

Preliminary Hydrology

FOR:

**Tentative Parcel Map 39217
(APN 177-020-084 & -085)**

IN THE CITY OF JURUPA VALLEY
RIVERSIDE COUNTY

FOR OWNER:

Providence Administrative Consulting Services
262 North University Avenue
Farmington, UT 84025

PREPARED BY:

SIKAND ENGINEERING ASSOCIATES

15230 BURBANK BLVD. STE 100
VAN NUYS, CA 91411
818-787-8550

Doug Farmer, Civil Engineer



A handwritten signature in black ink, appearing to read "Doug Farmer", located below the professional seal.

W.O. 5124-011

Date: 7-14-2025

TABLE OF CONTENTS

SECTION 1

NARRATIVE

SECTION 2

HYDROLOGIC INFORMATION

SECTION 3

EXISTING CONDITION

Rational Method Calculations (CivilDesign)

100-year Design Storm

Existing Hydrology Map

SECTION 4

PROPOSED CONDITION

Rational Method Calculations (CivilDesign)

100-year Design Storm

10-year Storm

Proposed Hydrology Map

SECTION 5

PROPOSED HYDROGRAPH

CALCULATION

Synthetic Hydrograph Analysis for Existing versus Proposed

100-year, 3-hour Design Storm

SECTION 6

PRELIMINARY SITE RETENTION

Retention Basin Calculations and Exhibit

Infiltration Drawdown Calculation

SECTION 1

I. NARRATIVE

A. Introduction

This report shows the results of the preliminary drainage analysis for the proposed commercial development, Tentative Parcel Map 39217 located at 6401 33rd Street in the City of Jurupa Valley, County of Riverside, California. The site is located between 33rd Street and 30th Street, east of Apple Avenue and west of Winter Park Avenue, see Vicinity Map in Section 2. The purpose of this analysis is to compare the storm event conditions of the onsite Pre-Development versus the Post-Development, to comply with the requirements established by the City of Jurupa Valley, and to provide the criteria for the design of the on-site storm drain systems and other related drainage devices.

B. Scope of Project

The proposed development is the addition of a new Skilled Nursing Facility and construction of a new Medical Office building. The site consists of one lot which will be divided into three new parcels per Parcel Map. Parcel 1 is the existing Skilled Nursing Facility; Parcel 2 is the Skilled Nursing Facility expansion and Parcel 3 is the Medical Office Building. The development includes 2 new buildings and associated parking lots. 33rd Street will be extended to a proposed offset cul-de-sac at the southeast corner of the project. A storm drain will be constructed in the easterly portion of 33rd Street which will connect to an existing Riverside County drain (Sunnyslope Drain). A retention / detention basin is proposed at the southeast corner of the project to mitigate the drainage impacts of the development. See Proposed Condition Hydrology Map in Section 4.

C. Site Description

The project site is bounded by 33rd Street on the south, a vacant lot that will be developed as residential use on the north and existing residential development on the east and west sides. The current existing condition of the site is an existing Skilled Nursing Facility consisting of a building and associated parking lots on the southwest corner of the site. The remainder of the site is undeveloped vacant property that is covered with vegetation. The site is sloped from northwest to southeast with elevations ranging from a high of 904 feet to a low of 884 feet. There is an existing storm drain (Sunnyslope Drain) that crosses the northeast corner of the project and runs parallel to the project's easterly boundary. See Existing Conditions Hydrology Map (Section 3).

II. SYSTEM SCHEMATIC

A. Proposed Surface Improvements

See Proposed Condition Hydrology Map (Section 4)

B. Proposed Flood Control Facilities

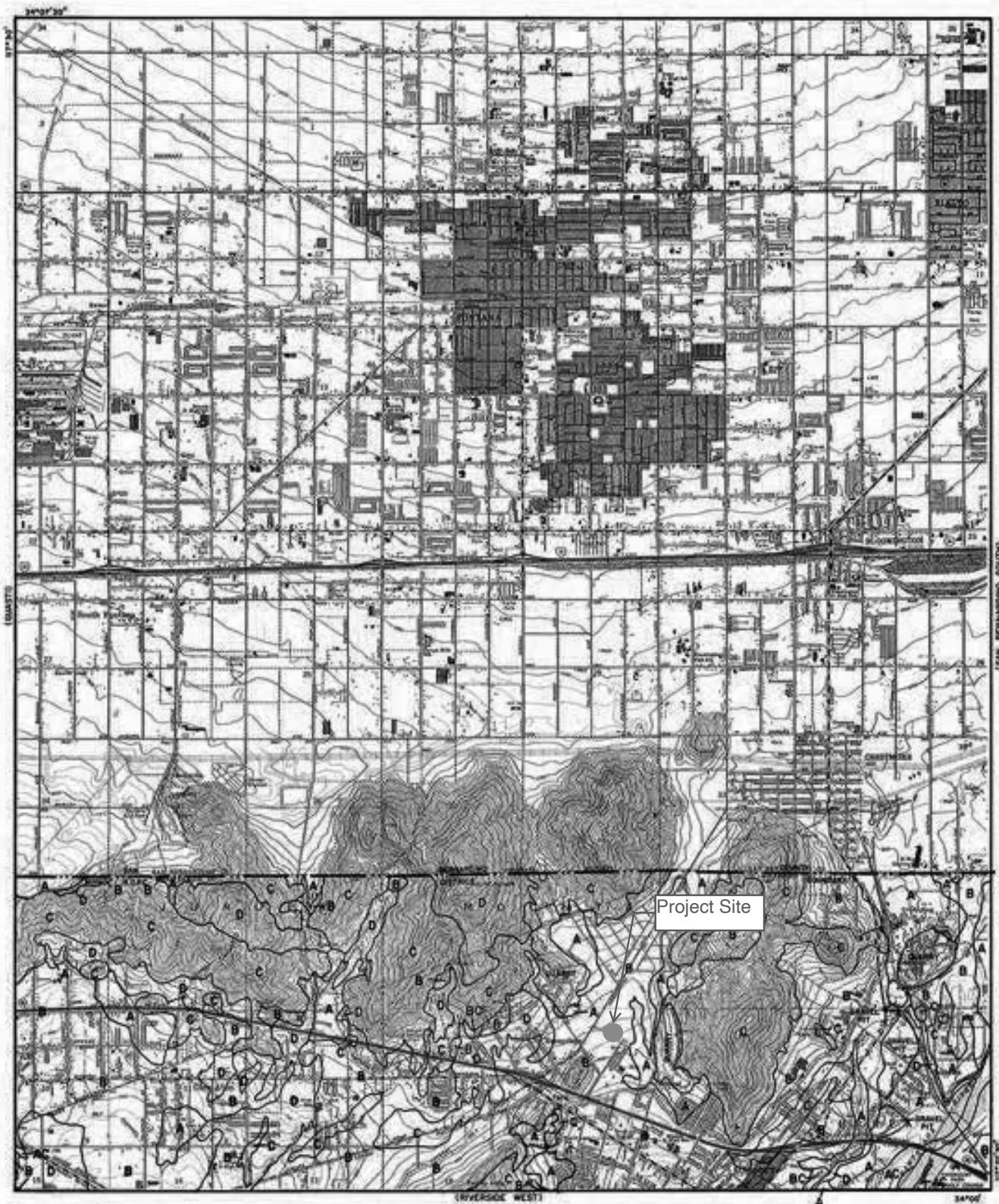
See Proposed Condition Hydrology Map (Section 4) and Retention/Detention Basin Basin Exhibit (Section 6).

III. PRELIMINARY DRAINAGE SUMMARY

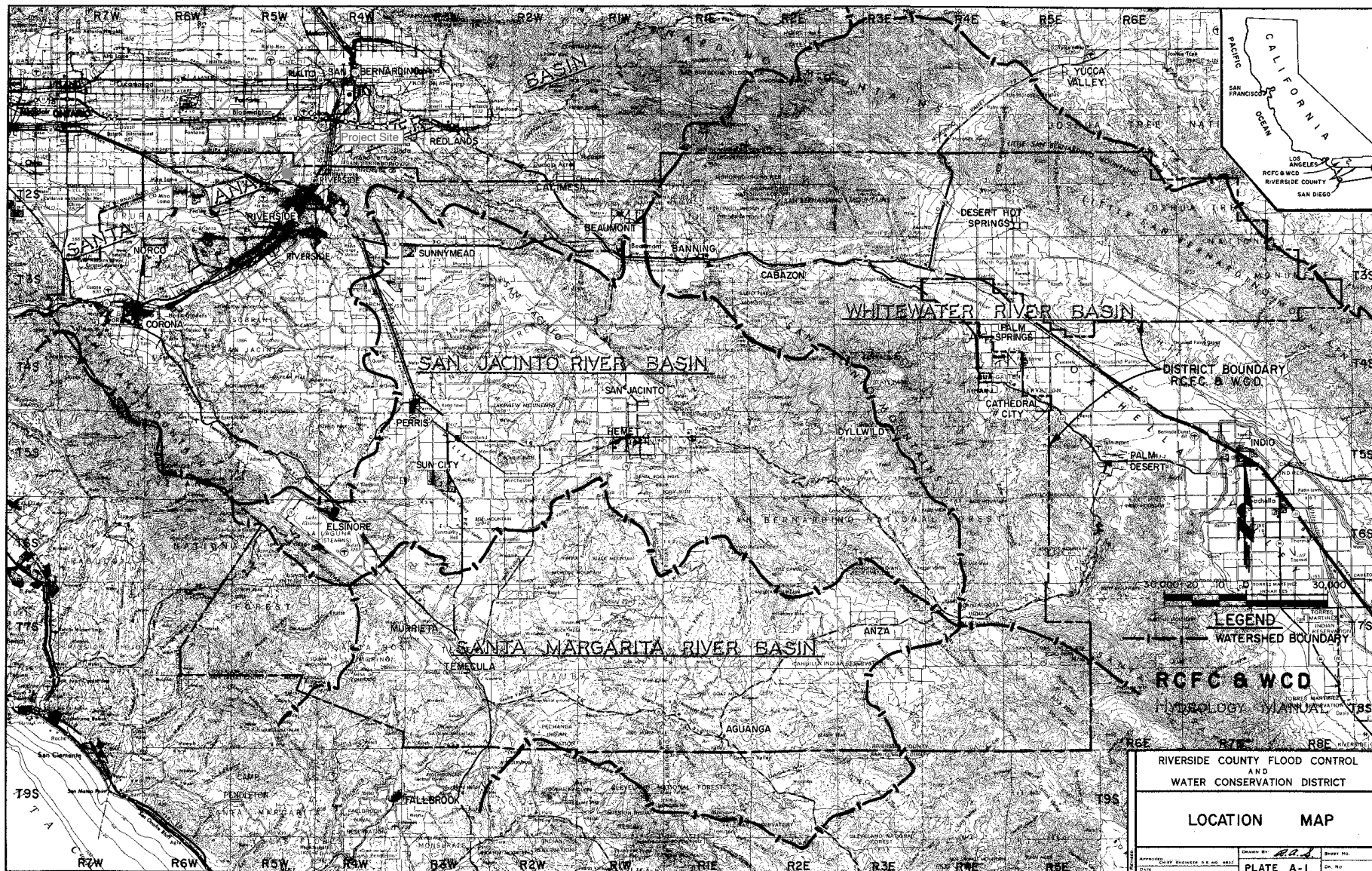
D. Introduction

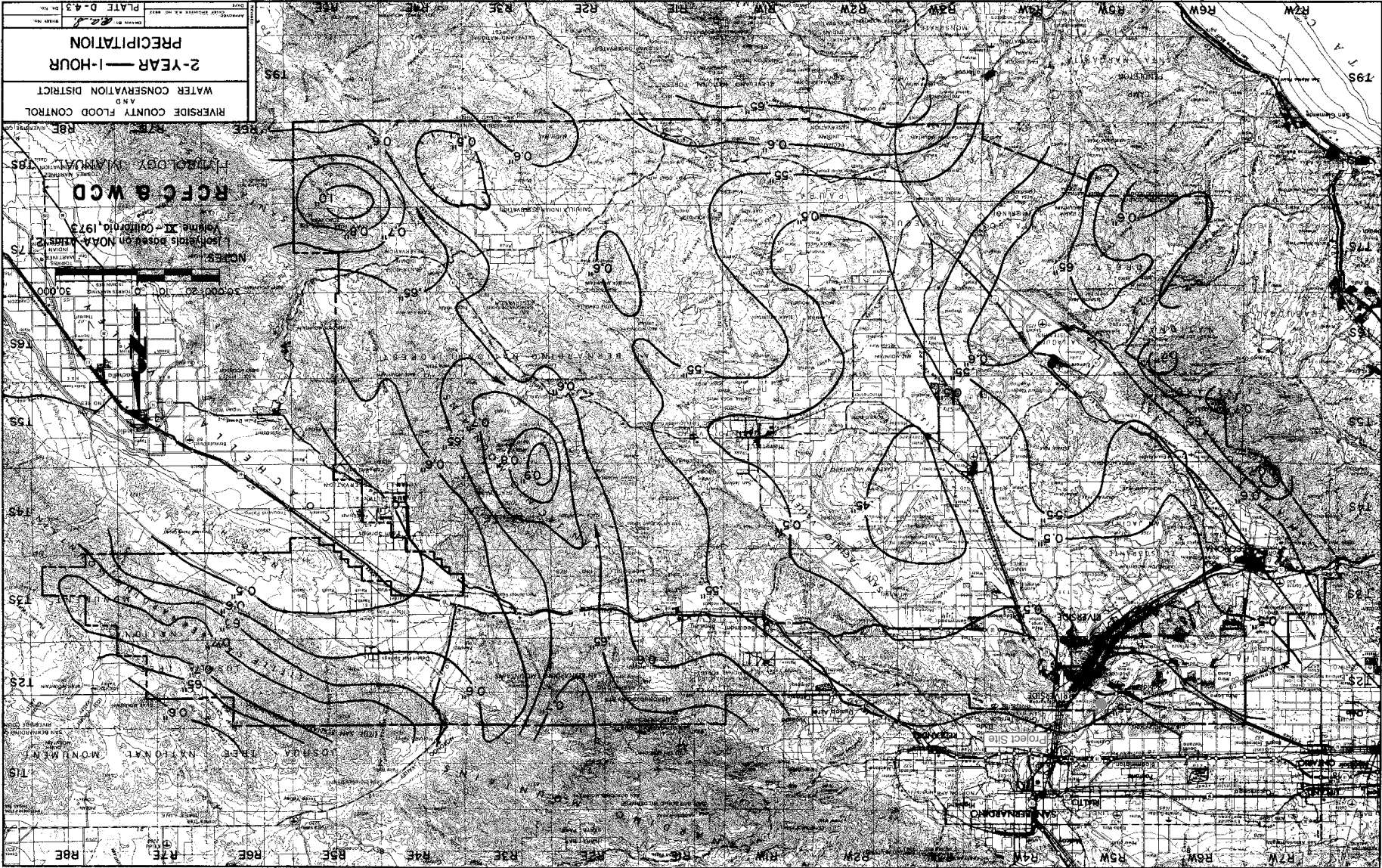
The preliminary onsite drainage analysis shows a 100-year storm peak discharge of 40.7 cfs for proposed development versus 38.9 cfs for existing condition. To mitigate this increase in Q, the proposed retention/detention basin is provided with a retention capacity of 15,013 cu-ft. The basin handles the volume difference between the proposed condition 100-year, 24 hour flood volume and the existing volume for the same return period which equals 9,532 cu-ft (see Section 5, Runoff Volume Calculation), while releasing a post-development, post retention/detention Q100 of 40.7 cfs. This volume reduction shows that there is no drainage impact on downstream systems.

