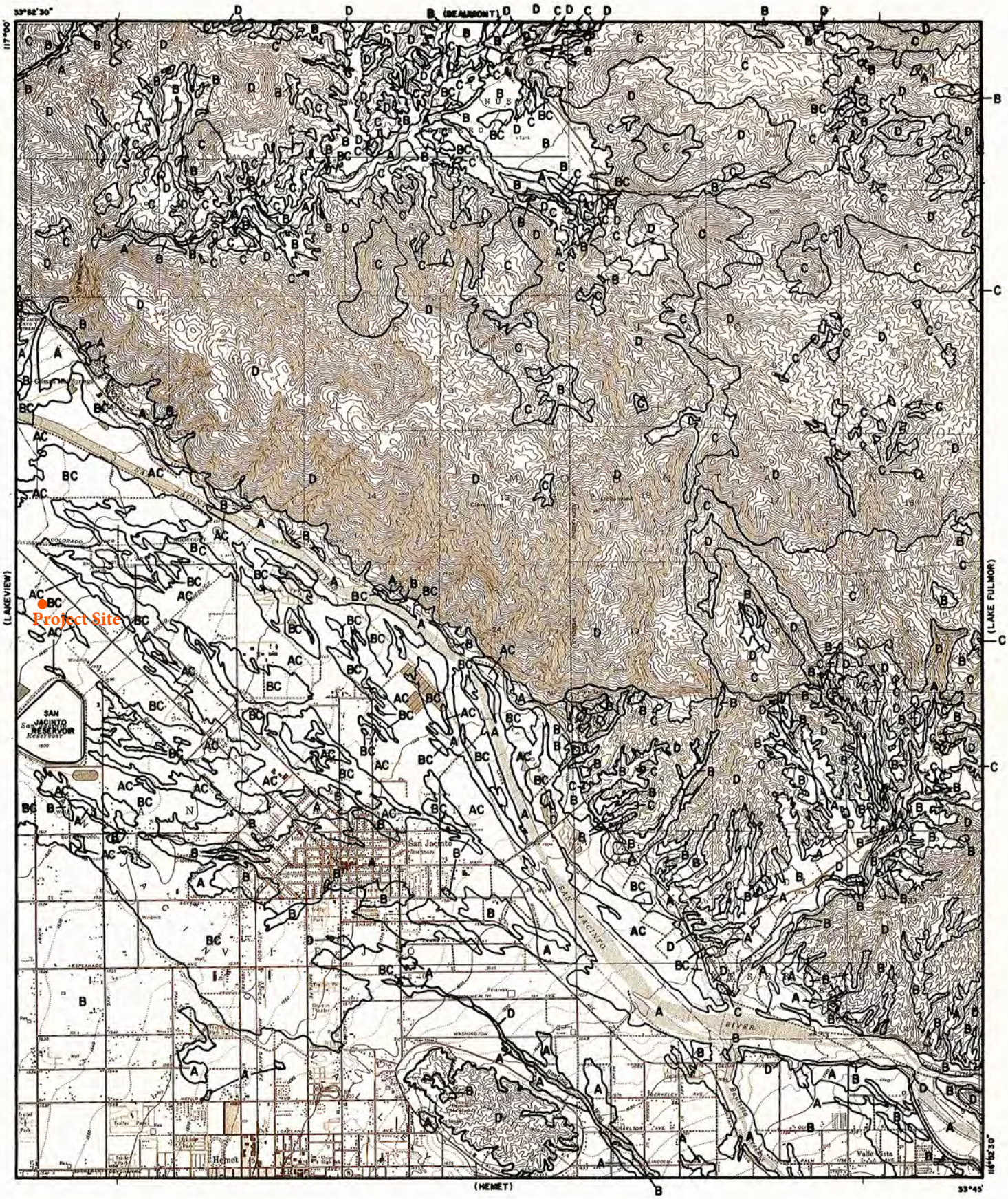
VICINITY MAP

VICINITY MAP NOT TO SCALE

APPENDIX B

(Based on RCFC & WCD Hydrology Manual):

Hydrology Soils Group Map for Bachelor MTN. (C-1.53)
100-year, 1-hour Precipitation Plate (D-4.4)
Soil Group B-Slope of Intensity Duration Curve (D4.6)



LEGEND

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

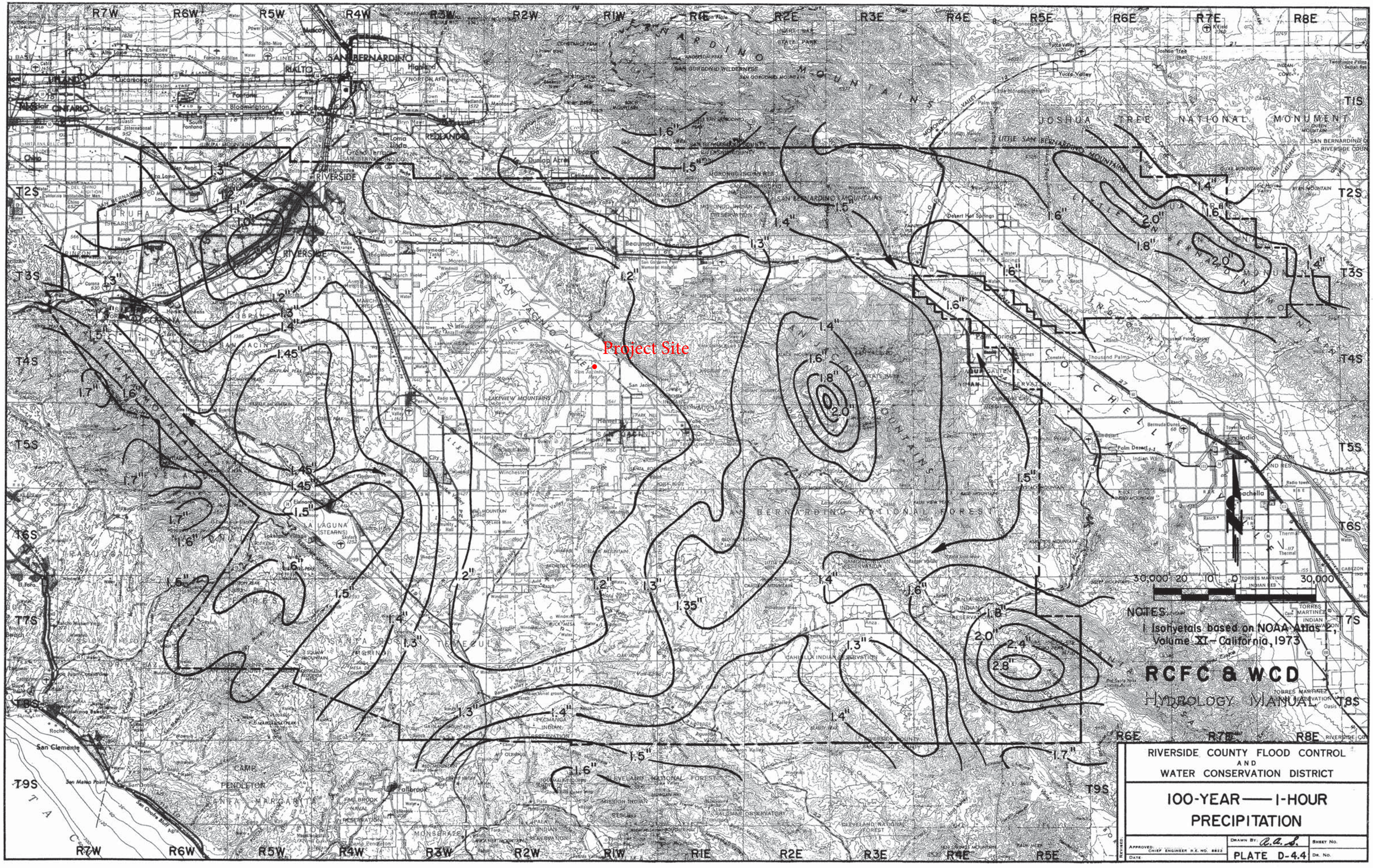
RCFC & WCD

HYDROLOGY MANUAL

0 FEET 5000

HYDROLOGIC SOILS GROUP MAP FOR SAN JACINTO

PLATE C-1.32



I100 year = 1.1 inch/hr


Project Site
.45
.50
.55
.58
.60
.63
NOTES
1. Slope of Intensity-Duration Curve based on District analysis of automatic recording rain gage records.
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
SLOPE OF INTENSITY DURATION CURVE
PLATE D-4.6

APPENDIX C

Existing Hydrology Map
Proposed Hydrology Map

EXISTING HYDROLOGY MAP

FOR TRACT 38066

N

GRAPHIC SCALE

80 0 40 80 160 240

(IN FEET)

1 inch = 80 ft.