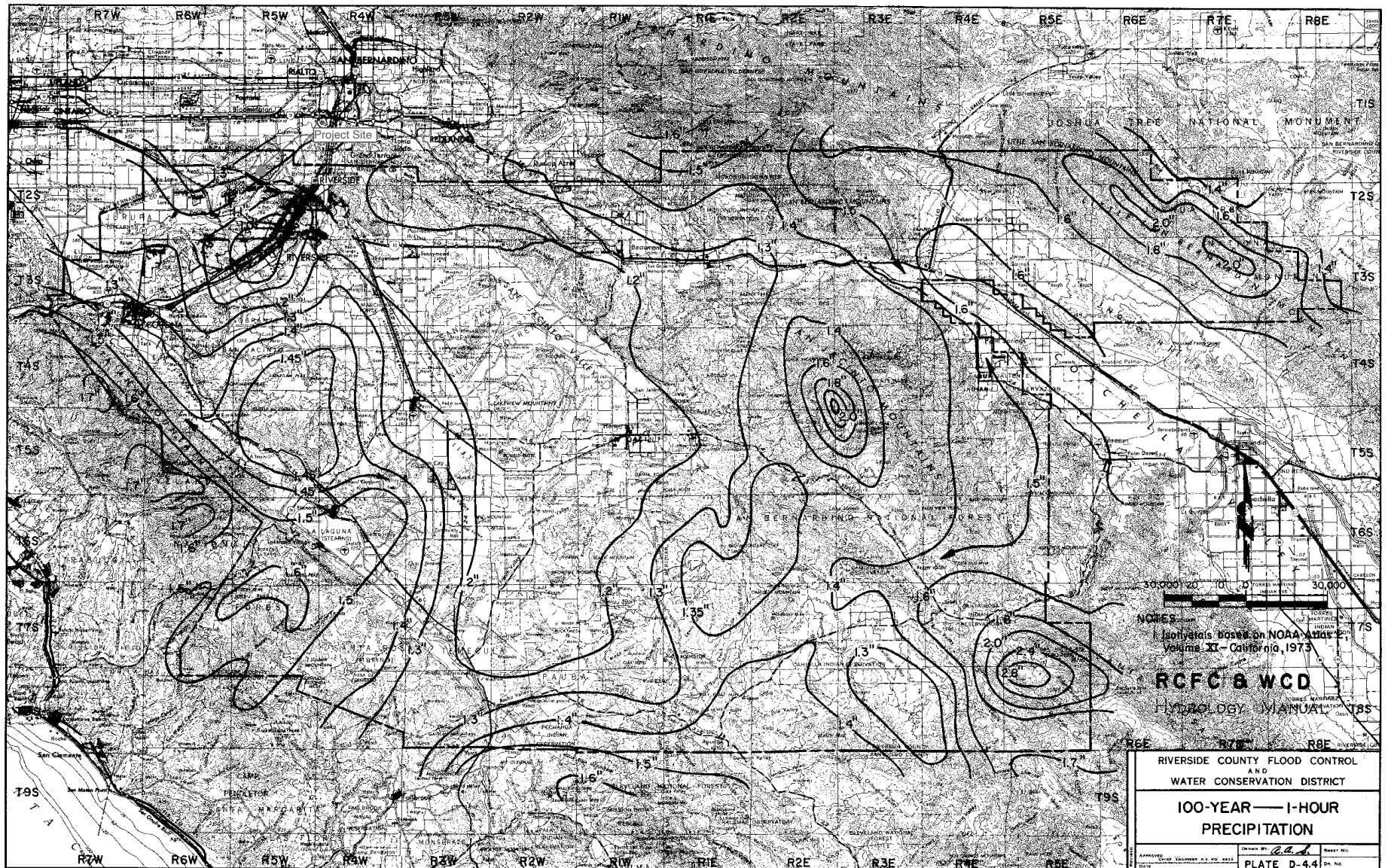
SECTION 2

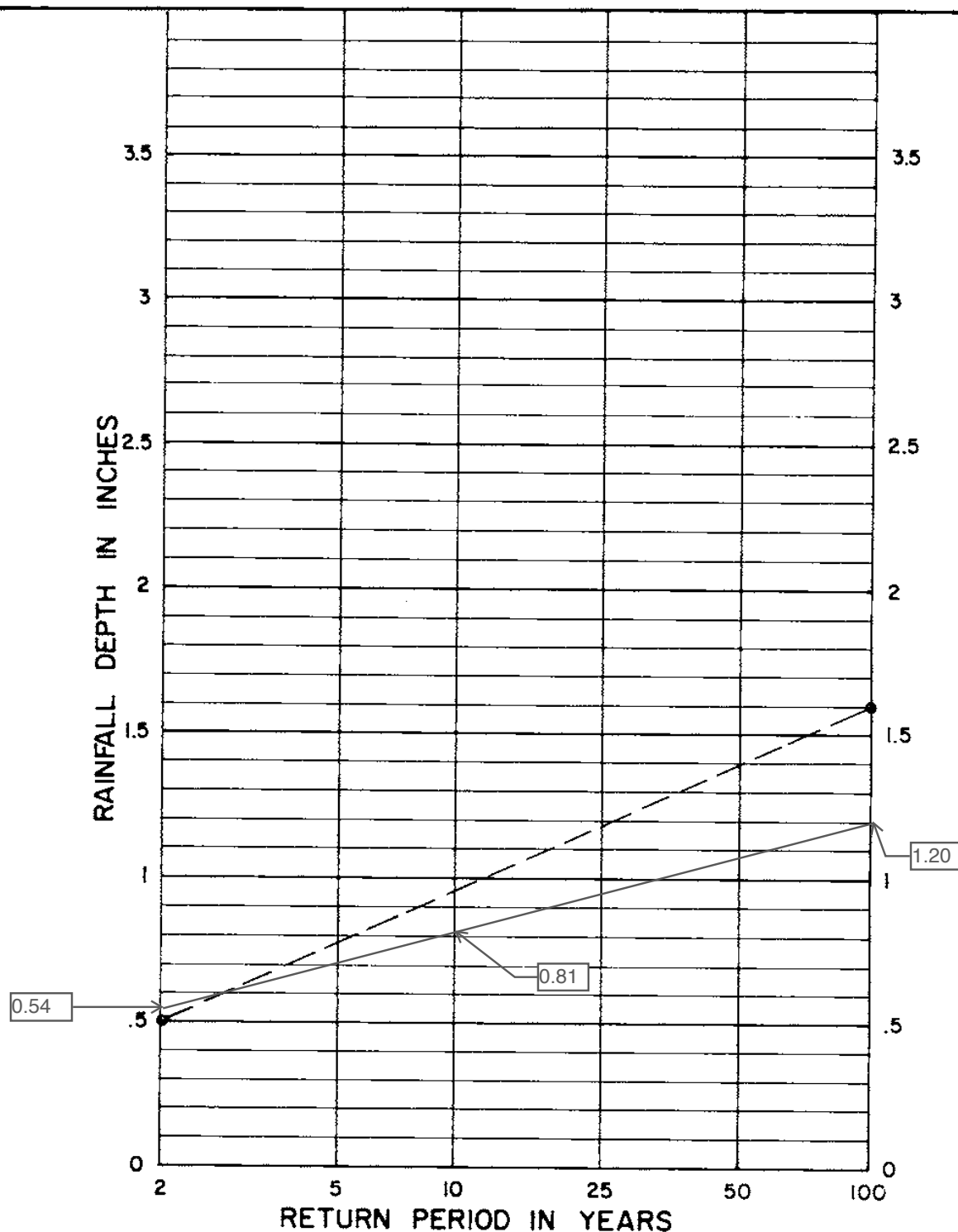


LEGEND — SOILS GROUP BOUNDARY A SOILS GROUP DESIGNATION RCFC&WCD HYDROLOGY MANUAL	HYDROLOGIC SOILS GROUP MAP FOR FONTANA
--	--









NOTE:
 1. For intermediate return periods plot 2-year and 100-year one hour values from maps, then connect points and read value for desired return period. For example given 2-year one hour = .50" and 100-year one hour = 1.60", 25-year one hour = 1.18"

Reference: NOAA Atlas 2, Volume XI-California, 1973.

RCFC & WCD
 HYDROLOGY MANUAL

RAINFALL DEPTH VERSUS
 RETURN PERIOD FOR
 PARTIAL DURATION SERIES

SECTION 3

1 100-year, Existing

1.1 Detailed output

```
Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
Rational Hydrology Study          Date: 07/09/24  File:X.out
-----
100-year existing runoff

-----

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

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

-----

Program License Serial Number 6057

-----

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

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

Standard intensity-duration curves data (Plate D-4.1)
For the [ Rubidoux ] area used.
10 year storm 10 minute intensity = 2.170(In/Hr)
10 year storm 60 minute intensity = 0.810(In/Hr)
100 year storm 10 minute intensity = 3.210(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 = 0.5500

+++++
Process from Point/Station      100.000 to Point/Station      101.000
**** INITIAL AREA EVALUATION ****
-----
Initial area flow distance = 685.000(Ft.)
Top (of initial area) elevation = 904.000(Ft.)
Bottom (of initial area) elevation = 898.000(Ft.)
Difference in elevation = 6.000(Ft.)
Slope = 0.00876 s(percent)= 0.88
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
```

Initial area time of concentration = 13.704 min.
 Rainfall intensity = 2.703(In/Hr) for a 100.0 year storm
 SINGLE FAMILY (1/4 Acre Lot)
 Runoff Coefficient = 0.774
 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 = 0.500; Impervious fraction = 0.500
 Initial subarea runoff = 7.912(CFS)
 Total initial stream area = 3.780(Ac.)
 Pervious area fraction = 0.500

++++++
 Process from Point/Station 101.000 to Point/Station 102.000
 **** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****

 Top of street segment elevation = 898.000(Ft.)
 End of street segment elevation = 890.800(Ft.)
 Length of street segment = 617.000(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 = 10.000(Ft.)
 Slope from curb to property line (v/hz) = 0.020
 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 = 11.216(CFS)
 Depth of flow = 0.396(Ft.), Average velocity = 2.885(Ft/s)
 Streetflow hydraulics at midpoint of street travel:
 Halfstreet flow width = 13.480(Ft.)
 Flow velocity = 2.89(Ft/s)
 Travel time = 3.56 min. TC = 17.27 min.
 Adding area flow to street
 SINGLE FAMILY (1/4 Acre Lot)
 Runoff Coefficient = 0.762
 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 = 0.500; Impervious fraction = 0.500
 Rainfall intensity = 2.381(In/Hr) for a 100.0 year storm
 Subarea runoff = 6.480(CFS) for 3.570(Ac.)
 Total runoff = 14.392(CFS) Total area = 7.350(Ac.)
 Street flow at end of street = 14.392(CFS)
 Half street flow at end of street = 7.196(CFS)
 Depth of flow = 0.425(Ft.), Average velocity = 3.063(Ft/s)
 Flow width (from curb towards crown)= 14.909(Ft.)

```

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

```

```

-----
Top of street segment elevation = 890.800(Ft.)
End of street segment elevation = 887.300(Ft.)
Length of street segment = 310.000(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 = 1.000(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 = 10.000(Ft.)
Slope from curb to property line (v/hz) = 0.020
Gutter width = 0.000(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 = 17.907(CFS)
Depth of flow = 0.506(Ft.), Average velocity = 3.109(Ft/s)
Warning: depth of flow exceeds top of curb
Distance that curb overflow reaches into property = 0.30(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width = 16.966(Ft.)
Flow velocity = 3.11(Ft/s)
Travel time = 1.66 min. TC = 18.93 min.
Adding area flow to street
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
Rainfall intensity = 2.263(In/Hr) for a 100.0 year storm
Subarea runoff = 7.081(CFS) for 3.590(Ac.)
Total runoff = 21.474(CFS) Total area = 10.940(Ac.)
Street flow at end of street = 21.474(CFS)
Half street flow at end of street = 10.737(CFS)
Depth of flow = 0.534(Ft.), Average velocity = 3.155(Ft/s)
Warning: depth of flow exceeds top of curb
Distance that curb overflow reaches into property = 1.70(Ft.)
Flow width (from curb towards crown)= 18.369(Ft.)

```

```

*****
Process from Point/Station      103.000 to Point/Station      104.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

```

```

-----
Top of natural channel elevation = 887.300(Ft.)
End of natural channel elevation = 884.000(Ft.)
Length of natural channel = 435.000(Ft.)

```

Estimated mean flow rate at midpoint of channel = 36.048(CFS)

Natural valley channel type used

L.A. County flood control district formula for channel velocity:

Velocity(ft/s) = $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$

Velocity using mean channel flow = 3.07(Ft/s)

Correction to map slope used on extremely rugged channels with drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0076

Corrected/adjusted channel slope = 0.0076

Travel time = 2.36 min. TC = 21.29 min.

Adding area flow to channel

UNDEVELOPED (fair cover) subarea

Runoff Coefficient = 0.553

Decimal fraction soil group A = 1.000

Decimal fraction soil group B = 0.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 0.000

RI index for soil(AMC 2) = 50.00

Pervious area fraction = 1.000; Impervious fraction = 0.000

Rainfall intensity = 2.122(In/Hr) for a 100.0 year storm

Subarea runoff = 17.412(CFS) for 14.850(Ac.)

Total runoff = 38.886(CFS) Total area = 25.790(Ac.)

End of computations, total study area = 25.79 (Ac.)

The following figures may

be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 0.732

Area averaged RI index number = 52.5

1.2 Tabulated output

[illegible]

[illegible]

2 10-year, Existing

2.1 Detailed output

```
Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
Rational Hydrology Study          Date: 07/09/24  File:X10.out
-----
10-year existing condition

-----

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

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

-----

Program License Serial Number 6057

-----

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 [ Rubidoux ] area used.
10 year storm 10 minute intensity = 2.170(In/Hr)
10 year storm 60 minute intensity = 0.810(In/Hr)
100 year storm 10 minute intensity = 3.210(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 = 0.5500

+++++
Process from Point/Station 100.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****
-----
Initial area flow distance = 685.000(Ft.)
Top (of initial area) elevation = 904.000(Ft.)
Bottom (of initial area) elevation = 898.000(Ft.)
Difference in elevation = 6.000(Ft.)
Slope = 0.00876 s(percent)= 0.88
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
```

Initial area time of concentration = 13.704 min.
 Rainfall intensity = 1.825(In/Hr) for a 10.0 year storm
 SINGLE FAMILY (1/4 Acre Lot)
 Runoff Coefficient = 0.736
 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 = 0.500; Impervious fraction = 0.500
 Initial subarea runoff = 5.076(CFS)
 Total initial stream area = 3.780(Ac.)
 Pervious area fraction = 0.500

++++++
 Process from Point/Station 101.000 to Point/Station 102.000
 **** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****

 Top of street segment elevation = 898.000(Ft.)
 End of street segment elevation = 890.800(Ft.)
 Length of street segment = 617.000(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 = 10.000(Ft.)
 Slope from curb to property line (v/hz) = 0.020
 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 = 7.208(CFS)
 Depth of flow = 0.351(Ft.), Average velocity = 2.599(Ft/s)
 Streetflow hydraulics at midpoint of street travel:
 Halfstreet flow width = 11.225(Ft.)
 Flow velocity = 2.60(Ft/s)
 Travel time = 3.96 min. TC = 17.66 min.
 Adding area flow to street
 SINGLE FAMILY (1/4 Acre Lot)
 Runoff Coefficient = 0.721
 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 = 0.500; Impervious fraction = 0.500
 Rainfall intensity = 1.587(In/Hr) for a 10.0 year storm
 Subarea runoff = 4.086(CFS) for 3.570(Ac.)
 Total runoff = 9.161(CFS) Total area = 7.350(Ac.)
 Street flow at end of street = 9.161(CFS)
 Half street flow at end of street = 4.581(CFS)
 Depth of flow = 0.375(Ft.), Average velocity = 2.750(Ft/s)
 Flow width (from curb towards crown)= 12.406(Ft.)

```

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

```

```

-----
Top of street segment elevation = 890.800(Ft.)
End of street segment elevation = 887.300(Ft.)
Length of street segment = 310.000(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 = 1.000(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 = 10.000(Ft.)
Slope from curb to property line (v/hz) = 0.020
Gutter width = 0.000(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 = 11.399(CFS)
Depth of flow = 0.452(Ft.), Average velocity = 2.795(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width = 14.279(Ft.)
Flow velocity = 2.80(Ft/s)
Travel time = 1.85 min. TC = 19.51 min.
Adding area flow to street
COMMERCIAL subarea type
Runoff Coefficient = 0.863
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 = 1.503(In/Hr) for a 10.0 year storm
Subarea runoff = 4.655(CFS) for 3.590(Ac.)
Total runoff = 13.817(CFS) Total area = 10.940(Ac.)
Street flow at end of street = 13.817(CFS)
Half street flow at end of street = 6.908(CFS)
Depth of flow = 0.473(Ft.), Average velocity = 2.935(Ft/s)
Flow width (from curb towards crown)= 15.341(Ft.)