102 ELEV=1,468.9
Q_{10}=4.19 CFS
Q_{100}=9.17 CFS
Tc=36.29 MIN.

104 ELEV=1,469.2
Q_{10}=4.05 CFS
Q_{100}=8.88 CFS
Tc=37.59 MIN.

106 ELEV=1,468.7
Q_{10}=4.01 CFS
Q_{100}=8.82 CFS
Tc=38.02 MIN.

113 ELEV=1,466.8
Q_{10}=4.84 CFS
Q_{100}=10.70 CFS
Tc=39.57 MIN.

112 ELEV=1,472.5
Q_{10}=2.26 CFS
Q_{100}=4.78 CFS
Tc=27.95 MIN.

E-1
8.14

E-2
8.05

E-3
8.05

F-1
3.64

F-2
10.00

L=806'

L=840'

L=880'

L=910'

L=407'

C/L RAMONA BLVD

C/L RANCH VIEW LANE

C/L HARVEST DR

101 ELEV= 1,475.0

103 ELEV= 1,475.0

105 ELEV= 1,475.0

111 ELEV= 1,475.4

Obscured Area

Dirt

LEGEND

———	TRACT BOUNDARY
▬▬▬	DRAINAGE AREA BOUNDARY
▬ ▬ ▬	DRAINAGE SUBAREA BOUNDARY
B–1 / 10.3	DRAINAGE AREA NUMBER / DRAINAGE AREA ACREAGE
10	NODE NUMBER
Q_{100}	100 YEAR STORM EVENT
Q_{10}	10 YEAR STORM EVENT
Tc	TIME OF CONCENTRATION
CB #2	CATCH BASIN #2

CITY OF SAN JACINTO

REGISTERED PROFESSIONAL ENGINEER
WEIDONG LIU
No. 66242
Exp. 06-30-22
CIVIL
STATE OF CALIFORNIA

W&W Land Design Consultants, Inc
Civil Engineering • Subdivision • Land Planning
2335 W. FOOTHILL BLVD., SUITE 1, UPLAND, CA 91786
TEL: (909) 608–7118 • FAX: (909) 946–1137

PROPOSED HYDROLOGY MAP

FOR TRACT 38066

GRAPHIC SCALE

80 0 40 80 160 240

(IN FEET)

1 inch = 80 ft.

N

A-1 1.25

A-2 1.62

A-3 2.49

A-4 2.35

A-5 2.15

A-6 3.02

A-7 3.10

A-8 1.15

A-9 3.94

B-1 3.57

B-2 0.89

B-3 5.60

B-4 0.74

B-5 1.28

B-6 0.28

B-7 1.35

G-1 1.65

H-1 1.45

ELEV=1,460.3 Q10=24.73 CFS Q100=38.93 CFS Tc=14.06 MIN. (155)

ELEV=1,460.6 Q10=24.73 CFS Q100=38.93 CFS (154)

ELEV=1,461.0 Q10=19.95 CFS Q100=30.53 CFS (153)

ELEV=1,462.8 Q10=9.70 CFS Q100=15.47 CFS (152)

ELEV=1,462.8 Q10=12.48 CFS Q100=19.06 CFS (152)

ELEV=1,467.2 Q10=5.76 CFS Q100=8.74 CFS CB #6 (19)

ELEV=1,467.2 Q10=4.15 CFS Q100=6.27 CFS CB #5 (17)

ELEV=1,467.0 Q10=5.16 CFS Q100=7.82 CFS CB #1 (21)

ELEV=1,467.0 Q10=6.50 CFS Q100=10.29 CFS CB #2 (24)

ELEV=1,470.9 Q10=4.14 CFS Q100=6.27 CFS CB #3 (15)

ELEV=1,470.9 Q10=8.76 CFS Q100=13.36 CFS CB #4 (151)

ELEV=1,468.6 Q10=1.81 CFS Q100=2.81 CFS C.B. #10 (39)

ELEV=1,464.0 Q10=1.81 CFS Q100=2.81 CFS Tc=29.32 MIN. (40)

ELEV=1,464.0 Q10=3.77 CFS Q100=5.71 CFS Tc=8.60 MIN. (164)

ELEV=1,467.5 Q10=3.77 CFS Q100=5.71 CFS C.B. #9 (163)

ELEV=1,468.9 Q10=5.69 CFS Q100=8.62 CFS C.B. #8 (32)

ELEV=1,467.0 Q10=15.41 CFS Q100=23.79 CFS Tc=13.46 MIN. (162)

ELEV=1,468.6 Q10=15.41 CFS Q100=23.79 CFS C.B. #7 (161)

ELEV=1,472.3 Q10=1.77 CFS Q100=2.67 CFS (34)

ELEV=1,471.2 Q10=0.51 CFS Q100=0.77 CFS (38)

ELEV=1,474.5 Q10=2.25 CFS Q100=3.41 CFS PKWY #1 (12)

ELEV=1,474.8 Q10=2.61 CFS Q100=3.95 CFS (102)

ELEV=1,475.9 Q10=2.71 CFS Q100=4.10 CFS (104)

ELEV=1,467.2 Q10=2.48 CFS Q100=3.75 CFS (23)

ELEV=1,468.9 Q10=5.69 CFS Q100=8.62 CFS C.B. #8 (32)

ELEV=1,471.0 (35)

ELEV=1,471.0 (36)

ELEV=1,471.4 (31)

ELEV=1,473.0 (37)

ELEV=1,474.6 (14)

ELEV=1,472.0 (20)

ELEV=1,476.2 (13)

ELEV=1,477.9 (11)

ELEV=1,477.6 (18)

ELEV=1,477.6 (16)

ELEV=1,478.7 (101)

ELEV=1,478.8 (103)

ELEV=1,476.2 (22)

L=41'

L=404'

L=381'

L=38'

L=41'

L=1,204'

L=657'

L=789'

L=357'

L=308'

L=66'

L=733'

L=498'

L=716'

L=345'

L=452'

L=21'

L=30'

L=37'

L=30'

L=21'

L=52'

L=21'

L=30'

L=342'

L=474'

L=449'

L=536'

L=523'

L=670'

L=579'

C/L RAMONA BLVD

C/L RANCH VIEW LANE

C/L HARVEST DR

C/L WHEELBARROW WAY

C/L BROOMWOOD DR

C/L "A" STREET

C/L "B" STREET

C/L "C" STREET

C/L "D" STREET

C/L "E" COURT

C/L "F" COURT

C/L "G" STREET

C/L "H" STREET

C/L "I" STREET

C/L "J" STREET

C/L "K" STREET

LOT "A" OPEN SPACE DETENTION / WQMP BASIN #2A

DETENTION / WQMP BASIN #2B

OPEN SPACE DETENTION / WQMP BASIN #2C

EDGE OF PAVEMENT

26' WIDE PAVEMENT FOR FIRE ACCESS

Obscured Area

Dirt

LEGEND

———	TRACT BOUNDARY
▬▬▬	DRAINAGE AREA BOUNDARY
▬ ▬ ▬	DRAINAGE SUBAREA BOUNDARY
B-1 / 3.57	DRAINAGE AREA NUMBER / DRAINAGE AREA ACREAGE
(10)	NODE NUMBER
Q_{100}	100 YEAR STORM EVENT
Q_{10}	10 YEAR STORM EVENT
Tc	TIME OF CONCENTRATION
CB #2	CATCH BASIN #2

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APPENDIX D

Hydrology Study

Existing Conditions-10 Year Storm Event
Existing Conditions-100 Year Storm Event

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 01/21/21 File:10E1.out

1932 Valle Reseda
Existing Condition
10 Year Storm Event
Subarea E-1

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

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

Program License Serial Number 6364

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 [San Jacinto] area used.
10 year storm 10 minute intensity = 1.980(In/Hr)
10 year storm 60 minute intensity = 0.810(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.810(In/Hr)
Slope of intensity duration curve = 0.5000

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

Initial area flow distance = 806.000(Ft.)
Top (of initial area) elevation = 1475.000(Ft.)
Bottom (of initial area) elevation = 1468.900(Ft.)

```
Difference in elevation =     6.100(Ft.)
Slope =    0.00757  s(percent)=       0.76
TC = k(0.940)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   36.296 min.
Rainfall intensity =      1.041(In/Hr) for a    10.0 year storm
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.495
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)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      4.195(CFS)
Total initial stream area =        8.140(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =            8.14 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  61.0
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 01/21/21 File:10E2.out

1832 Valle Reseda
Existing Condition
10 Year Storm Event
Subarea E-2

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

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

Program License Serial Number 6364

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 [San Jacinto] area used.
10 year storm 10 minute intensity = 1.980(In/Hr)
10 year storm 60 minute intensity = 0.810(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.810(In/Hr)
Slope of intensity duration curve = 0.5000

++
Process from Point/Station 103.000 to Point/Station 104.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 840.000(Ft.)
Top (of initial area) elevation = 1475.000(Ft.)
Bottom (of initial area) elevation = 1469.200(Ft.)

```
Difference in elevation =     5.800(Ft.)
Slope =    0.00690  s(percent)=       0.69
TC = k(0.940)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   37.585 min.
Rainfall intensity =      1.023(In/Hr) for a    10.0 year storm
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.491
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)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      4.045(CFS)
Total initial stream area =        8.050(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =            8.05 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  61.0
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 01/21/21 File:10E3.out

1932 Valle Reseda
Existing Condition
10 Year Storm Event
Subarea E-3

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

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

Program License Serial Number 6364

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 [San Jacinto] area used.
10 year storm 10 minute intensity = 1.980(In/Hr)
10 year storm 60 minute intensity = 0.810(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.810(In/Hr)
Slope of intensity duration curve = 0.5000

++
Process from Point/Station 105.000 to Point/Station 106.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 880.000(Ft.)
Top (of initial area) elevation = 1475.000(Ft.)
Bottom (of initial area) elevation = 1468.700(Ft.)

```
Difference in elevation =     6.300(Ft.)
Slope =    0.00716  s(percent)=       0.72
TC = k(0.940)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   38.015 min.
Rainfall intensity =      1.018(In/Hr) for a    10.0 year storm
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.490
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)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      4.012(CFS)
Total initial stream area =        8.050(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =            8.05 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  61.0
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 01/21/21 File:10F1.out

1932 Valle Reseda
Existing Condition
10 Year Storm Event
Subarea F-1

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

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

Program License Serial Number 6364

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 [San Jacinto] area used.
10 year storm 10 minute intensity = 1.980(In/Hr)
10 year storm 60 minute intensity = 0.810(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.810(In/Hr)
Slope of intensity duration curve = 0.5000

++
Process from Point/Station 111.000 to Point/Station 112.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 407.000(Ft.)
Top (of initial area) elevation = 1475.400(Ft.)
Bottom (of initial area) elevation = 1472.500(Ft.)

```
Difference in elevation =     2.900(Ft.)
Slope =    0.00713  s(percent)=       0.71
TC = k(0.940)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   27.951 min.
Rainfall intensity =      1.187(In/Hr) for a    10.0 year storm
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.524
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)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      2.263(CFS)
Total initial stream area =        3.640(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =            3.64 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  61.0
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 01/21/21 File:10F2.out

1932 Valle Reseda
Existing Condition
10 Year Storm Event
Subarea F-2

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

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

Program License Serial Number 6364

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 [San Jacinto] area used.
10 year storm 10 minute intensity = 1.980(In/Hr)
10 year storm 60 minute intensity = 0.810(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.810(In/Hr)
Slope of intensity duration curve = 0.5000

++
Process from Point/Station 112.000 to Point/Station 113.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 910.000(Ft.)
Top (of initial area) elevation = 1472.500(Ft.)
Bottom (of initial area) elevation = 1466.800(Ft.)

```
Difference in elevation =     5.700(Ft.)
Slope =    0.00626  s(percent)=       0.63
TC = k(0.940)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   39.571 min.
Rainfall intensity =      0.997(In/Hr) for a    10.0 year storm
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.485
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)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      4.840(CFS)
Total initial stream area =       10.000(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =           10.00 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  61.0
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 01/21/21 File:100E1.out

1932 Valle Reseda
Existing Condition
100 Year Storm Event
Subarea E-1

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

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

Program License Serial Number 6364

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 [San Jacinto] area used.
10 year storm 10 minute intensity = 1.980(In/Hr)
10 year storm 60 minute intensity = 0.810(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.200(In/Hr)
Slope of intensity duration curve = 0.5000

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

Initial area flow distance = 806.000(Ft.)
Top (of initial area) elevation = 1475.000(Ft.)
Bottom (of initial area) elevation = 1468.900(Ft.)

```
Difference in elevation =     6.100(Ft.)
Slope =    0.00757  s(percent)=       0.76
TC = k(0.940)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   36.296 min.
Rainfall intensity =      1.543(In/Hr) for a   100.0 year storm
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.730
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)  =  78.80
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      9.171(CFS)
Total initial stream area =        8.140(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =            8.14 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  61.0
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 01/21/21 File:100E2.out

1832 Valle Reseda
Existing Condition
100 Year Storm Event
Subarea E-2

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

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

Program License Serial Number 6364

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 [San Jacinto] area used.
10 year storm 10 minute intensity = 1.980(In/Hr)
10 year storm 60 minute intensity = 0.810(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.200(In/Hr)
Slope of intensity duration curve = 0.5000

++
Process from Point/Station 103.000 to Point/Station 104.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 840.000(Ft.)
Top (of initial area) elevation = 1475.000(Ft.)
Bottom (of initial area) elevation = 1469.200(Ft.)

```
Difference in elevation =     5.800(Ft.)
Slope =    0.00690  s(percent)=       0.69
TC = k(0.940)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   37.585 min.
Rainfall intensity =      1.516(In/Hr) for a   100.0 year storm
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.728
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)  =  78.80
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      8.883(CFS)
Total initial stream area =        8.050(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =            8.05 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  61.0
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 01/21/21 File:100E3.out

1932 Valle Reseda
Existing Condition
100 Year Storm Event
Subarea E-3

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

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

Program License Serial Number 6364

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 [San Jacinto] area used.
10 year storm 10 minute intensity = 1.980(In/Hr)
10 year storm 60 minute intensity = 0.810(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.200(In/Hr)
Slope of intensity duration curve = 0.5000

++
Process from Point/Station 105.000 to Point/Station 106.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 880.000(Ft.)
Top (of initial area) elevation = 1475.000(Ft.)
Bottom (of initial area) elevation = 1468.700(Ft.)

```
Difference in elevation =     6.300(Ft.)
Slope =    0.00716  s(percent)=       0.72
TC = k(0.940)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   38.015 min.
Rainfall intensity =      1.508(In/Hr) for a   100.0 year storm
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.727
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)  =  78.80
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      8.823(CFS)
Total initial stream area =        8.050(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =            8.05 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  61.0
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 01/21/21 File:100F1.out

1932 Valle Reseda
Existing Condition
100 Year Storm Event
Subarea F-1

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

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

Program License Serial Number 6364

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 [San Jacinto] area used.
10 year storm 10 minute intensity = 1.980(In/Hr)
10 year storm 60 minute intensity = 0.810(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.200(In/Hr)
Slope of intensity duration curve = 0.5000

++
Process from Point/Station 111.000 to Point/Station 112.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 407.000(Ft.)
Top (of initial area) elevation = 1475.400(Ft.)
Bottom (of initial area) elevation = 1472.500(Ft.)

```
Difference in elevation =     2.900(Ft.)
Slope =    0.00713  s(percent)=       0.71
TC = k(0.940)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   27.951 min.
Rainfall intensity =      1.758(In/Hr) for a   100.0 year storm
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.747
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)  =  78.80
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      4.784(CFS)
Total initial stream area =        3.640(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =            3.64 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  61.0
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 01/21/21 File:100F2.out

1932 Valle Reseda
Existing Condition
100 Year Storm Event
Subarea F-2

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

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

Program License Serial Number 6364

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 [San Jacinto] area used.
10 year storm 10 minute intensity = 1.980(In/Hr)
10 year storm 60 minute intensity = 0.810(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.200(In/Hr)
Slope of intensity duration curve = 0.5000

++
Process from Point/Station 112.000 to Point/Station 113.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 910.000(Ft.)
Top (of initial area) elevation = 1472.500(Ft.)
Bottom (of initial area) elevation = 1466.800(Ft.)

```
Difference in elevation =     5.700(Ft.)
Slope =    0.00626  s(percent)=       0.63
TC = k(0.940)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   39.571 min.
Rainfall intensity =      1.478(In/Hr) for a   100.0 year storm
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.724
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)  =  78.80
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =     10.701(CFS)
Total initial stream area =       10.000(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =           10.00 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  61.0
```

APPENDIX E

Hydrology Study

Proposed Conditions-10 Year Storm Event
Proposed Conditions-100 Year Storm Event

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 01/21/21 File:10B123.out

1932 Valle Reseda
Proposed Condtion
10 Year Storm Event
Subarea B-1, B-2 & B-3

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

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

Program License Serial Number 6364

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 [San Jacinto] area used.
10 year storm 10 minute intensity = 1.980(In/Hr)
10 year storm 60 minute intensity = 0.810(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.810(In/Hr)
Slope of intensity duration curve = 0.5000

++

Process from Point/Station 31.000 to Point/Station 32.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 789.000(Ft.)
Top (of initial area) elevation = 1474.400(Ft.)
Bottom (of initial area) elevation = 1468.900(Ft.)

```
Difference in elevation =     5.500(Ft.)
Slope =    0.00697  s(percent)=       0.70
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.676 min.
Rainfall intensity =      1.836(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 =      5.685(CFS)
Total initial stream area =        3.570(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       32.000 to Point/Station      161.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1468.900(Ft.)
Downstream point/station elevation =  1468.600(Ft.)
Pipe length  =    41.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.685(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     5.685(CFS)
Normal flow depth in pipe =   10.39(In.)
Flow top width inside pipe =   17.78(In.)
Critical Depth =   11.04(In.)
Pipe flow velocity =      5.38(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =    11.80 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       32.000 to Point/Station      161.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      3.570(Ac.)
Runoff from this stream =      5.685(CFS)
Time of concentration =   11.80 min.
Rainfall intensity =     1.826(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       33.000 to Point/Station       34.000
**** INITIAL AREA EVALUATION ****
```

```
Initial area flow distance =   308.000(Ft.)
Top (of initial area) elevation =  1475.100(Ft.)
Bottom (of initial area) elevation =  1472.300(Ft.)
Difference in elevation =     2.800(Ft.)
Slope =    0.00909  s(percent)=       0.91
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.600 min.
Rainfall intensity =      2.276(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.872
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 =      1.766(CFS)
Total initial stream area =        0.890(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       34.000 to Point/Station      161.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
Top of street segment elevation =  1472.300(Ft.)
End of street segment elevation =  1468.600(Ft.)
Length of street segment  =   657.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =   0.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      6.016(CFS)
Depth of flow =   0.369(Ft.), Average velocity =   1.885(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  12.121(Ft.)
Flow velocity =   1.89(Ft/s)
Travel time =    5.81 min.     TC =   13.41  min.
 Adding area flow to street
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
Rainfall intensity =      1.713(In/Hr) for a    10.0 year storm
Subarea runoff =      8.308(CFS) for      5.600(Ac.)
Total runoff =     10.073(CFS)  Total area =       6.490(Ac.)
Street flow at end of street =     10.073(CFS)
Half street flow at end of street =      5.037(CFS)
Depth of flow =   0.426(Ft.), Average velocity =   2.132(Ft/s)
Flow width (from curb towards crown)=  14.954(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       34.000 to Point/Station      161.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      6.490(Ac.)
Runoff from this stream =     10.073(CFS)
Time of concentration =   13.41 min.
Rainfall intensity =     1.713(In/Hr)
Summary of stream data:

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


1        5.685     11.80                1.826
2       10.073     13.41                1.713
Largest stream flow has longer time of concentration
Qp =     10.073 + sum of
          Qb         Ia/Ib
           5.685 *    0.938 =      5.334
Qp =     15.407