```

```

*****
Process from Point/Station      103.000 to Point/Station      104.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

```

```

-----
Top of natural channel elevation = 887.300(Ft.)
End of natural channel elevation = 884.000(Ft.)
Length of natural channel = 435.000(Ft.)
Estimated mean flow rate at midpoint of channel = 23.194(CFS)

```

```

Natural valley channel type used
L.A. County flood control district formula for channel velocity:

```

Velocity(ft/s) = $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{0.5}))$
Velocity using mean channel flow = 2.72(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0076
Corrected/adjusted channel slope = 0.0076
Travel time = 2.67 min. TC = 22.18 min.

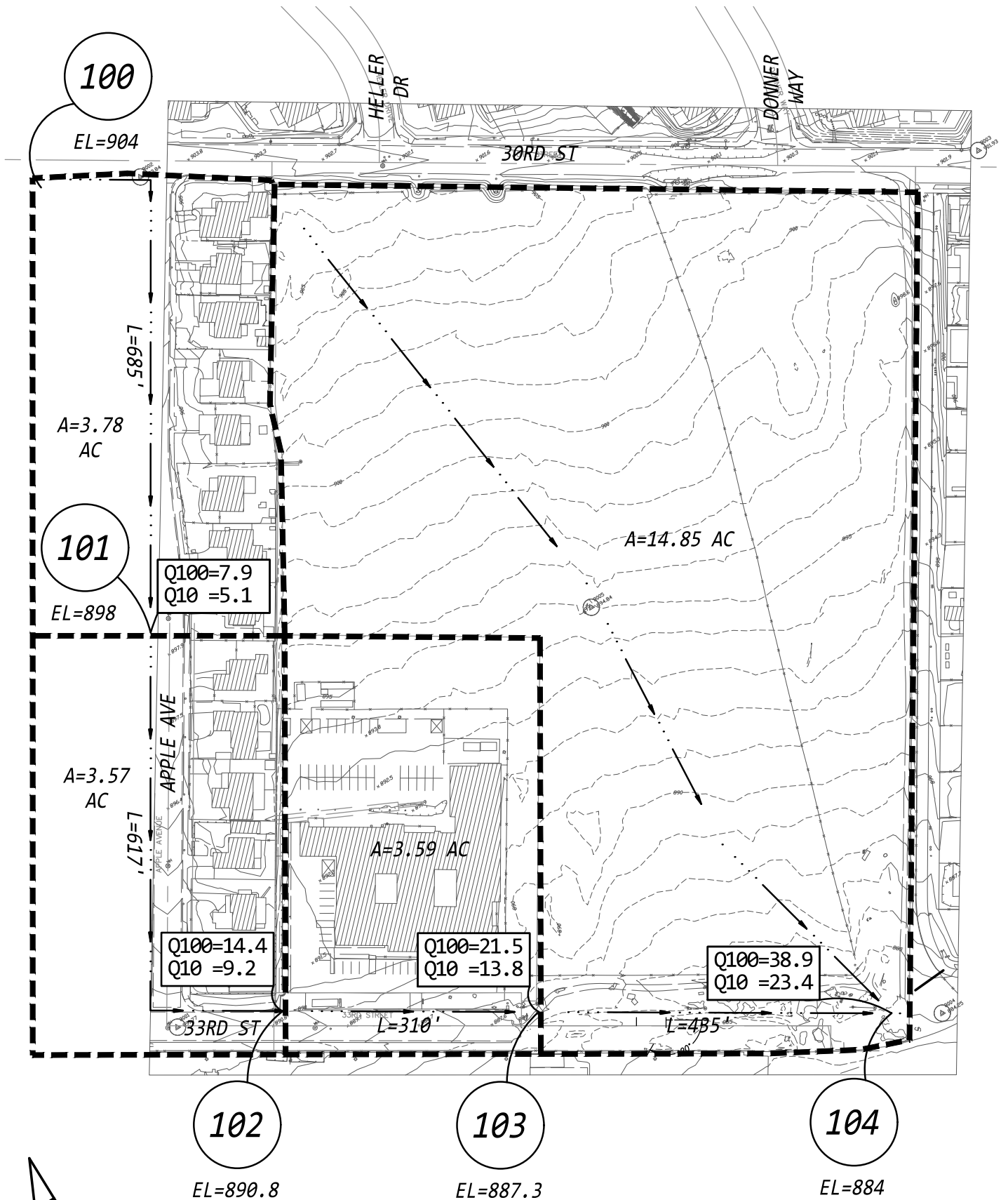
Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.461
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 50.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Rainfall intensity = 1.400(In/Hr) for a 10.0 year storm
Subarea runoff = 9.587(CFS) for 14.850(Ac.)
Total runoff = 23.403(CFS) Total area = 25.790(Ac.)
End of computations, total study area = 25.79 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 0.732
Area averaged RI index number = 52.5

2.2 Tabulated output

10-year existing condition															
Project: X10.rrv										Page 1		Calculated By:			
Study Date: 07/09/24 Moisture Condition(AMC): 2												Checked By:			
10.0 Year Storm 1 hour rainfall = 0.81 (In.) Intensity Slope = 0.550															
***** R A T I O N A L H Y D R O L O G Y - R I V E R S I D E C O *****															
Station/ Point No.	Soil Type A,B,C,D	Devel. Type	Area (Acres)	I in/h	C	L Elev	Q (sub)	Q Total	Slope v/hz	Section	V Fps	L ft.	T min.	Tc min.	Hydraulics or notes
100.00									0.009			685	13.7		INITIAL SUBAREA
101.00	B-100%	SF 1/4	3.8	1.8	0.7359	898.0	5.1							13.7	
									5.08	0.012	Street	2.6	617	4.0	qavg= 7.21
40.0 wide street															dn=0.4 Flow hw=12.4
flow to pt.#								Width Ctr-Brk=	18.0						0x-fall= 0.0200
102.00	B-100%	SF 1/4	3.6	1.6	0.7211	890.8	4.1							17.7	
									9.16	0.011	Street	2.8	310	1.8	qavg= 11.40
40.0 wide street															dn=0.5 Flow hw=15.3
flow to pt.#								Width Ctr-Brk=	1.0						0x-fall= 0.0200
103.00	B-100%	Comm	3.6	1.5	0.8630	887.3	4.7							19.5	
104.00	Natural Channel travel time + subarea flow addition														
									13.82	0.008	Nat Ch	2.7	435	2.7	qavg= 23.19
104.00	A-100%	U-fair	14.9	1.4	0.4610	884.0	9.6							22.2	
Total study area = 25.79 (Ac.) Peak flow rate = 23.403 (CFS)															

[illegible]



HYDROLOGY MAP - EXISTING CONDITIONS
SCALE: 1" = 150'

SECTION 4

3 100-year, Proposed

3.1 Detailed output

```
Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
Rational Hydrology Study          Date: 07/09/24  File:P.out
-----
100-year developed condition

-----

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

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

-----

Program License Serial Number 6057

-----

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

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

Standard intensity-duration curves data (Plate D-4.1)
For the [ Rubidoux ] area used.
10 year storm 10 minute intensity = 2.170(In/Hr)
10 year storm 60 minute intensity = 0.810(In/Hr)
100 year storm 10 minute intensity = 3.210(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 = 0.5500

+++++
Process from Point/Station      100.000 to Point/Station      101.000
**** INITIAL AREA EVALUATION ****
-----
Initial area flow distance = 685.000(Ft.)
Top (of initial area) elevation = 904.000(Ft.)
Bottom (of initial area) elevation = 898.000(Ft.)
Difference in elevation = 6.000(Ft.)
Slope = 0.00876 s(percent)= 0.88
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
```

Initial area time of concentration = 13.704 min.
 Rainfall intensity = 2.703(In/Hr) for a 100.0 year storm
 SINGLE FAMILY (1/4 Acre Lot)
 Runoff Coefficient = 0.774
 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 = 0.500; Impervious fraction = 0.500
 Initial subarea runoff = 7.912(CFS)
 Total initial stream area = 3.780(Ac.)
 Pervious area fraction = 0.500

++++++
 Process from Point/Station 101.000 to Point/Station 102.000
 **** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****

 Top of street segment elevation = 898.000(Ft.)
 End of street segment elevation = 890.800(Ft.)
 Length of street segment = 617.000(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 = 10.000(Ft.)
 Slope from curb to property line (v/hz) = 0.020
 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 = 11.216(CFS)
 Depth of flow = 0.396(Ft.), Average velocity = 2.885(Ft/s)
 Streetflow hydraulics at midpoint of street travel:
 Halfstreet flow width = 13.480(Ft.)
 Flow velocity = 2.89(Ft/s)
 Travel time = 3.56 min. TC = 17.27 min.
 Adding area flow to street
 SINGLE FAMILY (1/4 Acre Lot)
 Runoff Coefficient = 0.762
 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 = 0.500; Impervious fraction = 0.500
 Rainfall intensity = 2.381(In/Hr) for a 100.0 year storm
 Subarea runoff = 6.480(CFS) for 3.570(Ac.)
 Total runoff = 14.392(CFS) Total area = 7.350(Ac.)
 Street flow at end of street = 14.392(CFS)
 Half street flow at end of street = 7.196(CFS)
 Depth of flow = 0.425(Ft.), Average velocity = 3.063(Ft/s)
 Flow width (from curb towards crown)= 14.909(Ft.)

```

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

```

```

-----
Top of street segment elevation = 890.800(Ft.)
End of street segment elevation = 885.700(Ft.)
Length of street segment = 454.000(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 = 1.000(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 = 10.000(Ft.)
Slope from curb to property line (v/hz) = 0.020
Gutter width = 0.000(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 = 17.232(CFS)
Depth of flow = 0.500(Ft.), Average velocity = 3.098(Ft/s)
Warning: depth of flow exceeds top of curb
Distance that curb overflow reaches into property = 0.01(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width = 16.678(Ft.)
Flow velocity = 3.10(Ft/s)
Travel time = 2.44 min. TC = 19.71 min.
Adding area flow to street
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
Rainfall intensity = 2.213(In/Hr) for a 100.0 year storm
Subarea runoff = 5.592(CFS) for 2.900(Ac.)
Total runoff = 19.984(CFS) Total area = 10.250(Ac.)
Street flow at end of street = 19.984(CFS)
Half street flow at end of street = 9.992(CFS)
Depth of flow = 0.523(Ft.), Average velocity = 3.125(Ft/s)
Warning: depth of flow exceeds top of curb
Distance that curb overflow reaches into property = 1.17(Ft.)
Flow width (from curb towards crown)= 17.841(Ft.)

```

```

*****
Process from Point/Station      103.000 to Point/Station      104.000
**** STREET INLET + AREA + PIPE TRAVEL TIME ****

```

```

-----
Top of street segment elevation = 885.700(Ft.)
End of street segment elevation = 885.100(Ft.)
Length of street segment = 56.000(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 = 1.000(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 = 10.000(Ft.)
 Slope from curb to property line (v/hz) = 0.020
 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
 User-specified maximum inlet flow capacity of 100.000(CFS)
 Number of street inlets = 2
 Note: Single inlet capacity is greater than 1/2 street flow

Pipe calculations for under street flow rate of 19.984(CFS)
 Using a pipe slope = 0.010 %
 Upstream point/station elevation = 885.700(Ft.)
 Downstream point/station elevation = 885.100(Ft.)
 Pipe length = 56.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 19.984(CFS)
 Nearest computed pipe diameter = 54.00(In.)
 Calculated individual pipe flow = 19.984(CFS)
 Normal flow depth in pipe = 45.09(In.)
 Flow top width inside pipe = 40.08(In.)
 Critical Depth = 15.23(In.)
 Pipe flow velocity = 1.41(Ft/s)
 Travel time through pipe = 0.66 min.
 Time of concentration (TC) = 20.37 min.
 Maximum flow rate of street inlet(s) = 19.984(CFS)
 Maximum pipe flow capacity = 19.984(CFS)
 Remaining flow in street below inlet = 0.000(CFS)
 Sump condition with all flow intercepted by street inlet
 Insignificant sub-area being added to street
 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
 Rainfall intensity = 2.174(In/Hr) for a 100.0 year storm
 Subarea runoff = 0.000(CFS) for 0.000(Ac.)
 Total runoff = 19.984(CFS) Total area = 10.250(Ac.)

++++++
 Process from Point/Station 103.000 to Point/Station 104.000
 **** SUBAREA FLOW ADDITION ****

 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
 Time of concentration = 20.37 min.
 Rainfall intensity = 2.174(In/Hr) for a 100.0 year storm
 Subarea runoff = 4.467(CFS) for 2.360(Ac.)
 Total runoff = 24.451(CFS) Total area = 12.610(Ac.)

++++++
 Process from Point/Station 104.000 to Point/Station 105.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

 Upstream point/station elevation = 885.100(Ft.)
 Downstream point/station elevation = 884.000(Ft.)
 Pipe length = 118.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 24.451(CFS)
 Nearest computed pipe diameter = 27.00(In.)
 Calculated individual pipe flow = 24.451(CFS)
 Normal flow depth in pipe = 18.56(In.)
 Flow top width inside pipe = 25.03(In.)
 Critical Depth = 20.74(In.)
 Pipe flow velocity = 8.39(Ft/s)
 Travel time through pipe = 0.23 min.
 Time of concentration (TC) = 20.61 min.

++++++
 Process from Point/Station 104.000 to Point/Station 105.000
 **** SUBAREA FLOW ADDITION ****

 COMMERCIAL subarea type
 Runoff Coefficient = 0.849
 Decimal fraction soil group A = 1.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 0.000
 RI index for soil(AMC 2) = 32.00
 Pervious area fraction = 0.100; Impervious fraction = 0.900
 Time of concentration = 20.61 min.
 Rainfall intensity = 2.160(In/Hr) for a 100.0 year storm
 Subarea runoff = 6.399(CFS) for 3.490(Ac.)
 Total runoff = 30.850(CFS) Total area = 16.100(Ac.)

++++++
 Process from Point/Station 105.000 to Point/Station 106.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

 Upstream point/station elevation = 884.000(Ft.)
 Downstream point/station elevation = 882.000(Ft.)
 Pipe length = 196.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 30.850(CFS)
 Nearest computed pipe diameter = 27.00(In.)
 Calculated individual pipe flow = 30.850(CFS)
 Normal flow depth in pipe = 21.80(In.)

Flow top width inside pipe = 21.30(In.)
 Critical Depth = 23.01(In.)
 Pipe flow velocity = 8.97(Ft/s)
 Travel time through pipe = 0.36 min.
 Time of concentration (TC) = 20.97 min.

 Process from Point/Station 203.000 to Point/Station 106.000
 **** CONFLUENCE OF MINOR STREAMS ****

 Along Main Stream number: 1 in normal stream number 1
 Stream flow area = 16.100(Ac.)
 Runoff from this stream = 30.850(CFS)
 Time of concentration = 20.97 min.
 Rainfall intensity = 2.139(In/Hr)

 Process from Point/Station 200.000 to Point/Station 201.000
 **** INITIAL AREA EVALUATION ****

 Initial area flow distance = 665.000(Ft.)
 Top (of initial area) elevation = 906.500(Ft.)
 Bottom (of initial area) elevation = 894.000(Ft.)
 Difference in elevation = 12.500(Ft.)
 Slope = 0.01880 s(percent)= 1.88
 $TC = k(0.710)*[(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 21.163 min.
 Rainfall intensity = 2.129(In/Hr) for a 100.0 year storm
 UNDEVELOPED (fair cover) subarea
 Runoff Coefficient = 0.702
 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) = 69.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
 Initial subarea runoff = 6.847(CFS)
 Total initial stream area = 4.580(Ac.)
 Pervious area fraction = 1.000

 Process from Point/Station 201.000 to Point/Station 202.000
 **** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

 Top of natural channel elevation = 894.000(Ft.)
 End of natural channel elevation = 892.700(Ft.)
 Length of natural channel = 354.000(Ft.)
 Estimated mean flow rate at midpoint of channel = 10.667(CFS)

Natural valley channel type used
 L.A. County flood control district formula for channel velocity:
 $Velocity(ft/s) = (7 + 8(q(English\ Units)^{.352})(slope^{0.5}))$
 Velocity using mean channel flow = 1.54(Ft/s)

Correction to map slope used on extremely rugged channels with drops and waterfalls (Plate D-6.2)

Normal channel slope = 0.0037

Corrected/adjusted channel slope = 0.0037

Travel time = 3.83 min. TC = 24.99 min.

Adding area flow to channel

UNDEVELOPED (fair cover) subarea

Runoff Coefficient = 0.534

Decimal fraction soil group A = 1.000

Decimal fraction soil group B = 0.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 0.000

RI index for soil(AMC 2) = 50.00

Pervious area fraction = 1.000; Impervious fraction = 0.000

Rainfall intensity = 1.942(In/Hr) for a 100.0 year storm

Subarea runoff = 5.297(CFS) for 5.110(Ac.)

Total runoff = 12.144(CFS) Total area = 9.690(Ac.)

Process from Point/Station 202.000 to Point/Station 203.000

**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 892.700(Ft.)

Downstream point/station elevation = 882.000(Ft.)

Pipe length = 465.00(Ft.) Manning's N = 0.013

No. of pipes = 1 Required pipe flow = 12.144(CFS)

Nearest computed pipe diameter = 18.00(In.)

Calculated individual pipe flow = 12.144(CFS)

Normal flow depth in pipe = 11.77(In.)

Flow top width inside pipe = 17.13(In.)

Critical Depth = 15.85(In.)

Pipe flow velocity = 9.93(Ft/s)

Travel time through pipe = 0.78 min.

Time of concentration (TC) = 25.78 min.

Process from Point/Station 106.000 to Point/Station 203.000

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

Along Main Stream number: 1 in normal stream number 2

Stream flow area = 9.690(Ac.)

Runoff from this stream = 12.144(CFS)

Time of concentration = 25.78 min.

Rainfall intensity = 1.910(In/Hr)

Summary of stream data:

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

1	30.850	20.97	2.139
---	--------	-------	-------

2	12.144	25.78	1.910
---	--------	-------	-------

Largest stream flow has longer or shorter time of concentration

$$Q_p = 30.850 + \text{sum of}$$

$$Q_a \quad T_b/T_a$$

$$12.144 * 0.814 = 9.881$$

$$Q_p = 40.731$$

Total of 2 streams to confluence:

Flow rates before confluence point:

30.850 12.144

Area of streams before confluence:

16.100 9.690

Results of confluence:

Total flow rate = 40.731(CFS)

Time of concentration = 20.972 min.

Effective stream area after confluence = 25.790(Ac.)

End of computations, total study area = 25.79 (Ac.)

The following figures may

be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 0.552

Area averaged RI index number = 53.9

3.2 Tabulated output

100-year developed condition															

Project: P.rrv										Page 1		Calculated By:			
Study Date: 07/09/24 Moisture Condition(AMC): 2												Checked By:			
100.0 Year Storm 1 hour rainfall = 1.20 (In.) Intensity Slope = 0.550															
***** R A T I O N A L H Y D R O L O G Y - R I V E R S I D E C O *****															
Station/	Soil Type	Devel.	Area	I	C	L Elev	Q	Q	Slope	Section	V	L	T	Tc	Hydraulics
Point No.	A,B,C,D	Type	(Acres)	in/h			(sub)	Total	v/hz		Fps	ft.	min.	min.	or notes
-----	-----	-----	-----	----	-----	-----	-----	-----	-----	-----	----	----	----	-----	-----
100.00				----	-----	-----	-----		0.009			685	13.7	----	INITIAL SUBAREA
101.00	B-100%	SF 1/4	3.8	2.7	0.7743	898.0	7.9							13.7	
				----	-----	-----	-----	7.91	0.012	Street	2.9	617	3.6	----	qavg= 11.22
40.0 wide street															dn=0.4 Flow hw=14.9
flow to pt.#															
102.00	B-100%	SF 1/4	3.6	2.4	0.7625	890.8	6.5							17.3	
				----	-----	-----	-----	14.39	0.011	Street	3.1	454	2.4	----	qavg= 17.23
40.0 wide street															dn=0.5 Flow hw=17.8
flow to pt.#															
103.00	B-100%	Comm	2.9	2.2	0.8711	885.7	5.6							19.7	
Street & Inlet & pipe with area flow added to street. TC is based on pipe travel time. Maximum capacity of inlets = 9.99															
No. Pipes = 1 Pipe flow travel time --- 'N' = 0.013 ----- ----- 20.0 0.011 d= 54 1.4 56 0.7 20.4 hgl= 3.76(Ft.)															
				----	-----	-----	-----	19.98	0.011	Street	1.4	56	0.7	q in st at end= 0.00	
104.00	B-100%	Comm	0.0	2.2	0.8707	885.1	0.0							20.4	
104.00	B-100%	Comm	2.4	2.2	0.8707	0.0	4.5							20.4	
No. Pipes = 1 Pipe flow travel time --- 'N' = 0.013 ----- ----- 24.5 0.009 d= 27 8.4 118 0.2 20.6 hgl= 1.55(Ft.)															
105.00	A-100%	Comm	3.5	2.2	0.8489	0.0	6.4							20.6	
No. Pipes = 1 Pipe flow travel time --- 'N' = 0.013 ----- ----- 30.8 0.010 d= 27 9.0 196 0.4 21.0 hgl= 1.82(Ft.)															
				----	-----	-----	-----								
106.00			16.1	2.1			30.8							21.0	Stream Summary
				----	-----	-----	-----								
200.00				----	-----	-----	-----		0.019			665	21.2	----	INITIAL SUBAREA
201.00	B-100%	U-fair	4.6	2.1	0.7023	894.0	6.8							21.2	
202.00	Natural Channel travel time + subarea flow addition														
				----	-----	-----	-----	6.85	0.004	Nat Ch	1.5	354	3.8	----	qavg= 10.67
202.00	A-100%	U-fair	5.1	1.9	0.5337	892.7	5.3							25.0	
No. Pipes = 1 Pipe flow travel time --- 'N' = 0.013 ----- ----- 12.1 0.023 d= 18 9.9 465 0.8 25.8 hgl= 0.98(Ft.)															
				----	-----	-----	-----								

4 10-year, Proposed

4.1 Detailed output

```
Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
Rational Hydrology Study          Date: 07/09/24  File:P10.out
-----
10-year proposed conditions

-----

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

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

-----

Program License Serial Number 6057

-----

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 [ Rubidoux ] area used.
10 year storm 10 minute intensity = 2.170(In/Hr)
10 year storm 60 minute intensity = 0.810(In/Hr)
100 year storm 10 minute intensity = 3.210(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 = 0.5500

+++++
Process from Point/Station 100.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****
-----
Initial area flow distance = 685.000(Ft.)
Top (of initial area) elevation = 904.000(Ft.)
Bottom (of initial area) elevation = 898.000(Ft.)
Difference in elevation = 6.000(Ft.)
Slope = 0.00876 s(percent)= 0.88
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
```

Initial area time of concentration = 13.704 min.
 Rainfall intensity = 1.825(In/Hr) for a 10.0 year storm
 SINGLE FAMILY (1/4 Acre Lot)
 Runoff Coefficient = 0.736
 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 = 0.500; Impervious fraction = 0.500
 Initial subarea runoff = 5.076(CFS)
 Total initial stream area = 3.780(Ac.)
 Pervious area fraction = 0.500

 Process from Point/Station 101.000 to Point/Station 102.000
 **** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****

 Top of street segment elevation = 898.000(Ft.)
 End of street segment elevation = 890.800(Ft.)
 Length of street segment = 617.000(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 = 10.000(Ft.)
 Slope from curb to property line (v/hz) = 0.020
 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 = 7.208(CFS)
 Depth of flow = 0.351(Ft.), Average velocity = 2.599(Ft/s)
 Streetflow hydraulics at midpoint of street travel:
 Halfstreet flow width = 11.225(Ft.)
 Flow velocity = 2.60(Ft/s)
 Travel time = 3.96 min. TC = 17.66 min.
 Adding area flow to street
 SINGLE FAMILY (1/4 Acre Lot)
 Runoff Coefficient = 0.721
 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 = 0.500; Impervious fraction = 0.500
 Rainfall intensity = 1.587(In/Hr) for a 10.0 year storm
 Subarea runoff = 4.086(CFS) for 3.570(Ac.)
 Total runoff = 9.161(CFS) Total area = 7.350(Ac.)
 Street flow at end of street = 9.161(CFS)
 Half street flow at end of street = 4.581(CFS)
 Depth of flow = 0.375(Ft.), Average velocity = 2.750(Ft/s)
 Flow width (from curb towards crown)= 12.406(Ft.)

```

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

```

```

-----
Top of street segment elevation = 890.800(Ft.)
End of street segment elevation = 885.700(Ft.)
Length of street segment = 454.000(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 = 1.000(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 = 10.000(Ft.)
Slope from curb to property line (v/hz) = 0.020
Gutter width = 0.000(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 = 10.969(CFS)
Depth of flow = 0.448(Ft.), Average velocity = 2.763(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width = 14.089(Ft.)
Flow velocity = 2.76(Ft/s)
Travel time = 2.74 min. TC = 20.40 min.
Adding area flow to street
COMMERCIAL subarea type
Runoff Coefficient = 0.862
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 = 1.466(In/Hr) for a 10.0 year storm
Subarea runoff = 3.667(CFS) for 2.900(Ac.)
Total runoff = 12.829(CFS) Total area = 10.250(Ac.)
Street flow at end of street = 12.829(CFS)
Half street flow at end of street = 6.414(CFS)
Depth of flow = 0.465(Ft.), Average velocity = 2.875(Ft/s)
Flow width (from curb towards crown)= 14.937(Ft.)

```

```

*****
Process from Point/Station      103.000 to Point/Station      104.000
**** STREET INLET + AREA + PIPE TRAVEL TIME ****

```

```

-----
Top of street segment elevation = 885.700(Ft.)
End of street segment elevation = 885.100(Ft.)
Length of street segment = 56.000(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 = 1.000(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 = 10.000(Ft.)
 Slope from curb to property line (v/hz) = 0.020
 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
 User-specified maximum inlet flow capacity of 100.000(CFS)
 Number of street inlets = 2
 Note: Single inlet capacity is greater than 1/2 street flow

Pipe calculations for under street flow rate of 12.829(CFS)
 Using a pipe slope = 0.010 %
 Upstream point/station elevation = 885.700(Ft.)
 Downstream point/station elevation = 885.100(Ft.)
 Pipe length = 56.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 12.829(CFS)
 Nearest computed pipe diameter = 45.00(In.)
 Calculated individual pipe flow = 12.829(CFS)
 Normal flow depth in pipe = 40.13(In.)
 Flow top width inside pipe = 27.97(In.)
 Critical Depth = 12.76(In.)
 Pipe flow velocity = 1.23(Ft/s)
 Travel time through pipe = 0.76 min.
 Time of concentration (TC) = 21.16 min.
 Maximum flow rate of street inlet(s) = 12.829(CFS)
 Maximum pipe flow capacity = 12.829(CFS)
 Remaining flow in street below inlet = 0.000(CFS)
 Sump condition with all flow intercepted by street inlet
 Insignificant sub-area being added to street
 COMMERCIAL subarea type
 Runoff Coefficient = 0.862
 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 = 1.437(In/Hr) for a 10.0 year storm
 Subarea runoff = 0.000(CFS) for 0.000(Ac.)
 Total runoff = 12.829(CFS) Total area = 10.250(Ac.)

++++++
 Process from Point/Station 103.000 to Point/Station 104.000
 **** SUBAREA FLOW ADDITION ****

 COMMERCIAL subarea type
 Runoff Coefficient = 0.862
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 1.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 0.000
 RI index for soil(AMC 2) = 56.00
 Pervious area fraction = 0.100; Impervious fraction = 0.900

Time of concentration = 21.16 min.
 Rainfall intensity = 1.437(In/Hr) for a 10.0 year storm
 Subarea runoff = 2.924(CFS) for 2.360(Ac.)
 Total runoff = 15.752(CFS) Total area = 12.610(Ac.)

 Process from Point/Station 104.000 to Point/Station 105.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

 Upstream point/station elevation = 885.100(Ft.)
 Downstream point/station elevation = 884.000(Ft.)
 Pipe length = 118.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 15.752(CFS)
 Nearest computed pipe diameter = 21.00(In.)
 Calculated individual pipe flow = 15.752(CFS)
 Normal flow depth in pipe = 17.81(In.)
 Flow top width inside pipe = 15.07(In.)
 Critical Depth = 17.59(In.)
 Pipe flow velocity = 7.24(Ft/s)
 Travel time through pipe = 0.27 min.
 Time of concentration (TC) = 21.43 min.

 Process from Point/Station 104.000 to Point/Station 105.000
 **** SUBAREA FLOW ADDITION ****

 COMMERCIAL subarea type
 Runoff Coefficient = 0.840
 Decimal fraction soil group A = 1.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 0.000
 RI index for soil(AMC 2) = 32.00
 Pervious area fraction = 0.100; Impervious fraction = 0.900
 Time of concentration = 21.43 min.
 Rainfall intensity = 1.427(In/Hr) for a 10.0 year storm
 Subarea runoff = 4.184(CFS) for 3.490(Ac.)
 Total runoff = 19.937(CFS) Total area = 16.100(Ac.)

 Process from Point/Station 105.000 to Point/Station 106.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

 Upstream point/station elevation = 884.000(Ft.)
 Downstream point/station elevation = 882.000(Ft.)
 Pipe length = 196.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 19.937(CFS)
 Nearest computed pipe diameter = 24.00(In.)
 Calculated individual pipe flow = 19.937(CFS)
 Normal flow depth in pipe = 17.34(In.)
 Flow top width inside pipe = 21.49(In.)
 Critical Depth = 19.26(In.)
 Pipe flow velocity = 8.20(Ft/s)
 Travel time through pipe = 0.40 min.

Time of concentration (TC) = 21.83 min.

Process from Point/Station 203.000 to Point/Station 106.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 16.100(Ac.)
Runoff from this stream = 19.937(CFS)
Time of concentration = 21.83 min.
Rainfall intensity = 1.413(In/Hr)

Process from Point/Station 200.000 to Point/Station 201.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 665.000(Ft.)
Top (of initial area) elevation = 906.500(Ft.)
Bottom (of initial area) elevation = 894.000(Ft.)
Difference in elevation = 12.500(Ft.)
Slope = 0.01880 s(percent)= 1.88
 $TC = k(0.710)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 21.163 min.
Rainfall intensity = 1.437(In/Hr) for a 10.0 year storm
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.635
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) = 69.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 4.180(CFS)
Total initial stream area = 4.580(Ac.)
Pervious area fraction = 1.000

Process from Point/Station 201.000 to Point/Station 202.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 894.000(Ft.)
End of natural channel elevation = 892.700(Ft.)
Length of natural channel = 354.000(Ft.)
Estimated mean flow rate at midpoint of channel = 6.512(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 $Velocity(ft/s) = (7 + 8(q(English\ Units)^{.352})(slope^{.5}))$
Velocity using mean channel flow = 1.36(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
Normal channel slope = 0.0037
Corrected/adjusted channel slope = 0.0037

Travel time = 4.33 min. TC = 25.50 min.

Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.444
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 50.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Rainfall intensity = 1.297(In/Hr) for a 10.0 year storm
Subarea runoff = 2.941(CFS) for 5.110(Ac.)
Total runoff = 7.121(CFS) Total area = 9.690(Ac.)

Process from Point/Station 202.000 to Point/Station 203.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 892.700(Ft.)
Downstream point/station elevation = 882.000(Ft.)
Pipe length = 465.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 7.121(CFS)
Nearest computed pipe diameter = 15.00(In.)
Calculated individual pipe flow = 7.121(CFS)
Normal flow depth in pipe = 9.48(In.)
Flow top width inside pipe = 14.47(In.)
Critical Depth = 12.81(In.)
Pipe flow velocity = 8.71(Ft/s)
Travel time through pipe = 0.89 min.
Time of concentration (TC) = 26.39 min.