Total of 2 streams to confluence:
Flow rates before confluence point:
       5.685      10.073
Area of streams before confluence:
        3.570        6.490
Results of confluence:
Total flow rate =     15.407(CFS)
Time of concentration =    13.409 min.
Effective stream area after confluence =     10.060(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      161.000 to Point/Station      162.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1468.600(Ft.)
Downstream point/station elevation =  1467.000(Ft.)
Pipe length  =    38.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    15.407(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    15.407(CFS)
Normal flow depth in pipe =   11.25(In.)
Flow top width inside pipe =   17.43(In.)
Critical Depth =   16.97(In.)
Pipe flow velocity =     13.25(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =    13.46 min.
End of computations, total study area =           10.06 (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
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 01/21/21 File:10A.out

1932 Valle Reseda
Proposed Condition
10 Year Storm Event
Subarea A

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

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

Program License Serial Number 6364

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 [San Jacinto] area used.
10 year storm 10 minute intensity = 1.980(In/Hr)
10 year storm 60 minute intensity = 0.810(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.810(In/Hr)
Slope of intensity duration curve = 0.5000

++
Process from Point/Station 11.000 to Point/Station 12.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 449.000(Ft.)
Top (of initial area) elevation = 1477.900(Ft.)
Bottom (of initial area) elevation = 1474.500(Ft.)

```
Difference in elevation =     3.400(Ft.)
Slope =    0.00757  s(percent)=       0.76
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.166 min.
Rainfall intensity =      2.072(In/Hr) for a    10.0 year storm
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
Initial subarea runoff =      2.253(CFS)
Total initial stream area =        1.250(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station      151.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1474.500(Ft.)
End of street segment elevation =  1470.900(Ft.)
Length of street segment  =   342.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  42.000(Ft.)
Distance from crown to crossfall grade break  =  40.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =   0.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      3.624(CFS)
Depth of flow =   0.297(Ft.), Average velocity =   2.137(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   8.493(Ft.)
Flow velocity =   2.14(Ft/s)
Travel time =    2.67 min.     TC =   11.83  min.
 Adding area flow to street
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
Rainfall intensity =      1.824(In/Hr) for a    10.0 year storm
Subarea runoff =      2.562(CFS) for      1.620(Ac.)
Total runoff =      4.815(CFS)  Total area =       2.870(Ac.)
Street flow at end of street =      4.815(CFS)
Half street flow at end of street =      2.408(CFS)
Depth of flow =   0.320(Ft.), Average velocity =   2.277(Ft/s)
Flow width (from curb towards crown)=   9.648(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station      151.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      2.870(Ac.)
Runoff from this stream =      4.815(CFS)
Time of concentration =   11.83 min.
Rainfall intensity =     1.824(In/Hr)


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Process from Point/Station       13.000 to Point/Station      151.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   716.000(Ft.)
Top (of initial area) elevation =  1476.200(Ft.)
Bottom (of initial area) elevation =  1470.900(Ft.)
Difference in elevation =     5.300(Ft.)
Slope =    0.00740  s(percent)=       0.74
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.097 min.
Rainfall intensity =      1.883(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 =      4.070(CFS)
Total initial stream area =        2.490(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       13.000 to Point/Station      151.000
```

**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 2.490(Ac.)
Runoff from this stream = 4.070(CFS)
Time of concentration = 11.10 min.
Rainfall intensity = 1.883(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	4.815	11.83	1.824
2	4.070	11.10	1.883

Largest stream flow has longer time of concentration
Qp = 4.815 + sum of
Qb Ia/Ib
4.070 * 0.968 = 3.941
Qp = 8.757

Total of 2 streams to confluence:
Flow rates before confluence point:
4.815 4.070
Area of streams before confluence:
2.870 2.490
Results of confluence:
Total flow rate = 8.757(CFS)
Time of concentration = 11.833 min.
Effective stream area after confluence = 5.360(Ac.)

++
Process from Point/Station 151.000 to Point/Station 152.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1470.900(Ft.)
Downstream point/station elevation = 1462.800(Ft.)
Pipe length = 30.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 8.757(CFS)
Nearest computed pipe diameter = 12.00(In.)
Calculated individual pipe flow = 8.757(CFS)
Normal flow depth in pipe = 5.81(In.)
Flow top width inside pipe = 11.99(In.)
Critical depth could not be calculated.
Pipe flow velocity = 23.24(Ft/s)
Travel time through pipe = 0.02 min.
Time of concentration (TC) = 11.85 min.

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      151.000 to Point/Station      152.000
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      5.360(Ac.)
Runoff from this stream =      8.757(CFS)
Time of concentration =   11.85 min.
Rainfall intensity =     1.822(In/Hr)


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Process from Point/Station       14.000 to Point/Station       15.000
**** INITIAL AREA EVALUATION ****
____________________________________________________________________________
Initial area flow distance =   498.000(Ft.)
Top (of initial area) elevation =  1474.600(Ft.)
Bottom (of initial area) elevation =  1470.900(Ft.)
Difference in elevation =     3.700(Ft.)
Slope =    0.00743  s(percent)=       0.74
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.590 min.
Rainfall intensity =      2.026(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
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      4.139(CFS)
Total initial stream area =        2.350(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       15.000 to Point/Station      152.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
____________________________________________________________________________
Upstream point/station elevation =  1470.900(Ft.)
Downstream point/station elevation =  1462.800(Ft.)
Pipe length  =    21.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.139(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     4.139(CFS)
Normal flow depth in pipe =    3.97(In.)
Flow top width inside pipe =    8.94(In.)
Critical depth could not be calculated.
Pipe flow velocity =     22.00(Ft/s)
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Travel time through pipe =    0.02 min.
Time of concentration (TC) =     9.61 min.


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Process from Point/Station       15.000 to Point/Station      152.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.350(Ac.)
Runoff from this stream =      4.139(CFS)
Time of concentration =    9.61 min.
Rainfall intensity =     2.024(In/Hr)
Summary of stream data:

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


1        8.757     11.85                 1.822
2        4.139      9.61                 2.024
Largest stream flow has longer time of concentration
Qp =      8.757 + sum of
          Qb         Ia/Ib
           4.139 *    0.900 =      3.726
Qp =     12.483

Total of 2 streams to confluence:
Flow rates before confluence point:
       8.757       4.139
Area of streams before confluence:
        5.360        2.350
Results of confluence:
Total flow rate =     12.483(CFS)
Time of concentration =    11.855 min.
Effective stream area after confluence =      7.710(Ac.)


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Process from Point/Station      152.000 to Point/Station      153.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1462.800(Ft.)
Downstream point/station elevation =  1461.000(Ft.)
Pipe length  =   670.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.483(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    12.483(CFS)
Normal flow depth in pipe =   17.91(In.)
Flow top width inside pipe =   25.52(In.)
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Critical Depth =   14.70(In.)
Pipe flow velocity =      4.46(Ft/s)
Travel time through pipe =    2.50 min.
Time of concentration (TC) =    14.36 min.


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Process from Point/Station      152.000 to Point/Station      153.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      7.710(Ac.)
Runoff from this stream =     12.483(CFS)
Time of concentration =   14.36 min.
Rainfall intensity =     1.656(In/Hr)


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Process from Point/Station       16.000 to Point/Station       17.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   523.000(Ft.)
Top (of initial area) elevation =  1477.600(Ft.)
Bottom (of initial area) elevation =  1467.200(Ft.)
Difference in elevation =    10.400(Ft.)
Slope =    0.01989  s(percent)=       1.99
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.032 min.
Rainfall intensity =      2.214(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 =      4.146(CFS)
Total initial stream area =        2.150(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       17.000 to Point/Station      153.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1467.200(Ft.)
Downstream point/station elevation =  1461.000(Ft.)
Pipe length  =    21.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.146(CFS)
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Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     4.146(CFS)
Normal flow depth in pipe =    4.29(In.)
Flow top width inside pipe =    8.99(In.)
Critical depth could not be calculated.
Pipe flow velocity =     19.94(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =     8.05 min.


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Process from Point/Station       17.000 to Point/Station      153.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.150(Ac.)
Runoff from this stream =      4.146(CFS)
Time of concentration =    8.05 min.
Rainfall intensity =     2.211(In/Hr)


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Process from Point/Station       18.000 to Point/Station       19.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   536.000(Ft.)
Top (of initial area) elevation =  1477.600(Ft.)
Bottom (of initial area) elevation =  1467.200(Ft.)
Difference in elevation =    10.400(Ft.)
Slope =    0.01940  s(percent)=       1.94
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.151 min.
Rainfall intensity =      2.198(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 =      5.780(CFS)
Total initial stream area =        3.020(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       19.000 to Point/Station      153.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
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Upstream point/station elevation =  1467.200(Ft.)
Downstream point/station elevation =  1461.000(Ft.)
Pipe length  =    30.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.780(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     5.780(CFS)
Normal flow depth in pipe =    5.92(In.)
Flow top width inside pipe =    8.54(In.)
Critical depth could not be calculated.
Pipe flow velocity =     18.77(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =     8.18 min.


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Process from Point/Station       19.000 to Point/Station      153.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 3
Stream flow area =      3.020(Ac.)
Runoff from this stream =      5.780(CFS)
Time of concentration =    8.18 min.
Rainfall intensity =     2.194(In/Hr)
Summary of stream data:

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


1       12.483     14.36                1.656
2        4.146      8.05                2.211
3        5.780      8.18                2.194
Largest stream flow has longer time of concentration
Qp =     12.483 + sum of
          Qb         Ia/Ib
           4.146 *    0.749 =      3.105
          Qb         Ia/Ib
           5.780 *    0.755 =      4.362
Qp =     19.950

Total of 3 streams to confluence:
Flow rates before confluence point:
      12.483       4.146       5.780
Area of streams before confluence:
        7.710        2.150        3.020
Results of confluence:
Total flow rate =     19.950(CFS)
Time of concentration =    14.357 min.
Effective stream area after confluence =     12.880(Ac.)
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Process from Point/Station      153.000 to Point/Station      154.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1461.000(Ft.)
Downstream point/station elevation =  1460.300(Ft.)
Pipe length  =    52.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    19.950(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    19.950(CFS)
Normal flow depth in pipe =   15.66(In.)
Flow top width inside pipe =   22.86(In.)
Critical Depth =   19.26(In.)
Pipe flow velocity =      9.19(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =    14.45 min.