Process from Point/Station 106.000 to Point/Station 203.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 9.690(Ac.)
Runoff from this stream = 7.121(CFS)
Time of concentration = 26.39 min.
Rainfall intensity = 1.273(In/Hr)
Summary of stream data:

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

1	19.937	21.83	1.413
2	7.121	26.39	1.273

Largest stream flow has longer or shorter time of concentration

Qp = 19.937 + sum of
Qa Tb/Ta
7.121 * 0.827 = 5.890
Qp = 25.827

Total of 2 streams to confluence:
 Flow rates before confluence point:
 19.937 7.121
 Area of streams before confluence:
 16.100 9.690
 Results of confluence:
 Total flow rate = 25.827(CFS)
 Time of concentration = 21.826 min.
 Effective stream area after confluence = 25.790(Ac.)
 End of computations, total study area = 25.79 (Ac.)
 The following figures may
 be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 0.552
 Area averaged RI index number = 53.9

4.2 Tabulated output

10-year proposed conditions															

Project: P10.rrv															
Page 1															
Calculated By:															
Study Date: 07/09/24 Moisture Condition(AMC): 2															
Checked By:															
10.0 Year Storm 1 hour rainfall = 0.81 (In.) Intensity Slope = 0.550															
***** R A T I O N A L H Y D R O L O G Y - R I V E R S I D E C O *****															
Station/	Soil Type	Devel.	Area	I	C	L Elev	Q	Q	Slope	Section	V	L	T	Tc	Hydraulics
Point No.	A,B,C,D	Type	(Acres)	in/h			(sub)	Total	v/hz		Fps	ft.	min.	min.	or notes
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
100.00									0.009			685	13.7		INITIAL SUBAREA
101.00	B-100%	SF 1/4	3.8	1.8	0.7359	898.0	5.1							13.7	
								5.08	0.012	Street	2.6	617	4.0		qavg= 7.21
40.0 wide street															dn=0.4 Flow hw=12.4
flow to pt.#															
102.00	B-100%	SF 1/4	3.6	1.6	0.7211	890.8	4.1							17.7	
								9.16	0.011	Street	2.8	454	2.7		qavg= 10.97
40.0 wide street															dn=0.5 Flow hw=14.9
flow to pt.#															
103.00	B-100%	Comm	2.9	1.5	0.8625	885.7	3.7							20.4	
Street & Inlet & pipe with area flow added to street. TC is based on pipe travel time. Maximum capacity of inlets = 6.41															
No. Pipes = 1 Pipe flow travel time --- 'N' = 0.013															
								12.8	0.011	d= 45	1.2	56	0.8	21.2	hgl= 3.34(Ft.)
								12.83	0.011	Street	1.2	56	0.8	q in st at end= 0.00	
104.00	B-100%	Comm	0.0	1.4	0.8621	885.1	0.0							21.2	
104.00	B-100%	Comm	2.4	1.4	0.8621	0.0	2.9							21.2	
No. Pipes = 1 Pipe flow travel time --- 'N' = 0.013															
105.00	A-100%	Comm	3.5	1.4	0.8401	0.0	4.2							21.4	
No. Pipes = 1 Pipe flow travel time --- 'N' = 0.013															
								15.8	0.009	d= 21	7.2	118	0.3	21.4	hgl= 1.48(Ft.)
								19.9	0.010	d= 24	8.2	196	0.4	21.8	hgl= 1.45(Ft.)
106.00			16.1	1.4			19.9							21.8	Stream Summary
200.00									0.019			665	21.2		INITIAL SUBAREA
201.00	B-100%	U-fair	4.6	1.4	0.6352	894.0	4.2							21.2	
202.00	Natural Channel travel time + subarea flow addition														
								4.18	0.004	Nat Ch	1.4	354	4.3		qavg= 6.51
202.00	A-100%	U-fair	5.1	1.3	0.4438	892.7	2.9							25.5	
No. Pipes = 1 Pipe flow travel time --- 'N' = 0.013															
								7.1	0.023	d= 15	8.7	465	0.9	26.4	hgl= 0.79(Ft.)
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

SECTION 5

Runoff Volume Calculation

Table of Contents

1.0	SYNTHETIC HYDROGRAPH ANALYSIS	3
1.1	PRECIPITATION	3
1.2	SOIL DATA	4
1.3	HYDROLOGIC PARAMETERS	4
1.4	INPUT TO THE HEC HMS PREPROCESSOR, 100-YEAR STORM.....	5
1.5	INPUT TO THE HEC HMS PREPROCESSOR, 2-YEAR STORM.....	9
1.6	RESULTS, 100-YEAR STORM.....	13
1.7	RESULTS, 2-YEAR STORM.....	23

Appendices

- A. Precipitation
- B. Plate D-4.6 of the Hydrology Manual
- C. Hydrologic Soil data
- D. Hydrologic Parameters Maps

1.0 Synthetic Hydrograph Analysis

Analyses for the existing and proposed conditions were carried out to determine the amount of retention volume necessary.

The required basin volume will be the volumetric difference between the post- and pre-development runoff, that is, the incremental volume.

The County's HEC HMS Preprocessor was used to determine the 1-hour, 3-hour, 6- hour and 24-hour duration effective rain time-series. Since we are only interested in the volume of runoff, and not the hydrograph itself, there is no need to run the HEC-HMS program because the runoff volume can be calculated from the effective rain data.

1.1 Precipitation

Precipitation values were obtained from the NOAA Atlas 14 (Appendix A) and summarized in Table 1 and Table 2. The slope of the Intensity – Duration curve was obtained from Plate D-4.6 of the Hydrology Manual (Appendix B)

1.1.1 100-year Storm

Table 1 – Precipitation, 100-year Storm

Storm Frequency: 100-years	
Duration	Precipitation, inches
24-hour	4.82
6-hour	2.59
3-hour	1.89
1-hour	1.15
Slope of Rainfall Intensity – Duration curve = 0.52	

1.1.2 2-year Storm

Table 2 – Precipitation, 2-year Storm

Storm Frequency: 20-years	
Duration	Precipitation, inches
24-hour	2.01
6-hour	1.13
3-hour	0.814
1-hour	0.464
Slope of Rainfall Intensity – Duration curve = 0.52	

1.2 Soil Data

The soil type on the site was identified with the help of <https://websoilsurvey.nrcs.usda.gov/>, shown in Appendix C. The entire site belongs to Hydrologic Group A.

1.3 Hydrologic Parameters

See the hydrologic parameters maps in Appendix D for the following parameters:

Table 3 - Hydrologic Parameters

	Existing	Proposed
Length along longest watercourse, L	2047'	2126'
Length along longest watercourse to centroid, Lca	993'	1072'
Elevation Difference	20'	22'
Low Loss Rate (customarily between 80 and 90 percent)	85%	85%
Fm (a customarily used value)	60%	60%

1.4 Input to the HEC HMS Preprocessor, 100-year Storm

1.4.1 Existing Condition



HEC HMS Preprocessor

User Manual
Contact Project Planning (951) 955-1200

Watershed Area sq mi

1 Hour Storm Point Precipitation 1.15 in. Areal Adjustment Factor 100 % Adjusted Point Precipitation 1.15 Slope of Rainfall Intensity - Duration Curve .52	3 Hour Storm Point Precipitation 1.89 in. Areal Adjustment Factor 100 % Adjusted Point Precipitation 1.89	6 Hour Storm Point Precipitation 2.59 in. Areal Adjustment Factor 100 % Adjusted Point Precipitation 2.59	24 Hour Storm Point Precipitation 4.82 in. Areal Adjustment Factor 100 % Adjusted Point Precipitation 4.82
--	---	---	--

Lag Time Calculator
Basin Factor - n
Length along longest watercourse - L ft
Length along longest watercourse measured upstream to a point opposite the centroid of the area - Lca ft
Elevation Difference ft
Lag Time **0.105** hr
40% Lag Time 2.5 min

☒ Average Adjusted Loss Rate Calculator (Plate E-2.1) ☐ Average Adjusted Loss Rate (Manual Entry)

Add Loss Rate Values

AMC Condition:

Soil Group / Cover Type View Chart	RI Number	Perv. Area Infiltrn Rate (in/hr)	Land Use	Imp. Area Decimal %	Adj. Infiltrn Rate (in/hr)	Area (acres)		
-							Add	

Soil Group / Cover Type	RI Number	Perv. Area Infiltrn Rate (in/hr)	Land Use	Imp. Area Decimal %	Adj. Infiltrn Rate (in/hr)	Area (acres)	Area/ Total Area	Ave. Adj. Rate (in/hr)
Urban Landscaping Good A	32	0.74200	7,200-10,000 S.F. Lots (50)	50	0.408	3.78	0.147	0.06 ☒
Urban Landscaping Good A	32	0.74200	7,200-10,000 S.F. Lots (50)	50	0.408	3.57	0.138	0.056 ☒
Urban Landscaping Good A	32	0.74200	Commercial, Downtown Business or Industrial (90)	90	0.141	3.59	0.139	0.02 ☒
Urban Landscaping Good A	32	0.74200	Natural or Agriculture (0)	0	0.742	14.85	0.576	0.427 ☒
					Total area =	25.79		
							Average Soil Loss =	0.563

1.4.2 Proposed Condition



HEC HMS Preprocessor

User Manual
Contact Project Planning (951) 955-1200

Watershed Area sq mi

1 Hour Storm	3 Hour Storm	6 Hour Storm	24 Hour Storm
Point Precipitation 1.15 in.	Point Precipitation 1.89 in.	Point Precipitation 2.59 in.	Point Precipitation 4.82 in.
Areal Adjustment Factor 100 %	Areal Adjustment Factor 100 %	Areal Adjustment Factor 100 %	Areal Adjustment Factor 100 %
Adjusted Point Precipitation 1.15	Adjusted Point Precipitation 1.89	Adjusted Point Precipitation 2.59	Adjusted Point Precipitation 4.82
Slope of Rainfall Intensity - Duration Curve .52			

Lag Time Calculator

Basin Factor - n	.025	
Length along longest watercourse - L	2126	ft
Length along longest watercourse measured upstream to a point opposite the centroid of the area - Lca	1072	ft
Elevation Difference	22	ft
Lag Time	0.108	hr
40% Lag Time	2.6	min
Run		

☒ Average Adjusted Loss Rate Calculator (Plate E-2.1) ☐ Average Adjusted Loss Rate (Manual Entry)

Add Loss Rate Values

AMC Condition: **II** ▼

Soil Group / Cover Type View Chart	RI Number	Perv. Area Infiltrn Rate (in/hr)	Land Use	Imp. Area Decimal %	Adj. Infiltrn Rate (in/hr)	Area (acres)		
- ▼							Add	

Soil Group / Cover Type	RI Number	Perv. Area Infiltrn Rate (in/hr)	Land Use	Imp. Area Decimal %	Adj. Infiltrn Rate (in/hr)	Area (acres)	Area/ Total Area	Ave. Adj. Rate (in/hr)
Urban Landscaping Good A	32	0.74200	7,200-10,000 S.F. Lots (50)	50	0.408	3.78	0.147	0.06 <u>X</u>
Urban Landscaping Good A	32	0.74200	7,200-10,000 S.F. Lots (50)	50	0.408	3.57	0.138	0.056 <u>X</u>
Urban Landscaping Good A	32	0.74200	Commercial, Downtown Business or Industrial (90)	90	0.141	8.75	0.339	0.048 <u>X</u>
Urban Landscaping Good A	32	0.74200	Natural or Agriculture (0)	0	0.742	9.69	0.376	0.279 <u>X</u>
Total area =						25.79		
Average Soil Loss =								0.443

1.5 Input to the HEC HMS Preprocessor, 2-year Storm

1.5.1 Existing Conditions

**HEC HMS Preprocessor**

User Manual
Contact Project Planning (951) 955-1200

Watershed Area sq mi

1 Hour Storm	3 Hour Storm	6 Hour Storm	24 Hour Storm
Point Precipitation .464 in.	Point Precipitation .814 in.	Point Precipitation 1.13 in.	Point Precipitation 2.01 in.
Areal Adjustment Factor 100 %	Areal Adjustment Factor 100 %	Areal Adjustment Factor 100 %	Areal Adjustment Factor 100 %
Adjusted Point Precipitation 0.46	Adjusted Point Precipitation 0.81	Adjusted Point Precipitation 1.13	Adjusted Point Precipitation 2.01
Slope of Rainfall Intensity - Duration Curve .52			

Lag Time Calculator

Basin Factor - n	.025	
Length along longest watercourse - L	2047	ft
Length along longest watercourse measured upstream to a point opposite the centroid of the area - Lca	993	ft
Elevation Difference	20	ft
Lag Time	0.105	hr
40% Lag Time	2.5	min

Loss Rate Data **Effective Rainfall** **S-Graphs**

Unit Time Period min (Use interval less than 40% of lag time)

Low Loss %

Fm (Percentage of F)
(24-hour Storm Only) % (Typically 50-75%)

Watershed Area sq mi

1 Hour Storm

Point Precipitation in.
Areal Adjustment Factor %
Adjusted Point Precipitation 0.46
Slope of Rainfall Intensity - Duration Curve

3 Hour Storm

Point Precipitation in.
Areal Adjustment Factor %
Adjusted Point Precipitation 0.81

6 Hour Storm

Point Precipitation in.
Areal Adjustment Factor %
Adjusted Point Precipitation 1.13

24 Hour Storm

Point Precipitation in.
Areal Adjustment Factor %
Adjusted Point Precipitation 2.01

Lag Time Calculator

Basin Factor - n
Length along longest watercourse - L ft
Length along longest watercourse measured upstream to a point opposite the centroid of the area - Lca ft
Elevation Difference ft
Lag Time 0.11 hr
40% Lag Time 2.6 min

Loss Rate Data ☒ Effective Rainfall ☐ S-Graphs

☒ Average Adjusted Loss Rate Calculator (Plate E-2.1) ☐ Average Adjusted Loss Rate (Manual Entry)

Add Loss Rate Values

AMC Condition:

Soil Group / Cover Type View Chart	RI Number	Perv. Area Infiltrn Rate (in/hr)	Land Use	Imp. Area Decimal %	Adj. Infiltrn Rate (in/hr)	Area (acres)		
-							Add	

Soil Group / Cover Type	RI Number	Perv. Area Infiltrn Rate (in/hr)	Land Use	Imp. Area Decimal %	Adj. Infiltrn Rate (in/hr)	Area (acres)	Area/ Total Area	Ave. Adj. Rate (in/hr)
Urban Landscaping Good A	32	0.74200	7,200-10,000 S.F. Lots (50)	50	0.408	3.78	0.147	0.06 X
Urban Landscaping Good A	32	0.74200	7,200-10,000 S.F. Lots (50)	50	0.408	3.57	0.138	0.056 X
Urban Landscaping Good A	32	0.74200	Commercial, Downtown Business or Industrial (90)	90	0.141	3.59	0.139	0.02 X
Urban Landscaping Good A	32	0.74200	Natural or Agriculture (0)	0	0.742	14.85	0.576	0.427 X

1.5.2 Proposed Conditions



HEC HMS Preprocessor

[User Manual](#)
 Contact Project Planning (951) 955-1200

Watershed Area sq mi

1 Hour Storm Point Precipitation .464 in. Areal Adjustment Factor 100 % Adjusted Point Precipitation 0.46 Slope of Rainfall Intensity - Duration Curve .52	3 Hour Storm Point Precipitation .814 in. Areal Adjustment Factor 100 % Adjusted Point Precipitation 0.81	6 Hour Storm Point Precipitation 1.13 in. Areal Adjustment Factor 100 % Adjusted Point Precipitation 1.13	24 Hour Storm Point Precipitation 2.01 in. Areal Adjustment Factor 100 % Adjusted Point Precipitation 2.01
--	---	---	--

Lag Time Calculator

Basin Factor - n	.025		
Length along longest watercourse - L	2126	ft	
Length along longest watercourse measured upstream to a point opposite the centroid of the area - Lca	1072	ft	
Elevation Difference	22	ft	
Lag Time	0.108	hr	
40% Lag Time	2.6	min	

Loss Rate Data Effective Rainfall S-Graphs

Unit Time Period min (Use interval less than 40% of lag time)
 Low Loss %
 Fm (Percentage of F) (24-hour Storm Only) % (Typically 50-75%)

☒ Average Adjusted Loss Rate Calculator (Plate E-2.1) ☐ Average Adjusted Loss Rate (Manual Entry)

Add Loss Rate Values

AMC Condition:

Soil Group / Cover Type View Chart	RI Number	Perv. Area Infiltrn Rate (in/hr)	Land Use	Imp. Area Decimal %	Adj. Infiltrn Rate (in/hr)	Area (acres)		
-							Add	

Soil Group / Cover Type	RI Number	Perv. Area Infiltrn Rate (in/hr)	Land Use	Imp. Area Decimal %	Adj. Infiltrn Rate (in/hr)	Area (acres)	Area/ Total Area	Ave. Adj. Rate (in/hr)
Urban Landscaping Good A	32	0.74200	7,200-10,000 S.F. Lots (50)	50	0.408	3.78	0.147	0.06 ☒
Urban Landscaping Good A	32	0.74200	7,200-10,000 S.F. Lots (50)	50	0.408	3.57	0.138	0.056 ☒
Urban Landscaping Good A	32	0.74200	Commercial, Downtown Business or Industrial (90)	90	0.141	8.75	0.339	0.048 ☒
Urban Landscaping Good A	32	0.74200	Natural or Agriculture (0)	0	0.742	9.69	0.376	0.279 ☒
Total area =						25.79		
						Average Soil Loss =		0.443

1.6 Results, 100-year Storm

The HEC HMS Preprocessor produces effective rain time-series. The volume of the runoff hydrograph can be obtained by simply summing the rainfall values (in inches), divided by 12 to convert it to feet, then multiplying by the total watershed area (in acres). This will produce the runoff volume in Acre-feet.