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Process from Point/Station      153.000 to Point/Station      154.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     12.880(Ac.)
Runoff from this stream =     19.950(CFS)
Time of concentration =   14.45 min.
Rainfall intensity =     1.650(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station       22.000 to Point/Station       23.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   345.000(Ft.)
Top (of initial area) elevation =  1476.200(Ft.)
Bottom (of initial area) elevation =  1467.200(Ft.)
Difference in elevation =     9.000(Ft.)
Slope =    0.02609  s(percent)=       2.61
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.441 min.
Rainfall intensity =      2.472(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.873
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 =      2.483(CFS)
Total initial stream area =        1.150(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       23.000 to Point/Station       24.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1467.200(Ft.)
End of street segment elevation =  1467.000(Ft.)
Length of street segment  =   733.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  19.000(Ft.)
Distance from crown to crossfall grade break  =  17.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =   0.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      4.581(CFS)
Depth of flow =   0.521(Ft.), Average velocity =   0.570(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  19.000(Ft.)
Flow velocity =   0.57(Ft/s)
Travel time =   21.42 min.     TC =   27.86  min.
 Adding area flow to street
COMMERCIAL subarea type
Runoff Coefficient = 0.858
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
Rainfall intensity =      1.189(In/Hr) for a    10.0 year storm
Subarea runoff =      4.018(CFS) for      3.940(Ac.)
Total runoff =      6.500(CFS)  Total area =       5.090(Ac.)
Street flow at end of street =      6.500(CFS)
Half street flow at end of street =      3.250(CFS)
Depth of flow =   0.571(Ft.), Average velocity =   0.656(Ft/s)
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Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  19.000(Ft.)


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Process from Point/Station       24.000 to Point/Station      152.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
____________________________________________________________________________
Upstream point/station elevation =  1467.000(Ft.)
Downstream point/station elevation =  1462.800(Ft.)
Pipe length  =    30.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.500(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     6.500(CFS)
Normal flow depth in pipe =    5.91(In.)
Flow top width inside pipe =   12.00(In.)
Critical depth could not be calculated.
Pipe flow velocity =     16.87(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =    27.89 min.


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Process from Point/Station       24.000 to Point/Station      152.000
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      5.090(Ac.)
Runoff from this stream =      6.500(CFS)
Time of concentration =   27.89 min.
Rainfall intensity =     1.188(In/Hr)


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Process from Point/Station       20.000 to Point/Station       21.000
**** INITIAL AREA EVALUATION ****
____________________________________________________________________________
Initial area flow distance =   662.000(Ft.)
Top (of initial area) elevation =  1472.000(Ft.)
Bottom (of initial area) elevation =  1467.000(Ft.)
Difference in elevation =     5.000(Ft.)
Slope =    0.00755  s(percent)=       0.76
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.711 min.
Rainfall intensity =      1.917(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
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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 =      5.160(CFS)
Total initial stream area =        3.100(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       21.000 to Point/Station      152.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1467.000(Ft.)
Downstream point/station elevation =  1462.800(Ft.)
Pipe length  =    21.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.160(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     5.160(CFS)
Normal flow depth in pipe =    5.53(In.)
Flow top width inside pipe =    8.76(In.)
Critical depth could not be calculated.
Pipe flow velocity =     18.10(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =    10.73 min.


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Process from Point/Station       21.000 to Point/Station      152.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      3.100(Ac.)
Runoff from this stream =      5.160(CFS)
Time of concentration =   10.73 min.
Rainfall intensity =     1.915(In/Hr)
Summary of stream data:

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


1        6.500     27.89                1.188
2        5.160     10.73                1.915
Largest stream flow has longer time of concentration
Qp =      6.500 + sum of
          Qb         Ia/Ib
           5.160 *    0.620 =      3.201
Qp =      9.701
```

```
Total of 2 streams to confluence:
Flow rates before confluence point:
       6.500       5.160
Area of streams before confluence:
        5.090        3.100
Results of confluence:
Total flow rate =      9.701(CFS)
Time of concentration =    27.888 min.
Effective stream area after confluence =      8.190(Ac.)


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Process from Point/Station      152.000 to Point/Station      154.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1462.800(Ft.)
Downstream point/station elevation =  1460.600(Ft.)
Pipe length  =   452.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.701(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     9.701(CFS)
Normal flow depth in pipe =   15.26(In.)
Flow top width inside pipe =   18.72(In.)
Critical Depth =   13.91(In.)
Pipe flow velocity =      5.18(Ft/s)
Travel time through pipe =    1.45 min.
Time of concentration (TC) =    29.34 min.


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Process from Point/Station      152.000 to Point/Station      154.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      8.190(Ac.)
Runoff from this stream =      9.701(CFS)
Time of concentration =   29.34 min.
Rainfall intensity =     1.158(In/Hr)
Summary of stream data:

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


1       19.950     14.45                1.650
2        9.701     29.34                1.158
Largest stream flow has longer or shorter time of concentration
Qp =     19.950 + sum of
          Qa          Tb/Ta
```

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          9.701 *    0.493 =      4.778
Qp =     24.728

Total of 2 main streams to confluence:
Flow rates before confluence point:
      19.950       9.701
Area of streams before confluence:
       12.880        8.190


Results of confluence:
Total flow rate =     24.728(CFS)
Time of concentration =    14.452 min.
Effective stream area after confluence  =     21.070(Ac.)


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Process from Point/Station      154.000 to Point/Station      155.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1460.600(Ft.)
Downstream point/station elevation =  1460.300(Ft.)
Pipe length  =    37.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    24.728(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    24.728(CFS)
Normal flow depth in pipe =   19.78(In.)
Flow top width inside pipe =   23.90(In.)
Critical Depth =   20.86(In.)
Pipe flow velocity =      7.92(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    14.53 min.
End of computations, total study area =           21.07 (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: 01/21/21 File:10B45.out

1932 Valle Reseda
Proposed Condition
10 Year Storm Event
Subarea A-4 & A-5

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

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

Program License Serial Number 6364

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 [San Jacinto] area used.
10 year storm 10 minute intensity = 1.980(In/Hr)
10 year storm 60 minute intensity = 0.810(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.810(In/Hr)
Slope of intensity duration curve = 0.5000

++
Process from Point/Station 35.000 to Point/Station 163.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 381.000(Ft.)
Top (of initial area) elevation = 1471.000(Ft.)
Bottom (of initial area) elevation = 1467.500(Ft.)

```
Difference in elevation =     3.500(Ft.)
Slope =    0.00919  s(percent)=       0.92
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.258 min.
Rainfall intensity =      2.183(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 =      1.407(CFS)
Total initial stream area =        0.740(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       35.000 to Point/Station      163.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      0.740(Ac.)
Runoff from this stream =      1.407(CFS)
Time of concentration =    8.26 min.
Rainfall intensity =     2.183(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       36.000 to Point/Station      163.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   404.000(Ft.)
Top (of initial area) elevation =  1471.000(Ft.)
Bottom (of initial area) elevation =  1467.500(Ft.)
Difference in elevation =     3.500(Ft.)
Slope =    0.00866  s(percent)=       0.87
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.553 min.
Rainfall intensity =      2.145(In/Hr) for a    10.0 year storm
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
Initial subarea runoff =      2.390(CFS)
```

```
Total initial stream area =        1.280(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       36.000 to Point/Station      163.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.280(Ac.)
Runoff from this stream =      2.390(CFS)
Time of concentration =    8.55 min.
Rainfall intensity =     2.145(In/Hr)
Summary of stream data:

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


1        1.407      8.26                2.183
2        2.390      8.55                2.145
Largest stream flow has longer time of concentration
Qp =      2.390 + sum of
          Qb         Ia/Ib
           1.407 *    0.983 =      1.382
Qp =      3.773

Total of 2 streams to confluence:
Flow rates before confluence point:
       1.407       2.390
Area of streams before confluence:
        0.740        1.280
Results of confluence:
Total flow rate =      3.773(CFS)
Time of concentration =     8.553 min.
Effective stream area after confluence =      2.020(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      163.000 to Point/Station      164.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1467.500(Ft.)
Downstream point/station elevation =  1464.000(Ft.)
Pipe length  =    41.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.773(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     3.773(CFS)
Normal flow depth in pipe =    5.98(In.)
Flow top width inside pipe =    8.50(In.)
```

Critical depth could not be calculated.
Pipe flow velocity = 12.10(Ft/s)
Travel time through pipe = 0.06 min.
Time of concentration (TC) = 8.61 min.
End of computations, total study area = 2.02 (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

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 01/21/21 File:10B67.out

1932 Valle Reseda
Proposed Conition
10 Year Storm Event
Subarea B-6 & B-7

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

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

Program License Serial Number 6364

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 [San Jacinto] area used.
10 year storm 10 minute intensity = 1.980(In/Hr)
10 year storm 60 minute intensity = 0.810(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.810(In/Hr)
Slope of intensity duration curve = 0.5000

++
Process from Point/Station 37.000 to Point/Station 38.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 357.000(Ft.)
Top (of initial area) elevation = 1473.000(Ft.)
Bottom (of initial area) elevation = 1471.200(Ft.)