In the following sections the effective rainfall time series are listed, and the volume of the runoff hydrograph calculated for the 100-year, 1-hour, 3-hour, 6-hour, and 24-hour storms. The summary of results is shown in Table 4 - 100-year runoff hydrograph volumes.

Table 4 - 100-year runoff hydrograph volumes

	Existing, Ac-ft	Proposed, Ac-ft	Increase, Ac-ft
1-hour	1.2613	1.5192	0.2579
3-hour	1.3174	1.6129	0.2955
6-hour	1.4623	1.8105	0.3482
24-hour	1.4150	1.8762	0.4612

The greatest increase occurs during the 24-hour storm, therefore the retention basins including the one for the future residential development must provide **0.4612** acre-feet or 20,090 cu-ft of storage. There are 8.75 acres being developed with the Skilled Nursing Facility / Medical Office project and 9.69 acres being developed with the future residential development. The basin for the Skilled Nursing Facility / Medical Office project will be required to provide $8.75/(8.75+9.69)*20,090 = 9,532$ cu-ft of storage with the remaining 10,558 to be provided with the future residential development.

1.6.1 Effective Rain, Existing Conditions

100-year, 1-hour Effective Rain in Existing Condition

Time	inches		
0:00		D, Sum of 'inches' column:	0.5869 in
0:05	0.0025	A, Watershed area:	25.79 Ac
0:10	0.0014	Volume of runoff, $V=A * D /12$:	1.2613 Ac-Ft
0:15	0.006		
0:20	0.0117		
0:25	0.0175		
0:30	0.0255		
0:35	0.0359		
0:40	0.0531		
0:45	0.1014		
0:50	0.2923		
0:55	0.0336		
1:00	0.006		

100-year, 3-hour Effective Rain in Existing Condition

Time	inches		
0:05	0.0037	D, Sum of 'inches' column:	0.613 in
0:10	0.0037	A, Watershed area:	25.79 Ac
0:15	0.0031	Volume of runoff, $V=A * D /12$:	1.3174 Ac-Ft
0:20	0.0043		
0:25	0.0043		
0:30	0.0051		
0:35	0.0043		
0:40	0.0051		
0:45	0.0051		
0:50	0.0043		
0:55	0.0045		
1:00	0.0051		
1:05	0.0062		
1:10	0.0062		
1:15	0.0062		
1:20	0.0057		
1:25	0.0022		
1:30	0.0041		
1:35	0.0068		
1:40	0.0041		
1:45	0.0155		
1:50	0.0117		
1:55	0.0079		
2:00	0.0098		
2:05	0.0117		
2:10	0.0325		
2:15	0.0476		
2:20	0.0192		
2:25	0.0816		
2:30	0.0911		
2:35	0.1081		
2:40	0.0646		
2:45	0.0057		
2:50	0.0051		
2:55	0.0051		
3:00	0.0017		

100-year, 6-hour Effective Rain in Existing Condition

D, Sum of 'inches' column: 0.6804 in

A, Watershed area: 25.79 Ac

Volume of runoff, $V = A * D / 12$: **1.4623** Ac-Ft

Time	inches	Time	inches
0:05	0.0019	3:05	0.0039
0:10	0.0023	3:10	0.0043
0:15	0.0023	3:15	0.0043
0:20	0.0023	3:20	0.0043
0:25	0.0023	3:25	0.0047
0:30	0.0027	3:30	0.0051
0:35	0.0027	3:35	0.0054
0:40	0.0027	3:40	0.0054
0:45	0.0027	3:45	0.0058
0:50	0.0027	3:50	0.0058
0:55	0.0027	3:55	0.0062
1:00	0.0031	4:00	0.0062
1:05	0.0031	4:05	0.0066
1:10	0.0031	4:10	0.007
1:15	0.0031	4:15	0.0023
1:20	0.0031	4:20	0.0049
1:25	0.0031	4:25	0.0075
1:30	0.0031	4:30	0.0075
1:35	0.0031	4:35	0.0101
1:40	0.0031	4:40	0.0127
1:45	0.0031	4:45	0.0152
1:50	0.0031	4:50	0.0152
1:55	0.0031	4:55	0.0178
2:00	0.0035	5:00	0.0204
2:05	0.0031	5:05	0.0334
2:10	0.0035	5:10	0.0463
2:15	0.0035	5:15	0.0541
2:20	0.0035	5:20	0.0619
2:25	0.0035	5:25	0.0748
2:30	0.0035	5:30	0.0981
2:35	0.0035	5:35	0.0023
2:40	0.0035	5:40	0.0035
2:45	0.0039	5:45	0.0023
2:50	0.0039	5:50	0.0019
2:55	0.0039	5:55	0.0012
3:00	0.0039	6:00	0.0008

100-year, 24-hour Effective Rain in Existing Condition

D, Sum of 'inches' column: 0.6584 in
A, Watershed area: 25.79 Ac
Volume of runoff, V=A * D /12: **1.4150** Ac-Ft

Time	inches	Time	inches	Time	inches	Time	inches	Time	inches	Time	inches	Time	inches
0:05	0.0005	3:35	0.0012	7:05	0.0024	10:35	0.0048	14:05	0.003	17:35	0.0012	21:05	0.0007
0:10	0.0005	3:40	0.0012	7:10	0.0024	10:40	0.0048	14:10	0.0031	17:40	0.0012	21:10	0.0007
0:15	0.0005	3:45	0.0012	7:15	0.0024	10:45	0.0048	14:15	0.0033	17:45	0.0012	21:15	0.0007
0:20	0.0007	3:50	0.0014	7:20	0.0027	10:50	0.0048	14:20	0.002	17:50	0.0009	21:20	0.0005
0:25	0.0007	3:55	0.0014	7:25	0.0027	10:55	0.0048	14:25	0.0022	17:55	0.0009	21:25	0.0005
0:30	0.0007	4:00	0.0014	7:30	0.0027	11:00	0.0048	14:30	0.0023	18:00	0.0009	21:30	0.0005
0:35	0.0007	4:05	0.0014	7:35	0.0029	11:05	0.0046	14:35	0.0025	18:05	0.0009	21:35	0.0007
0:40	0.0007	4:10	0.0014	7:40	0.0029	11:10	0.0046	14:40	0.0026	18:10	0.0009	21:40	0.0007
0:45	0.0007	4:15	0.0014	7:45	0.0029	11:15	0.0046	14:45	0.0028	18:15	0.0009	21:45	0.0007
0:50	0.0009	4:20	0.0017	7:50	0.0031	11:20	0.0046	14:50	0.001	18:20	0.0009	21:50	0.0005
0:55	0.0009	4:25	0.0017	7:55	0.0031	11:25	0.0046	14:55	0.0012	18:25	0.0009	21:55	0.0005
1:00	0.0009	4:30	0.0017	8:00	0.0031	11:30	0.0046	15:00	0.0013	18:30	0.0009	22:00	0.0005
1:05	0.0007	4:35	0.0017	8:05	0.0036	11:35	0.0041	15:05	0	18:35	0.0007	22:05	0.0007
1:10	0.0007	4:40	0.0017	8:10	0.0036	11:40	0.0041	15:10	0.0002	18:40	0.0007	22:10	0.0007
1:15	0.0007	4:45	0.0017	8:15	0.0036	11:45	0.0041	15:15	0.0003	18:45	0.0007	22:15	0.0007
1:20	0.0007	4:50	0.002	8:20	0.0036	11:50	0.0043	15:20	0.0056	18:50	0.0005	22:20	0.0005
1:25	0.0007	4:55	0.002	8:25	0.0036	11:55	0.0043	15:25	0.0056	18:55	0.0005	22:25	0.0005
1:30	0.0007	5:00	0.002	8:30	0.0036	12:00	0.0043	15:30	0.0056	19:00	0.0005	22:30	0.0005
1:35	0.0007	5:05	0.0014	8:35	0.0038	12:05	0.006	15:35	0.0046	19:05	0.0007	22:35	0.0005
1:40	0.0007	5:10	0.0014	8:40	0.0038	12:10	0.006	15:40	0.0046	19:10	0.0007	22:40	0.0005
1:45	0.0007	5:15	0.0014	8:45	0.0038	12:15	0.006	15:45	0.0046	19:15	0.0007	22:45	0.0005
1:50	0.0009	5:20	0.0017	8:50	0.0041	12:20	0.0063	15:50	0.0046	19:20	0.0009	22:50	0.0005
1:55	0.0009	5:25	0.0017	8:55	0.0041	12:25	0.0063	15:55	0.0046	19:25	0.0009	22:55	0.0005
2:00	0.0009	5:30	0.0017	9:00	0.0041	12:30	0.0063	16:00	0.0046	19:30	0.0009	23:00	0.0005
2:05	0.0009	5:35	0.002	9:05	0.0046	12:35	0.0014	16:05	0.0009	19:35	0.0007	23:05	0.0005
2:10	0.0009	5:40	0.002	9:10	0.0046	12:40	0.0016	16:10	0.0009	19:40	0.0007	23:10	0.0005
2:15	0.0009	5:45	0.002	9:15	0.0046	12:45	0.0018	16:15	0.0009	19:45	0.0007	23:15	0.0005
2:20	0.0009	5:50	0.002	9:20	0.0048	12:50	0.0039	16:20	0.0009	19:50	0.0005	23:20	0.0005

2:25	0.0009	5:55	0.002	9:25	0.0048	12:55	0.0041	16:25	0.0009	19:55	0.0005	23:25	0.0005
2:30	0.0009	6:00	0.002	9:30	0.0048	13:00	0.0042	16:30	0.0009	20:00	0.0005	23:30	0.0005
2:35	0.0012	6:05	0.0022	9:35	0.0051	13:05	0.0121	16:35	0.0007	20:05	0.0007	23:35	0.0005
2:40	0.0012	6:10	0.0022	9:40	0.0051	13:10	0.0123	16:40	0.0007	20:10	0.0007	23:40	0.0005
2:45	0.0012	6:15	0.0022	9:45	0.0051	13:15	0.0124	16:45	0.0007	20:15	0.0007	23:45	0.0005
2:50	0.0012	6:20	0.0022	9:50	0.0053	13:20	0.0126	16:50	0.0007	20:20	0.0007	23:50	0.0005
2:55	0.0012	6:25	0.0022	9:55	0.0053	13:25	0.0128	16:55	0.0007	20:25	0.0007	23:55	0.0005
3:00	0.0012	6:30	0.0022	10:00	0.0053	13:30	0.0129	17:00	0.0007	20:30	0.0007	23:59	0.0005
3:05	0.0012	6:35	0.0024	10:05	0.0036	13:35	0.0056	17:05	0.0012	20:35	0.0007		
3:10	0.0012	6:40	0.0024	10:10	0.0036	13:40	0.0056	17:10	0.0012	20:40	0.0007		
3:15	0.0012	6:45	0.0024	10:15	0.0036	13:45	0.0056	17:15	0.0012	20:45	0.0007		
3:20	0.0012	6:50	0.0024	10:20	0.0036	13:50	0.0056	17:20	0.0012	20:50	0.0005		
3:25	0.0012	6:55	0.0024	10:25	0.0036	13:55	0.0056	17:25	0.0012	20:55	0.0005		
3:30	0.0012	7:00	0.0024	10:30	0.0036	14:00	0.0056	17:30	0.0012	21:00	0.0005		

1.6.2 Effective Rain, Proposed Conditions

100-year, 1-hour Effective Rain in Proposed Condition

Time	inches
0:00	
0:05	0.0125
0:10	0.0114
0:15	0.016
0:20	0.0217
0:25	0.0275
0:30	0.0355
0:35	0.0459
0:40	0.0631
0:45	0.1114
0:50	0.3023
0:55	0.0436
1:00	0.016

D, Sum of 'inches' column: 0.7069 in
A, Watershed area: 25.79 Ac
Volume of runoff, $V=A * D /12$: **1.5192** Ac-Ft

100-year, 3-hour Effective Rain in Proposed Condition

Time	inches		
0:05	0.0037	D, Sum of 'inches' column:	0.7505 in
0:10	0.0037	A, Watershed area:	25.79 Ac
0:15	0.0031	Volume of runoff, $V=A * D /12$:	1.6129 Ac-Ft
0:20	0.0043		
0:25	0.0043		
0:30	0.0051		
0:35	0.0043		
0:40	0.0051		
0:45	0.0051		
0:50	0.0043		
0:55	0.0045		
1:00	0.0051		
1:05	0.0047		
1:10	0.0047		
1:15	0.0047		
1:20	0.0009		
1:25	0.0122		
1:30	0.0141		
1:35	0.0084		
1:40	0.0141		
1:45	0.0255		
1:50	0.0217		
1:55	0.0179		
2:00	0.0198		
2:05	0.0217		
2:10	0.0425		
2:15	0.0576		
2:20	0.0292		
2:25	0.0916		
2:30	0.1011		
2:35	0.1181		
2:40	0.0746		
2:45	0.0009		
2:50	0.0051		
2:55	0.0051		
3:00	0.0017		

100-year, 6-hour Effective Rain in Proposed Condition

D, Sum of 'inches' column: 0.8424 in
A, Watershed area: 25.79 Ac
Volume of runoff, $V=A * D /12$: **1.8105** Ac-Ft

Time	inches	Time	inches
0:05	0.0019	3:05	0.0039
0:10	0.0023	3:10	0.0043
0:15	0.0023	3:15	0.0043
0:20	0.0023	3:20	0.0043
0:25	0.0023	3:25	0.0047
0:30	0.0027	3:30	0.0051
0:35	0.0027	3:35	0.0054
0:40	0.0027	3:40	0.0054
0:45	0.0027	3:45	0.0019
0:50	0.0027	3:50	0.0019
0:55	0.0027	3:55	0.0045
1:00	0.0031	4:00	0.0045
1:05	0.0031	4:05	0.0071
1:10	0.0031	4:10	0.0097
1:15	0.0031	4:15	0.0123
1:20	0.0031	4:20	0.0149
1:25	0.0031	4:25	0.0175
1:30	0.0031	4:30	0.0175
1:35	0.0031	4:35	0.0201
1:40	0.0031	4:40	0.0227
1:45	0.0031	4:45	0.0252
1:50	0.0031	4:50	0.0252
1:55	0.0031	4:55	0.0278
2:00	0.0035	5:00	0.0304
2:05	0.0031	5:05	0.0434
2:10	0.0035	5:10	0.0563
2:15	0.0035	5:15	0.0641
2:20	0.0035	5:20	0.0719
2:25	0.0035	5:25	0.0848
2:30	0.0035	5:30	0.1081
2:35	0.0035	5:35	0.0123
2:40	0.0035	5:40	0.0035
2:45	0.0039	5:45	0.0023
2:50	0.0039	5:50	0.0019
2:55	0.0039	5:55	0.0012
3:00	0.0039	6:00	0.0008

100-year, 24-hour Effective Rain in Proposed Condition

D, Sum of 'inches' column: 0.873 in
A, Watershed area: 25.79 Ac
Volume of runoff, $V=A * D /12$: **1.8762** Ac-Ft

Time	inches	Time	inches	Time	inches	Time	inches	Time	inches	Time	inches	Time	inches
0:05	0.0005	3:35	0.0012	7:05	0.0024	10:35	0.0048	14:05	0.0116	17:35	0.0012	21:05	0.0007
0:10	0.0005	3:40	0.0012	7:10	0.0024	10:40	0.0048	14:10	0.0117	17:40	0.0012	21:10	0.0007
0:15	0.0005	3:45	0.0012	7:15	0.0024	10:45	0.0048	14:15	0.0118	17:45	0.0012	21:15	0.0007
0:20	0.0007	3:50	0.0014	7:20	0.0027	10:50	0.0048	14:20	0.0105	17:50	0.0009	21:20	0.0005
0:25	0.0007	3:55	0.0014	7:25	0.0027	10:55	0.0048	14:25	0.0106	17:55	0.0009	21:25	0.0005
0:30	0.0007	4:00	0.0014	7:30	0.0027	11:00	0.0048	14:30	0.0108	18:00	0.0009	21:30	0.0005
0:35	0.0007	4:05	0.0014	7:35	0.0029	11:05	0.0046	14:35	0.0109	18:05	0.0009	21:35	0.0007
0:40	0.0007	4:10	0.0014	7:40	0.0029	11:10	0.0046	14:40	0.011	18:10	0.0009	21:40	0.0007
0:45	0.0007	4:15	0.0014	7:45	0.0029	11:15	0.0046	14:45	0.0111	18:15	0.0009	21:45	0.0007
0:50	0.0009	4:20	0.0017	7:50	0.0031	11:20	0.0046	14:50	0.0093	18:20	0.0009	21:50	0.0005
0:55	0.0009	4:25	0.0017	7:55	0.0031	11:25	0.0046	14:55	0.0094	18:25	0.0009	21:55	0.0005
1:00	0.0009	4:30	0.0017	8:00	0.0031	11:30	0.0046	15:00	0.0096	18:30	0.0009	22:00	0.0005
1:05	0.0007	4:35	0.0017	8:05	0.0036	11:35	0.0041	15:05	0.0082	18:35	0.0007	22:05	0.0007
1:10	0.0007	4:40	0.0017	8:10	0.0036	11:40	0.0041	15:10	0.0083	18:40	0.0007	22:10	0.0007
1:15	0.0007	4:45	0.0017	8:15	0.0036	11:45	0.0041	15:15	0.0085	18:45	0.0007	22:15	0.0007
1:20	0.0007	4:50	0.002	8:20	0.0036	11:50	0.0043	15:20	0.0071	18:50	0.0005	22:20	0.0005
1:25	0.0007	4:55	0.002	8:25	0.0036	11:55	0.0043	15:25	0.0072	18:55	0.0005	22:25	0.0005
1:30	0.0007	5:00	0.002	8:30	0.0036	12:00	0.0043	15:30	0.0074	19:00	0.0005	22:30	0.0005
1:35	0.0007	5:05	0.0014	8:35	0.0038	12:05	0.0051	15:35	0.0007	19:05	0.0007	22:35	0.0005
1:40	0.0007	5:10	0.0014	8:40	0.0038	12:10	0.0052	15:40	0.0008	19:10	0.0007	22:40	0.0005
1:45	0.0007	5:15	0.0014	8:45	0.0038	12:15	0.0053	15:45	0.001	19:15	0.0007	22:45	0.0005
1:50	0.0009	5:20	0.0017	8:50	0.0041	12:20	0.0074	15:50	0.0011	19:20	0.0009	22:50	0.0005
1:55	0.0009	5:25	0.0017	8:55	0.0041	12:25	0.0075	15:55	0.0012	19:25	0.0009	22:55	0.0005
2:00	0.0009	5:30	0.0017	9:00	0.0041	12:30	0.0077	16:00	0.0013	19:30	0.0009	23:00	0.0005
2:05	0.0009	5:35	0.002	9:05	0.0046	12:35	0.0107	16:05	0.0009	19:35	0.0007	23:05	0.0005
2:10	0.0009	5:40	0.002	9:10	0.0046	12:40	0.0108	16:10	0.0009	19:40	0.0007	23:10	0.0005
2:15	0.0009	5:45	0.002	9:15	0.0046	12:45	0.011	16:15	0.0009	19:45	0.0007	23:15	0.0005
2:20	0.0009	5:50	0.002	9:20	0.0048	12:50	0.013	16:20	0.0009	19:50	0.0005	23:20	0.0005

2:25	0.0009	5:55	0.002	9:25	0.0048	12:55	0.0132	16:25	0.0009	19:55	0.0005	23:25	0.0005
2:30	0.0009	6:00	0.002	9:30	0.0048	13:00	0.0133	16:30	0.0009	20:00	0.0005	23:30	0.0005
2:35	0.0012	6:05	0.0022	9:35	0.0051	13:05	0.0211	16:35	0.0007	20:05	0.0007	23:35	0.0005
2:40	0.0012	6:10	0.0022	9:40	0.0051	13:10	0.0213	16:40	0.0007	20:10	0.0007	23:40	0.0005
2:45	0.0012	6:15	0.0022	9:45	0.0051	13:15	0.0214	16:45	0.0007	20:15	0.0007	23:45	0.0005
2:50	0.0012	6:20	0.0022	9:50	0.0053	13:20	0.0215	16:50	0.0007	20:20	0.0007	23:50	0.0005
2:55	0.0012	6:25	0.0022	9:55	0.0053	13:25	0.0217	16:55	0.0007	20:25	0.0007	23:55	0.0005
3:00	0.0012	6:30	0.0022	10:00	0.0053	13:30	0.0218	17:00	0.0007	20:30	0.0007	0:00	0.0005
3:05	0.0012	6:35	0.0024	10:05	0.0036	13:35	0.0046	17:05	0.0012	20:35	0.0007		
3:10	0.0012	6:40	0.0024	10:10	0.0036	13:40	0.0047	17:10	0.0012	20:40	0.0007		
3:15	0.0012	6:45	0.0024	10:15	0.0036	13:45	0.0048	17:15	0.0012	20:45	0.0007		
3:20	0.0012	6:50	0.0024	10:20	0.0036	13:50	0.0049	17:20	0.0012	20:50	0.0005		
3:25	0.0012	6:55	0.0024	10:25	0.0036	13:55	0.0051	17:25	0.0012	20:55	0.0005		
3:30	0.0012	7:00	0.0024	10:30	0.0036	14:00	0.0052	17:30	0.0012	21:00	0.0005		

1.7 Results, 2-year Storm

For HCOC mitigation, it is necessary to compare the existing and proposed runoff volumes for the 2-year, 24-hour runoff.

In the following sections the effective rainfall time series are listed, and the volume of the runoff hydrograph calculated for the 2-year, 24-hour storm for the existing and proposed conditions. The results are summarized in Table 5 - 2-year, 24-hour Storm Runoff Volumes.

Table 5 - 2-year, 24-hour Storm Runoff Volumes

	Existing, Ac-ft	Proposed, Ac-ft	Increase, Ac-ft
24-hour	0.6448	0.6448	0

There is no increase for the proposed condition.

1.7.1 Effective Rain, Existing Conditions

2-year, 24-hour Effective Rain in Existing Condition

D, Sum of 'inches' column: 0.3 in
A, Watershed area: 25.79 Ac
Volume of runoff, $V=A * D /12$: **0.6448** Ac-Ft

Time	inches	Time	inches	Time	inches	Time	inches	Time	inches	Time	inches	Time	inches
0:05	0.0005	3:35	0.0012	7:05	0.0024	10:35	0.0048	14:05	0.003	17:35	0.0012	21:05	0.0007
0:10	0.0005	3:40	0.0012	7:10	0.0024	10:40	0.0048	14:10	0.0031	17:40	0.0012	21:10	0.0007
0:15	0.0005	3:45	0.0012	7:15	0.0024	10:45	0.0048	14:15	0.0033	17:45	0.0012	21:15	0.0007
0:20	0.0007	3:50	0.0014	7:20	0.0027	10:50	0.0048	14:20	0.002	17:50	0.0009	21:20	0.0005
0:25	0.0007	3:55	0.0014	7:25	0.0027	10:55	0.0048	14:25	0.0022	17:55	0.0009	21:25	0.0005
0:30	0.0007	4:00	0.0014	7:30	0.0027	11:00	0.0048	14:30	0.0023	18:00	0.0009	21:30	0.0005
0:35	0.0007	4:05	0.0014	7:35	0.0029	11:05	0.0046	14:35	0.0025	18:05	0.0009	21:35	0.0007
0:40	0.0007	4:10	0.0014	7:40	0.0029	11:10	0.0046	14:40	0.0026	18:10	0.0009	21:40	0.0007
0:45	0.0007	4:15	0.0014	7:45	0.0029	11:15	0.0046	14:45	0.0028	18:15	0.0009	21:45	0.0007
0:50	0.0009	4:20	0.0017	7:50	0.0031	11:20	0.0046	14:50	0.001	18:20	0.0009	21:50	0.0005
0:55	0.0009	4:25	0.0017	7:55	0.0031	11:25	0.0046	14:55	0.0012	18:25	0.0009	21:55	0.0005
1:00	0.0009	4:30	0.0017	8:00	0.0031	11:30	0.0046	15:00	0.0013	18:30	0.0009	22:00	0.0005
1:05	0.0007	4:35	0.0017	8:05	0.0036	11:35	0.0041	15:05	0	18:35	0.0007	22:05	0.0007
1:10	0.0007	4:40	0.0017	8:10	0.0036	11:40	0.0041	15:10	0.0002	18:40	0.0007	22:10	0.0007
1:15	0.0007	4:45	0.0017	8:15	0.0036	11:45	0.0041	15:15	0.0003	18:45	0.0007	22:15	0.0007
1:20	0.0007	4:50	0.002	8:20	0.0036	11:50	0.0043	15:20	0.0056	18:50	0.0005	22:20	0.0005
1:25	0.0007	4:55	0.002	8:25	0.0036	11:55	0.0043	15:25	0.0056	18:55	0.0005	22:25	0.0005
1:30	0.0007	5:00	0.002	8:30	0.0036	12:00	0.0043	15:30	0.0056	19:00	0.0005	22:30	0.0005
1:35	0.0007	5:05	0.0014	8:35	0.0038	12:05	0.006	15:35	0.0046	19:05	0.0007	22:35	0.0005
1:40	0.0007	5:10	0.0014	8:40	0.0038	12:10	0.006	15:40	0.0046	19:10	0.0007	22:40	0.0005
1:45	0.0007	5:15	0.0014	8:45	0.0038	12:15	0.006	15:45	0.0046	19:15	0.0007	22:45	0.0005
1:50	0.0009	5:20	0.0017	8:50	0.0041	12:20	0.0063	15:50	0.0046	19:20	0.0009	22:50	0.0005
1:55	0.0009	5:25	0.0017	8:55	0.0041	12:25	0.0063	15:55	0.0046	19:25	0.0009	22:55	0.0005
2:00	0.0009	5:30	0.0017	9:00	0.0041	12:30	0.0063	16:00	0.0046	19:30	0.0009	23:00	0.0005
2:05	0.0009	5:35	0.002	9:05	0.0046	12:35	0.0014	16:05	0.0009	19:35	0.0007	23:05	0.0005
2:10	0.0009	5:40	0.002	9:10	0.0046	12:40	0.0016	16:10	0.0009	19:40	0.0007	23:10	0.0005
2:15	0.0009	5:45	0.002	9:15	0.0046	12:45	0.0018	16:15	0.0009	19:45	0.0007	23:15	0.0005

2:20	0.0009	5:50	0.002	9:20	0.0048	12:50	0.0039	16:20	0.0009	19:50	0.0005	23:20	0.0005
2:25	0.0009	5:55	0.002	9:25	0.0048	12:55	0.0041	16:25	0.0009	19:55	0.0005	23:25	0.0005
2:30	0.0009	6:00	0.002	9:30	0.0048	13:00	0.0042	16:30	0.0009	20:00	0.0005	23:30	0.0005
2:35	0.0012	6:05	0.0022	9:35	0.0051	13:05	0.0121	16:35	0.0007	20:05	0.0007	23:35	0.0005
2:40	0.0012	6:10	0.0022	9:40	0.0051	13:10	0.0123	16:40	0.0007	20:10	0.0007	23:40	0.0005
2:45	0.0012	6:15	0.0022	9:45	0.0051	13:15	0.0124	16:45	0.0007	20:15	0.0007	23:45	0.0005
2:50	0.0012	6:20	0.0022	9:50	0.0053	13:20	0.0126	16:50	0.0007	20:20	0.0007	23:50	0.0005
2:55	0.0012	6:25	0.0022	9:55	0.0053	13:25	0.0128	16:55	0.0007	20:25	0.0007	23:55	0.0005
3:00	0.0012	6:30	0.0022	10:00	0.0053	13:30	0.0129	17:00	0.0007	20:30	0.0007	23:59	0.0005
3:05	0.0012	6:35	0.0024	10:05	0.0036	13:35	0.0056	17:05	0.0012	20:35	0.0007		
3:10	0.0012	6:40	0.0024	10:10	0.0036	13:40	0.0056	17:10	0.0012	20:40	0.0007		
3:15	0.0012	6:45	0.0024	10:15	0.0036	13:45	0.0056	17:15	0.0012	20:45	0.0007		
3:20	0.0012	6:50	0.0024	10:20	0.0036	13:50	0.0056	17:20	0.0012	20:50	0.0005		
3:25	0.0012	6:55	0.0024	10:25	0.0036	13:55	0.0056	17:25	0.0012	20:55	0.0005		
3:30	0.0012	7:00	0.0024	10:30	0.0036	14:00	0.0056	17:30	0.0012	21:00	0.0005		

1.7.2 Effective Rain, Proposed Conditions

2-year, 24-hour Effective Rain in Proposed Condition

D, Sum of 'inches' column: 0.3 in
A, Watershed area: 25.79 Ac
Volume of runoff, $V=A * D /12$: **0.6448** Ac-Ft