```
Difference in elevation =     1.800(Ft.)
Slope =    0.00504  s(percent)=       0.50
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.071 min.
Rainfall intensity =      2.083(In/Hr) for a    10.0 year storm
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
Initial subarea runoff =      0.507(CFS)
Total initial stream area =        0.280(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       38.000 to Point/Station       39.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1471.200(Ft.)
End of street segment elevation =  1468.600(Ft.)
Length of street segment  =  1204.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  30.000(Ft.)
Distance from crown to crossfall grade break  =  28.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =   0.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      1.235(CFS)
Depth of flow =   0.275(Ft.), Average velocity =   0.911(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   7.426(Ft.)
Flow velocity =   0.91(Ft/s)
Travel time =   22.04 min.     TC =   31.11  min.
 Adding area flow to street
COMMERCIAL subarea type
Runoff Coefficient = 0.857
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
Rainfall intensity =      1.125(In/Hr) for a    10.0 year storm
Subarea runoff =      1.301(CFS) for      1.350(Ac.)
Total runoff =      1.808(CFS)  Total area =       1.630(Ac.)
Street flow at end of street =      1.808(CFS)
Half street flow at end of street =      0.904(CFS)
Depth of flow =   0.304(Ft.), Average velocity =   0.989(Ft/s)
Flow width (from curb towards crown)=   8.876(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       39.000 to Point/Station       40.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1468.600(Ft.)
Downstream point/station elevation =  1464.000(Ft.)
Pipe length  =    41.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.808(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     1.808(CFS)
Normal flow depth in pipe =    4.72(In.)
Flow top width inside pipe =    4.91(In.)
Critical depth could not be calculated.
Pipe flow velocity =     10.90(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =    31.17 min.
End of computations, total study area =            1.63 (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
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 01/21/21 File:10G.out

1932 Valle Reseda
Proposed Condition
10 Year Storm Event
Subarea G

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

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

Program License Serial Number 6364

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 [San Jacinto] area used.
10 year storm 10 minute intensity = 1.980(In/Hr)
10 year storm 60 minute intensity = 0.810(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.810(In/Hr)
Slope of intensity duration curve = 0.5000

++
Process from Point/Station 103.000 to Point/Station 104.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 579.000(Ft.)
Top (of initial area) elevation = 1478.800(Ft.)
Bottom (of initial area) elevation = 1475.900(Ft.)

```
Difference in elevation =     2.900(Ft.)
Slope =    0.00501  s(percent)=       0.50
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.022 min.
Rainfall intensity =      1.890(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 =      2.706(CFS)
Total initial stream area =        1.650(Ac.)
Pervious area fraction = 0.100
End of computations, total study area =            1.65 (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
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 01/21/21 File:10H.out

1932 Valle Reseda
Proposed Condition
10 Year Storm event
Subarea H

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

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

Program License Serial Number 6364

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 [San Jacinto] area used.
10 year storm 10 minute intensity = 1.980(In/Hr)
10 year storm 60 minute intensity = 0.810(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.810(In/Hr)
Slope of intensity duration curve = 0.5000

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

Initial area flow distance = 474.000(Ft.)
Top (of initial area) elevation = 1478.700(Ft.)
Bottom (of initial area) elevation = 1474.800(Ft.)

```
Difference in elevation =     3.900(Ft.)
Slope =    0.00823  s(percent)=       0.82
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.212 min.
Rainfall intensity =      2.067(In/Hr) for a    10.0 year storm
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
Initial subarea runoff =      2.607(CFS)
Total initial stream area =        1.450(Ac.)
Pervious area fraction = 0.100
End of computations, total study area =            1.45 (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
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 01/21/21 File:100A.out

1932 Valle Reseda
Proposed Condition
100 Year Storm Event
Subarea A

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

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

Program License Serial Number 6364

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 [San Jacinto] area used.
10 year storm 10 minute intensity = 1.980(In/Hr)
10 year storm 60 minute intensity = 0.810(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.200(In/Hr)
Slope of intensity duration curve = 0.5000

++
Process from Point/Station 11.000 to Point/Station 12.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 449.000(Ft.)
Top (of initial area) elevation = 1477.900(Ft.)
Bottom (of initial area) elevation = 1474.500(Ft.)

```
Difference in elevation =     3.400(Ft.)
Slope =    0.00757  s(percent)=       0.76
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.166 min.
Rainfall intensity =      3.070(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 =      3.410(CFS)
Total initial stream area =        1.250(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station      151.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1474.500(Ft.)
End of street segment elevation =  1470.900(Ft.)
Length of street segment  =   342.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  42.000(Ft.)
Distance from crown to crossfall grade break  =  40.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =   0.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      5.434(CFS)
Depth of flow =   0.330(Ft.), Average velocity =   2.340(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  10.170(Ft.)
Flow velocity =   2.34(Ft/s)
Travel time =    2.44 min.     TC =   11.60  min.
 Adding area flow to street
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
Rainfall intensity =      2.729(In/Hr) for a   100.0 year storm
Subarea runoff =      3.923(CFS) for      1.620(Ac.)
Total runoff =      7.333(CFS)  Total area =       2.870(Ac.)
Street flow at end of street =      7.333(CFS)
Half street flow at end of street =      3.666(CFS)
Depth of flow =   0.358(Ft.), Average velocity =   2.509(Ft/s)
Flow width (from curb towards crown)=  11.554(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station      151.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      2.870(Ac.)
Runoff from this stream =      7.333(CFS)
Time of concentration =   11.60 min.
Rainfall intensity =     2.729(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station      151.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   716.000(Ft.)
Top (of initial area) elevation =  1476.200(Ft.)
Bottom (of initial area) elevation =  1470.900(Ft.)
Difference in elevation =     5.300(Ft.)
Slope =    0.00740  s(percent)=       0.74
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.097 min.
Rainfall intensity =      2.790(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 =      6.166(CFS)
Total initial stream area =        2.490(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station      151.000
```

**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 2.490(Ac.)
Runoff from this stream = 6.166(CFS)
Time of concentration = 11.10 min.
Rainfall intensity = 2.790(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	7.333	11.60	2.729
2	6.166	11.10	2.790

Largest stream flow has longer time of concentration
Qp = 7.333 + sum of

Qb	Ia/Ib	
6.166 *	0.978 =	6.031

Qp = 13.363

Total of 2 streams to confluence:
Flow rates before confluence point:
7.333 6.166
Area of streams before confluence:
2.870 2.490
Results of confluence:
Total flow rate = 13.363(CFS)
Time of concentration = 11.602 min.
Effective stream area after confluence = 5.360(Ac.)

++
Process from Point/Station 151.000 to Point/Station 152.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1470.900(Ft.)
Downstream point/station elevation = 1462.800(Ft.)
Pipe length = 30.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 13.363(CFS)
Nearest computed pipe diameter = 12.00(In.)
Calculated individual pipe flow = 13.363(CFS)
Normal flow depth in pipe = 7.55(In.)
Flow top width inside pipe = 11.59(In.)
Critical depth could not be calculated.
Pipe flow velocity = 25.67(Ft/s)
Travel time through pipe = 0.02 min.
Time of concentration (TC) = 11.62 min.

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      151.000 to Point/Station      152.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      5.360(Ac.)
Runoff from this stream =     13.363(CFS)
Time of concentration =   11.62 min.
Rainfall intensity =     2.727(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       15.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------------
Initial area flow distance =   498.000(Ft.)
Top (of initial area) elevation =  1474.600(Ft.)
Bottom (of initial area) elevation =  1470.900(Ft.)
Difference in elevation =     3.700(Ft.)
Slope =    0.00743  s(percent)=       0.74
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.590 min.
Rainfall intensity =      3.002(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 =      6.266(CFS)
Total initial stream area =        2.350(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.000 to Point/Station      152.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------------
Upstream point/station elevation =  1470.900(Ft.)
Downstream point/station elevation =  1462.800(Ft.)
Pipe length  =    21.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.266(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     6.266(CFS)
Normal flow depth in pipe =    5.07(In.)
Flow top width inside pipe =    8.93(In.)
Critical depth could not be calculated.
Pipe flow velocity =     24.40(Ft/s)
```

```
Travel time through pipe =    0.01 min.
Time of concentration (TC) =     9.60 min.


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Process from Point/Station       15.000 to Point/Station      152.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.350(Ac.)
Runoff from this stream =      6.266(CFS)
Time of concentration =    9.60 min.
Rainfall intensity =     2.999(In/Hr)
Summary of stream data:

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


1       13.363     11.62                 2.727
2        6.266      9.60                 2.999
Largest stream flow has longer time of concentration
Qp =     13.363 + sum of
          Qb         Ia/Ib
           6.266 *    0.909 =      5.696
Qp =     19.059

Total of 2 streams to confluence:
Flow rates before confluence point:
      13.363       6.266
Area of streams before confluence:
        5.360        2.350
Results of confluence:
Total flow rate =     19.059(CFS)
Time of concentration =    11.621 min.
Effective stream area after confluence =      7.710(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      152.000 to Point/Station      153.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1462.800(Ft.)
Downstream point/station elevation =  1461.000(Ft.)
Pipe length  =   670.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    19.059(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    19.059(CFS)
Normal flow depth in pipe =   22.17(In.)
Flow top width inside pipe =   26.35(In.)
```

```
Critical Depth =   17.77(In.)
Pipe flow velocity =      4.90(Ft/s)
Travel time through pipe =    2.28 min.
Time of concentration (TC) =    13.90 min.


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Process from Point/Station      152.000 to Point/Station      153.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      7.710(Ac.)
Runoff from this stream =     19.059(CFS)
Time of concentration =   13.90 min.
Rainfall intensity =     2.493(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       16.000 to Point/Station       17.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   523.000(Ft.)
Top (of initial area) elevation =  1477.600(Ft.)
Bottom (of initial area) elevation =  1467.200(Ft.)
Difference in elevation =    10.400(Ft.)
Slope =    0.01989  s(percent)=       1.99
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.032 min.
Rainfall intensity =      3.280(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 =      6.270(CFS)
Total initial stream area =        2.150(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       17.000 to Point/Station      153.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1467.200(Ft.)
Downstream point/station elevation =  1461.000(Ft.)
Pipe length  =    21.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.270(CFS)
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```
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     6.270(CFS)
Normal flow depth in pipe =    5.54(In.)
Flow top width inside pipe =    8.76(In.)
Critical depth could not be calculated.
Pipe flow velocity =     22.00(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =     8.05 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       17.000 to Point/Station      153.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.150(Ac.)
Runoff from this stream =      6.270(CFS)
Time of concentration =    8.05 min.
Rainfall intensity =     3.277(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       18.000 to Point/Station       19.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   536.000(Ft.)
Top (of initial area) elevation =  1477.600(Ft.)
Bottom (of initial area) elevation =  1467.200(Ft.)
Difference in elevation =    10.400(Ft.)
Slope =    0.01940  s(percent)=       1.94
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.151 min.
Rainfall intensity =      3.256(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 =      8.742(CFS)
Total initial stream area =        3.020(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       19.000 to Point/Station      153.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
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```
Upstream point/station elevation =  1467.200(Ft.)
Downstream point/station elevation =  1461.000(Ft.)
Pipe length  =    30.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.742(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     8.742(CFS)
Normal flow depth in pipe =    6.28(In.)
Flow top width inside pipe =   11.99(In.)
Critical depth could not be calculated.
Pipe flow velocity =     21.02(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =     8.17 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       19.000 to Point/Station      153.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 3
Stream flow area =      3.020(Ac.)
Runoff from this stream =      8.742(CFS)
Time of concentration =    8.17 min.
Rainfall intensity =     3.251(In/Hr)
Summary of stream data:

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


1       19.059     13.90                2.493
2        6.270      8.05                3.277
3        8.742      8.17                3.251
Largest stream flow has longer time of concentration
Qp =     19.059 + sum of
          Qb         Ia/Ib
           6.270 *    0.761 =      4.771
          Qb         Ia/Ib
           8.742 *    0.767 =      6.704
Qp =     30.534

Total of 3 streams to confluence:
Flow rates before confluence point:
      19.059       6.270       8.742
Area of streams before confluence:
        7.710        2.150        3.020
Results of confluence:
Total flow rate =     30.534(CFS)
Time of concentration =    13.901 min.
Effective stream area after confluence =     12.880(Ac.)
```

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Process from Point/Station      153.000 to Point/Station      154.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1461.000(Ft.)
Downstream point/station elevation =  1460.300(Ft.)
Pipe length  =    52.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    30.534(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    30.534(CFS)
Normal flow depth in pipe =   19.13(In.)
Flow top width inside pipe =   24.54(In.)
Critical Depth =   22.93(In.)
Pipe flow velocity =     10.14(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =    13.99 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      153.000 to Point/Station      154.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     12.880(Ac.)
Runoff from this stream =     30.534(CFS)
Time of concentration =   13.99 min.
Rainfall intensity =     2.485(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       22.000 to Point/Station       23.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   345.000(Ft.)
Top (of initial area) elevation =  1476.200(Ft.)
Bottom (of initial area) elevation =  1467.200(Ft.)
Difference in elevation =     9.000(Ft.)
Slope =    0.02609  s(percent)=       2.61
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.441 min.
Rainfall intensity =      3.662(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 =      3.749(CFS)
Total initial stream area =        1.150(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       23.000 to Point/Station       24.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1467.200(Ft.)
End of street segment elevation =  1467.000(Ft.)
Length of street segment  =   733.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  19.000(Ft.)
Distance from crown to crossfall grade break  =  17.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =   0.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      7.086(CFS)
Depth of flow =   0.585(Ft.), Average velocity =   0.679(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  19.000(Ft.)
Flow velocity =   0.68(Ft/s)
Travel time =   17.99 min.     TC =   24.43  min.
 Adding area flow to street
COMMERCIAL subarea type
Runoff Coefficient = 0.883
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
Rainfall intensity =      1.881(In/Hr) for a   100.0 year storm
Subarea runoff =      6.540(CFS) for      3.940(Ac.)
Total runoff =     10.289(CFS)  Total area =       5.090(Ac.)
Street flow at end of street =     10.289(CFS)
Half street flow at end of street =      5.145(CFS)
Depth of flow =   0.653(Ft.), Average velocity =   0.788(Ft/s)
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Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  19.000(Ft.)


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Process from Point/Station       24.000 to Point/Station      152.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
____________________________________________________________________________
Upstream point/station elevation =  1467.000(Ft.)
Downstream point/station elevation =  1462.800(Ft.)
Pipe length  =    30.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    10.289(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =    10.289(CFS)
Normal flow depth in pipe =    7.91(In.)
Flow top width inside pipe =   11.38(In.)
Critical depth could not be calculated.
Pipe flow velocity =     18.73(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =    24.46 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       24.000 to Point/Station      152.000
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      5.090(Ac.)
Runoff from this stream =     10.289(CFS)
Time of concentration =   24.46 min.
Rainfall intensity =     1.880(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       20.000 to Point/Station       21.000
**** INITIAL AREA EVALUATION ****
____________________________________________________________________________
Initial area flow distance =   662.000(Ft.)
Top (of initial area) elevation =  1472.000(Ft.)
Bottom (of initial area) elevation =  1467.000(Ft.)
Difference in elevation =     5.000(Ft.)
Slope =    0.00755  s(percent)=       0.76
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.711 min.
Rainfall intensity =      2.840(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
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```
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 =      7.816(CFS)
Total initial stream area =        3.100(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       21.000 to Point/Station      152.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1467.000(Ft.)
Downstream point/station elevation =  1462.800(Ft.)
Pipe length  =    21.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.816(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     7.816(CFS)
Normal flow depth in pipe =    5.93(In.)
Flow top width inside pipe =   12.00(In.)
Critical depth could not be calculated.
Pipe flow velocity =     20.19(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =    10.73 min.


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Process from Point/Station       21.000 to Point/Station      152.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      3.100(Ac.)
Runoff from this stream =      7.816(CFS)
Time of concentration =   10.73 min.
Rainfall intensity =     2.838(In/Hr)
Summary of stream data:

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


1       10.289     24.46                1.880
2        7.816     10.73                2.838
Largest stream flow has longer time of concentration
Qp =     10.289 + sum of
          Qb         Ia/Ib
           7.816 *    0.662 =      5.177
Qp =     15.466
```

```
Total of 2 streams to confluence:
Flow rates before confluence point:
      10.289       7.816
Area of streams before confluence:
        5.090        3.100
Results of confluence:
Total flow rate =     15.466(CFS)
Time of concentration =    24.455 min.
Effective stream area after confluence =      8.190(Ac.)


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Process from Point/Station      152.000 to Point/Station      154.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1462.800(Ft.)
Downstream point/station elevation =  1460.600(Ft.)
Pipe length  =   452.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    15.466(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    15.466(CFS)
Normal flow depth in pipe =   19.27(In.)
Flow top width inside pipe =   19.10(In.)
Critical Depth =   17.01(In.)
Pipe flow velocity =      5.73(Ft/s)
Travel time through pipe =    1.32 min.
Time of concentration (TC) =    25.77 min.


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Process from Point/Station      152.000 to Point/Station      154.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      8.190(Ac.)
Runoff from this stream =     15.466(CFS)
Time of concentration =   25.77 min.
Rainfall intensity =     1.831(In/Hr)
Summary of stream data:

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


1       30.534     13.99                2.485
2       15.466     25.77                1.831
Largest stream flow has longer or shorter time of concentration
Qp =     30.534 + sum of
          Qa          Tb/Ta
```

```
          15.466 *    0.543 =      8.394
Qp =     38.928

Total of 2 main streams to confluence:
Flow rates before confluence point:
      30.534      15.466
Area of streams before confluence:
       12.880        8.190


Results of confluence:
Total flow rate =     38.928(CFS)
Time of concentration =    13.986 min.
Effective stream area after confluence  =     21.070(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      154.000 to Point/Station      155.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1460.600(Ft.)
Downstream point/station elevation =  1460.300(Ft.)
Pipe length  =    37.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    38.928(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    38.928(CFS)
Normal flow depth in pipe =   26.44(In.)
Flow top width inside pipe =   19.41(In.)
Critical Depth =   25.24(In.)
Pipe flow velocity =      8.51(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =    14.06 min.
End of computations, total study area =           21.07 (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
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 01/21/21 File:100B123.out

1932 Valle Reseda
Proposed Condtion
100 Year Storm Event
Subarea B-1, B-2 & B-3

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

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

Program License Serial Number 6364

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 [San Jacinto] area used.
10 year storm 10 minute intensity = 1.980(In/Hr)
10 year storm 60 minute intensity = 0.810(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.200(In/Hr)
Slope of intensity duration curve = 0.5000

++
Process from Point/Station 31.000 to Point/Station 32.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 789.000(Ft.)
Top (of initial area) elevation = 1474.400(Ft.)
Bottom (of initial area) elevation = 1468.900(Ft.)

```
Difference in elevation =     5.500(Ft.)
Slope =    0.00697  s(percent)=       0.70
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.676 min.
Rainfall intensity =      2.720(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 =      8.616(CFS)
Total initial stream area =        3.570(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       32.000 to Point/Station      161.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1468.900(Ft.)
Downstream point/station elevation =  1468.600(Ft.)
Pipe length  =    41.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.616(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     8.616(CFS)
Normal flow depth in pipe =   14.13(In.)
Flow top width inside pipe =   14.79(In.)
Critical Depth =   13.64(In.)
Pipe flow velocity =      5.79(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =    11.79 min.


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Process from Point/Station       32.000 to Point/Station      161.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      3.570(Ac.)
Runoff from this stream =      8.616(CFS)
Time of concentration =   11.79 min.
Rainfall intensity =     2.707(In/Hr)


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Process from Point/Station       33.000 to Point/Station       34.000
**** INITIAL AREA EVALUATION ****
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Initial area flow distance =   308.000(Ft.)
Top (of initial area) elevation =  1475.100(Ft.)
Bottom (of initial area) elevation =  1472.300(Ft.)
Difference in elevation =     2.800(Ft.)
Slope =    0.00909  s(percent)=       0.91
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.600 min.
Rainfall intensity =      3.372(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 =      2.669(CFS)
Total initial stream area =        0.890(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       34.000 to Point/Station      161.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
Top of street segment elevation =  1472.300(Ft.)
End of street segment elevation =  1468.600(Ft.)
Length of street segment  =   657.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =   0.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      9.176(CFS)
Depth of flow =   0.415(Ft.), Average velocity =   2.084(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  14.403(Ft.)
Flow velocity =   2.08(Ft/s)
Travel time =    5.25 min.     TC =   12.85  min.
 Adding area flow to street
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
Rainfall intensity =      2.593(In/Hr) for a   100.0 year storm
Subarea runoff =     12.874(CFS) for      5.600(Ac.)
Total runoff =     15.543(CFS)  Total area =       6.490(Ac.)
Street flow at end of street =     15.543(CFS)
Half street flow at end of street =      7.771(CFS)
Depth of flow =   0.482(Ft.), Average velocity =   2.368(Ft/s)
Flow width (from curb towards crown)=  17.762(Ft.)


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Process from Point/Station       34.000 to Point/Station      161.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      6.490(Ac.)
Runoff from this stream =     15.543(CFS)
Time of concentration =   12.85 min.
Rainfall intensity =     2.593(In/Hr)
Summary of stream data:

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


1        8.616     11.79                2.707
2       15.543     12.85                2.593
Largest stream flow has longer time of concentration
Qp =     15.543 + sum of
          Qb         Ia/Ib
           8.616 *    0.958 =      8.254
Qp =     23.797

Total of 2 streams to confluence:
Flow rates before confluence point:
       8.616      15.543
Area of streams before confluence:
        3.570        6.490
Results of confluence:
Total flow rate =     23.797(CFS)
Time of concentration =    12.854 min.
Effective stream area after confluence =     10.060(Ac.)
```

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Process from Point/Station      161.000 to Point/Station      162.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1468.600(Ft.)
Downstream point/station elevation =  1467.000(Ft.)
Pipe length  =    38.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    23.797(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    23.797(CFS)
Normal flow depth in pipe =   13.34(In.)
Flow top width inside pipe =   20.22(In.)
Critical depth could not be calculated.
Pipe flow velocity =     14.76(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =    12.90 min.
End of computations, total study area =           10.06 (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
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 01/21/21 File:100B45.out

1932 Valle Reseda
Proposed Condition
100 Year Storm Event
Subarea A-4 & A-5

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

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

Program License Serial Number 6364

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 [San Jacinto] area used.
10 year storm 10 minute intensity = 1.980(In/Hr)
10 year storm 60 minute intensity = 0.810(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.200(In/Hr)
Slope of intensity duration curve = 0.5000

++

Process from Point/Station 35.000 to Point/Station 163.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 381.000(Ft.)
Top (of initial area) elevation = 1471.000(Ft.)
Bottom (of initial area) elevation = 1467.500(Ft.)

```
Difference in elevation =     3.500(Ft.)
Slope =    0.00919  s(percent)=       0.92
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.258 min.
Rainfall intensity =      3.235(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 =      2.128(CFS)
Total initial stream area =        0.740(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       35.000 to Point/Station      163.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      0.740(Ac.)
Runoff from this stream =      2.128(CFS)
Time of concentration =    8.26 min.
Rainfall intensity =     3.235(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       36.000 to Point/Station      163.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   404.000(Ft.)
Top (of initial area) elevation =  1471.000(Ft.)
Bottom (of initial area) elevation =  1467.500(Ft.)
Difference in elevation =     3.500(Ft.)
Slope =    0.00866  s(percent)=       0.87
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.553 min.
Rainfall intensity =      3.178(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 =      3.616(CFS)
```

```
Total initial stream area =        1.280(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       36.000 to Point/Station      163.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.280(Ac.)
Runoff from this stream =      3.616(CFS)
Time of concentration =    8.55 min.
Rainfall intensity =     3.178(In/Hr)
Summary of stream data:

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


1        2.128      8.26                3.235
2        3.616      8.55                3.178
Largest stream flow has longer time of concentration
Qp =      3.616 + sum of
          Qb         Ia/Ib
           2.128 *    0.983 =      2.091
Qp =      5.707

Total of 2 streams to confluence:
Flow rates before confluence point:
       2.128       3.616
Area of streams before confluence:
        0.740        1.280
Results of confluence:
Total flow rate =      5.707(CFS)
Time of concentration =     8.553 min.
Effective stream area after confluence =      2.020(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      163.000 to Point/Station      164.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1467.500(Ft.)
Downstream point/station elevation =  1464.000(Ft.)
Pipe length  =    41.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.707(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     5.707(CFS)
Normal flow depth in pipe =    6.34(In.)
Flow top width inside pipe =   11.98(In.)
```

Critical Depth = 11.35(In.)
Pipe flow velocity = 13.56(Ft/s)
Travel time through pipe = 0.05 min.
Time of concentration (TC) = 8.60 min.
End of computations, total study area = 2.02 (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

Riverside County Rational Hydrology Program

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Rational Hydrology Study Date: 01/21/21 File:100B67.out

1932 Valle Reseda
Proposed Conition
100 Year Storm Event
Subarea B-6 & B-7

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

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

Program License Serial Number 6364

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 [San Jacinto] area used.
10 year storm 10 minute intensity = 1.980(In/Hr)
10 year storm 60 minute intensity = 0.810(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.200(In/Hr)
Slope of intensity duration curve = 0.5000

++
Process from Point/Station 37.000 to Point/Station 38.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 357.000(Ft.)
Top (of initial area) elevation = 1473.000(Ft.)
Bottom (of initial area) elevation = 1471.200(Ft.)

```
Difference in elevation =     1.800(Ft.)
Slope =    0.00504  s(percent)=       0.50
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.071 min.
Rainfall intensity =      3.086(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 =      0.768(CFS)
Total initial stream area =        0.280(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       38.000 to Point/Station       39.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =  1471.200(Ft.)
End of street segment elevation =  1468.600(Ft.)
Length of street segment  =  1204.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  30.000(Ft.)
Distance from crown to crossfall grade break  =  28.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =   0.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      1.848(CFS)
Depth of flow =   0.306(Ft.), Average velocity =   0.993(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   8.964(Ft.)
Flow velocity =   0.99(Ft/s)
Travel time =   20.20 min.     TC =   29.27  min.
 Adding area flow to street
COMMERCIAL subarea type
Runoff Coefficient = 0.881
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
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```
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  74.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      1.718(In/Hr) for a   100.0 year storm
Subarea runoff =      2.044(CFS) for      1.350(Ac.)
Total runoff =      2.812(CFS)  Total area =       1.630(Ac.)
Street flow at end of street =      2.812(CFS)
Half street flow at end of street =      1.406(CFS)
Depth of flow =   0.342(Ft.), Average velocity =   1.093(Ft/s)
Flow width (from curb towards crown)=  10.769(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       39.000 to Point/Station       40.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1468.600(Ft.)
Downstream point/station elevation =  1464.000(Ft.)
Pipe length  =    41.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.812(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     2.812(CFS)
Normal flow depth in pipe =    4.54(In.)
Flow top width inside pipe =    9.00(In.)
Critical Depth =    8.54(In.)
Pipe flow velocity =     12.59(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =    29.32 min.
End of computations, total study area =            1.63 (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
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
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1932 Valle Reseda
Proposed Condition
100 Year Storm Event
Subarea G

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

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

Program License Serial Number 6364

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 [San Jacinto] area used.
10 year storm 10 minute intensity = 1.980(In/Hr)
10 year storm 60 minute intensity = 0.810(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.200(In/Hr)
Slope of intensity duration curve = 0.5000

++

Process from Point/Station 103.000 to Point/Station 104.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 579.000(Ft.)
Top (of initial area) elevation = 1478.800(Ft.)
Bottom (of initial area) elevation = 1475.900(Ft.)

```
Difference in elevation =     2.900(Ft.)
Slope =    0.00501  s(percent)=       0.50
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.022 min.
Rainfall intensity =      2.800(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 =      4.100(CFS)
Total initial stream area =        1.650(Ac.)
Pervious area fraction = 0.100
End of computations, total study area =            1.65 (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
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 01/21/21 File:100H.out

1932 Valle Reseda
Proposed Condition
100 Year Storm Event
Subarea H

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

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

Program License Serial Number 6364

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 [San Jacinto] area used.
10 year storm 10 minute intensity = 1.980(In/Hr)
10 year storm 60 minute intensity = 0.810(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.200(In/Hr)
Slope of intensity duration curve = 0.5000

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

Initial area flow distance = 474.000(Ft.)
Top (of initial area) elevation = 1478.700(Ft.)
Bottom (of initial area) elevation = 1474.800(Ft.)

```
Difference in elevation =     3.900(Ft.)
Slope =    0.00823  s(percent)=       0.82
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.212 min.
Rainfall intensity =      3.062(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 =      3.945(CFS)
Total initial stream area =        1.450(Ac.)
Pervious area fraction = 0.100
End of computations, total study area =            1.45 (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
```