Time	inches	Time	inches	Time	inches	Time	inches	Time	inches	Time	inches	Time	inches
0:05	0.0005	3:35	0.0012	7:05	0.0024	10:35	0.0048	14:05	0.003	17:35	0.0012	21:05	0.0007
0:10	0.0005	3:40	0.0012	7:10	0.0024	10:40	0.0048	14:10	0.0031	17:40	0.0012	21:10	0.0007
0:15	0.0005	3:45	0.0012	7:15	0.0024	10:45	0.0048	14:15	0.0033	17:45	0.0012	21:15	0.0007
0:20	0.0007	3:50	0.0014	7:20	0.0027	10:50	0.0048	14:20	0.002	17:50	0.0009	21:20	0.0005
0:25	0.0007	3:55	0.0014	7:25	0.0027	10:55	0.0048	14:25	0.0022	17:55	0.0009	21:25	0.0005
0:30	0.0007	4:00	0.0014	7:30	0.0027	11:00	0.0048	14:30	0.0023	18:00	0.0009	21:30	0.0005
0:35	0.0007	4:05	0.0014	7:35	0.0029	11:05	0.0046	14:35	0.0025	18:05	0.0009	21:35	0.0007
0:40	0.0007	4:10	0.0014	7:40	0.0029	11:10	0.0046	14:40	0.0026	18:10	0.0009	21:40	0.0007
0:45	0.0007	4:15	0.0014	7:45	0.0029	11:15	0.0046	14:45	0.0028	18:15	0.0009	21:45	0.0007
0:50	0.0009	4:20	0.0017	7:50	0.0031	11:20	0.0046	14:50	0.001	18:20	0.0009	21:50	0.0005
0:55	0.0009	4:25	0.0017	7:55	0.0031	11:25	0.0046	14:55	0.0012	18:25	0.0009	21:55	0.0005
1:00	0.0009	4:30	0.0017	8:00	0.0031	11:30	0.0046	15:00	0.0013	18:30	0.0009	22:00	0.0005
1:05	0.0007	4:35	0.0017	8:05	0.0036	11:35	0.0041	15:05	0	18:35	0.0007	22:05	0.0007
1:10	0.0007	4:40	0.0017	8:10	0.0036	11:40	0.0041	15:10	0.0002	18:40	0.0007	22:10	0.0007
1:15	0.0007	4:45	0.0017	8:15	0.0036	11:45	0.0041	15:15	0.0003	18:45	0.0007	22:15	0.0007
1:20	0.0007	4:50	0.002	8:20	0.0036	11:50	0.0043	15:20	0.0056	18:50	0.0005	22:20	0.0005
1:25	0.0007	4:55	0.002	8:25	0.0036	11:55	0.0043	15:25	0.0056	18:55	0.0005	22:25	0.0005
1:30	0.0007	5:00	0.002	8:30	0.0036	12:00	0.0043	15:30	0.0056	19:00	0.0005	22:30	0.0005
1:35	0.0007	5:05	0.0014	8:35	0.0038	12:05	0.006	15:35	0.0046	19:05	0.0007	22:35	0.0005
1:40	0.0007	5:10	0.0014	8:40	0.0038	12:10	0.006	15:40	0.0046	19:10	0.0007	22:40	0.0005
1:45	0.0007	5:15	0.0014	8:45	0.0038	12:15	0.006	15:45	0.0046	19:15	0.0007	22:45	0.0005
1:50	0.0009	5:20	0.0017	8:50	0.0041	12:20	0.0063	15:50	0.0046	19:20	0.0009	22:50	0.0005
1:55	0.0009	5:25	0.0017	8:55	0.0041	12:25	0.0063	15:55	0.0046	19:25	0.0009	22:55	0.0005
2:00	0.0009	5:30	0.0017	9:00	0.0041	12:30	0.0063	16:00	0.0046	19:30	0.0009	23:00	0.0005
2:05	0.0009	5:35	0.002	9:05	0.0046	12:35	0.0014	16:05	0.0009	19:35	0.0007	23:05	0.0005
2:10	0.0009	5:40	0.002	9:10	0.0046	12:40	0.0016	16:10	0.0009	19:40	0.0007	23:10	0.0005
2:15	0.0009	5:45	0.002	9:15	0.0046	12:45	0.0018	16:15	0.0009	19:45	0.0007	23:15	0.0005

2:20	0.0009	5:50	0.002	9:20	0.0048	12:50	0.0039	16:20	0.0009	19:50	0.0005	23:20	0.0005
2:25	0.0009	5:55	0.002	9:25	0.0048	12:55	0.0041	16:25	0.0009	19:55	0.0005	23:25	0.0005
2:30	0.0009	6:00	0.002	9:30	0.0048	13:00	0.0042	16:30	0.0009	20:00	0.0005	23:30	0.0005
2:35	0.0012	6:05	0.0022	9:35	0.0051	13:05	0.0121	16:35	0.0007	20:05	0.0007	23:35	0.0005
2:40	0.0012	6:10	0.0022	9:40	0.0051	13:10	0.0123	16:40	0.0007	20:10	0.0007	23:40	0.0005
2:45	0.0012	6:15	0.0022	9:45	0.0051	13:15	0.0124	16:45	0.0007	20:15	0.0007	23:45	0.0005
2:50	0.0012	6:20	0.0022	9:50	0.0053	13:20	0.0126	16:50	0.0007	20:20	0.0007	23:50	0.0005
2:55	0.0012	6:25	0.0022	9:55	0.0053	13:25	0.0128	16:55	0.0007	20:25	0.0007	23:55	0.0005
3:00	0.0012	6:30	0.0022	10:00	0.0053	13:30	0.0129	17:00	0.0007	20:30	0.0007	23:59	0.0005
3:05	0.0012	6:35	0.0024	10:05	0.0036	13:35	0.0056	17:05	0.0012	20:35	0.0007		
3:10	0.0012	6:40	0.0024	10:10	0.0036	13:40	0.0056	17:10	0.0012	20:40	0.0007		
3:15	0.0012	6:45	0.0024	10:15	0.0036	13:45	0.0056	17:15	0.0012	20:45	0.0007		
3:20	0.0012	6:50	0.0024	10:20	0.0036	13:50	0.0056	17:20	0.0012	20:50	0.0005		
3:25	0.0012	6:55	0.0024	10:25	0.0036	13:55	0.0056	17:25	0.0012	20:55	0.0005		
3:30	0.0012	7:00	0.0024	10:30	0.0036	14:00	0.0056	17:30	0.0012	21:00	0.0005		

Appendix A

Precipitation from NOAA Atlas 14



NOAA Atlas 14, Volume 6, Version 2
Location name: Jurupa Valley, California, USA*
Latitude: 34.0124°, Longitude: -117.4226°
Elevation: 891 ft**
 * source: ESRI Maps
 ** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aeriels](#)

PF tabular

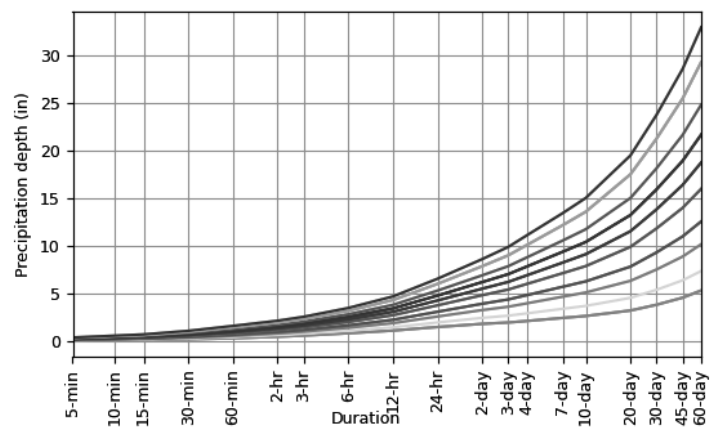
PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.096 (0.080-0.116)	0.124 (0.103-0.150)	0.161 (0.134-0.196)	0.192 (0.158-0.236)	0.236 (0.187-0.299)	0.270 (0.210-0.350)	0.306 (0.232-0.407)	0.344 (0.253-0.471)	0.397 (0.289-0.568)	0.439 (0.299-0.652)
10-min	0.137 (0.114-0.166)	0.177 (0.148-0.215)	0.231 (0.192-0.281)	0.275 (0.227-0.338)	0.338 (0.269-0.429)	0.387 (0.301-0.502)	0.438 (0.333-0.583)	0.493 (0.363-0.675)	0.569 (0.402-0.814)	0.630 (0.429-0.934)
15-min	0.166 (0.138-0.201)	0.214 (0.179-0.260)	0.279 (0.232-0.339)	0.333 (0.274-0.408)	0.408 (0.325-0.519)	0.468 (0.364-0.607)	0.530 (0.402-0.706)	0.596 (0.439-0.816)	0.688 (0.486-0.984)	0.762 (0.519-1.13)
30-min	0.247 (0.206-0.299)	0.319 (0.266-0.387)	0.415 (0.345-0.505)	0.496 (0.408-0.608)	0.608 (0.484-0.772)	0.696 (0.542-0.904)	0.789 (0.598-1.05)	0.886 (0.653-1.22)	1.02 (0.722-1.46)	1.13 (0.772-1.68)
60-min	0.360 (0.300-0.436)	0.505 (0.387-0.563)	0.605 (0.502-0.735)	0.722 (0.595-0.885)	0.885 (0.704-1.12)	1.01 (0.790-1.32)	1.29 (0.872-1.53)	1.49 (0.952-1.77)	1.65 (1.05-2.13)	1.85 (1.12-2.45)
2-hr	0.521 (0.435-0.631)	0.667 (0.555-0.808)	0.858 (0.713-1.04)	1.02 (0.837-1.25)	1.23 (0.980-1.56)	1.40 (1.09-1.82)	1.57 (1.19-2.09)	1.75 (1.29-2.40)	2.00 (1.41-2.86)	2.19 (1.49-3.25)
3-hr	0.638 (0.532-0.772)	0.808 (0.678-0.987)	1.04 (0.868-1.27)	1.23 (1.02-1.51)	1.49 (1.18-1.89)	1.69 (1.31-2.19)	1.89 (1.43-2.52)	2.10 (1.55-2.88)	2.38 (1.68-3.41)	2.61 (1.78-3.86)
6-hr	0.882 (0.736-1.07)	1.15 (0.939-1.37)	1.45 (1.20-1.76)	1.70 (1.40-2.09)	2.05 (1.63-2.61)	2.32 (1.81-3.01)	2.62 (1.96-3.45)	2.86 (2.11-3.93)	3.24 (2.29-4.63)	3.53 (2.40-5.23)
12-hr	1.16 (0.968-1.40)	1.50 (1.25-1.82)	1.94 (1.61-2.36)	2.29 (1.89-2.81)	2.76 (2.20-3.51)	3.12 (2.43-4.05)	3.48 (2.64-4.64)	3.85 (2.84-5.28)	4.35 (3.07-6.22)	4.73 (3.22-7.01)
24-hr	1.53 (1.36-1.77)	2.03 (1.78-2.32)	2.63 (2.32-3.05)	3.13 (2.74-3.65)	3.80 (3.22-4.58)	4.31 (3.58-5.30)	4.81 (3.91-6.08)	5.35 (4.21-6.92)	6.05 (4.58-8.16)	6.59 (4.82-9.19)
2-day	1.86 (1.65-2.15)	2.49 (2.20-2.88)	3.31 (2.92-3.83)	3.97 (3.47-4.63)	4.86 (4.12-5.86)	5.54 (4.60-6.82)	6.24 (5.05-7.85)	6.94 (5.47-8.99)	7.90 (5.98-10.7)	8.64 (6.32-12.0)
3-day	2.01 (1.78-2.31)	2.72 (2.41-3.14)	3.66 (3.23-4.23)	4.42 (3.87-5.16)	5.46 (4.62-6.58)	6.26 (5.19-7.70)	7.07 (5.72-8.90)	7.90 (6.23-10.2)	9.04 (6.84-12.2)	9.92 (7.26-13.8)
4-day	2.16 (1.91-2.49)	2.96 (2.62-3.42)	4.01 (3.54-4.64)	4.87 (4.26-5.68)	6.04 (5.11-7.28)	6.94 (5.76-8.54)	7.86 (6.37-9.91)	8.82 (6.95-11.4)	10.1 (7.66-13.6)	11.1 (8.14-15.5)
7-day	2.49 (2.20-2.87)	3.44 (3.04-3.98)	4.71 (4.15-5.45)	5.75 (5.03-6.71)	7.17 (6.08-8.65)	8.28 (6.87-10.2)	9.41 (7.62-11.9)	10.6 (8.35-13.7)	12.2 (9.23-16.5)	13.5 (9.85-18.8)
10-day	2.69 (2.38-3.10)	3.75 (3.31-4.32)	5.15 (4.54-5.96)	6.31 (5.52-7.36)	7.91 (6.70-9.53)	9.16 (7.60-11.3)	10.4 (8.45-13.1)	11.8 (9.28-15.2)	13.6 (10.3-18.3)	15.0 (11.0-21.0)
20-day	3.26 (2.88-3.76)	4.59 (4.05-5.29)	6.37 (5.61-7.37)	7.85 (6.87-9.16)	9.92 (8.40-12.0)	11.6 (9.59-14.2)	13.3 (10.7-16.7)	15.0 (11.9-19.5)	17.5 (13.3-23.6)	19.5 (14.3-27.2)
30-day	3.86 (3.42-4.45)	5.43 (4.80-6.27)	7.56 (6.66-8.74)	9.34 (8.17-10.9)	11.9 (10.0-14.3)	13.8 (11.5-17.0)	15.9 (12.9-20.1)	18.1 (14.3-23.5)	21.2 (16.1-28.7)	23.7 (17.4-33.1)
45-day	4.60 (4.08-5.31)	6.42 (5.68-7.41)	8.91 (7.86-10.3)	11.0 (9.64-12.9)	14.0 (11.9-16.9)	16.4 (13.6-20.2)	18.9 (15.3-23.9)	21.6 (17.1-28.0)	25.5 (19.3-34.3)	28.6 (20.9-39.8)
60-day	5.36 (4.74-6.18)	7.39 (6.54-8.54)	10.2 (8.99-11.8)	12.6 (11.0-14.7)	16.0 (13.5-19.3)	18.7 (15.6-23.1)	21.7 (17.6-27.3)	24.8 (19.5-32.1)	29.3 (22.1-39.5)	32.9 (24.1-45.9)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values. Please refer to NOAA Atlas 14 document for more information.

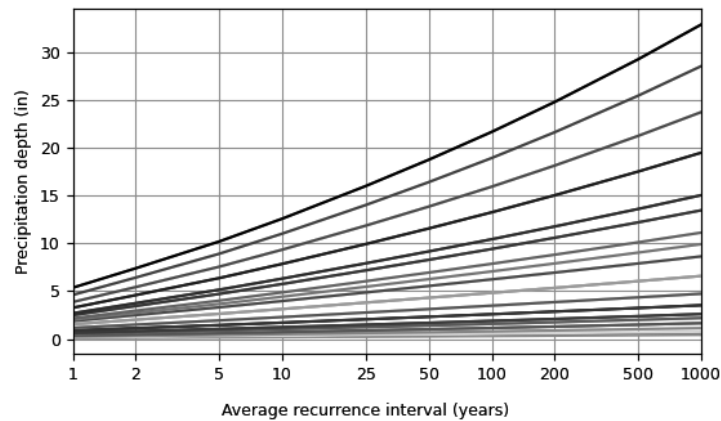
[Back to Top](#)

PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 34.0124°, Longitude: -117.4226°



Average recurrence interval (years)
1
2
5
10
25
50
100
200
500
1000



Duration
5-min
10-min
15-min
30-min
60-min
2-hr
3-hr
6-hr
12-hr
24-hr
2-day
3-day
4-day
7-day
10-day
20-day
30-day
45-day
60-day

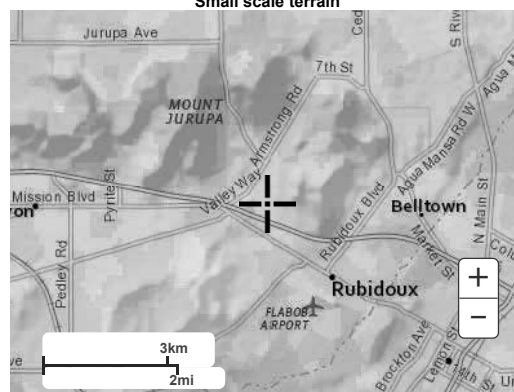
NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Wed Jul 10 23:30:40 2024

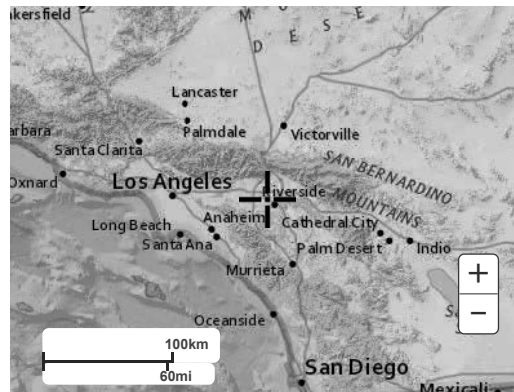
[Back to Top](#)

Maps & aerals

Small scale terrain



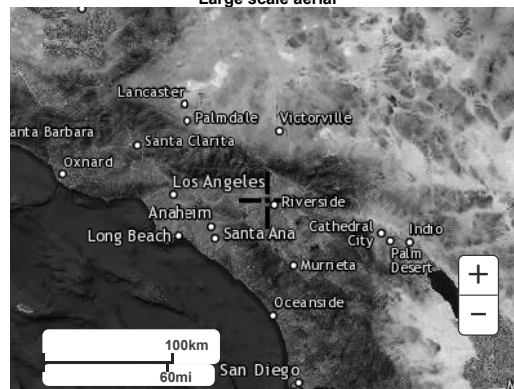
Large scale terrain



Large scale map



Large scale aerial



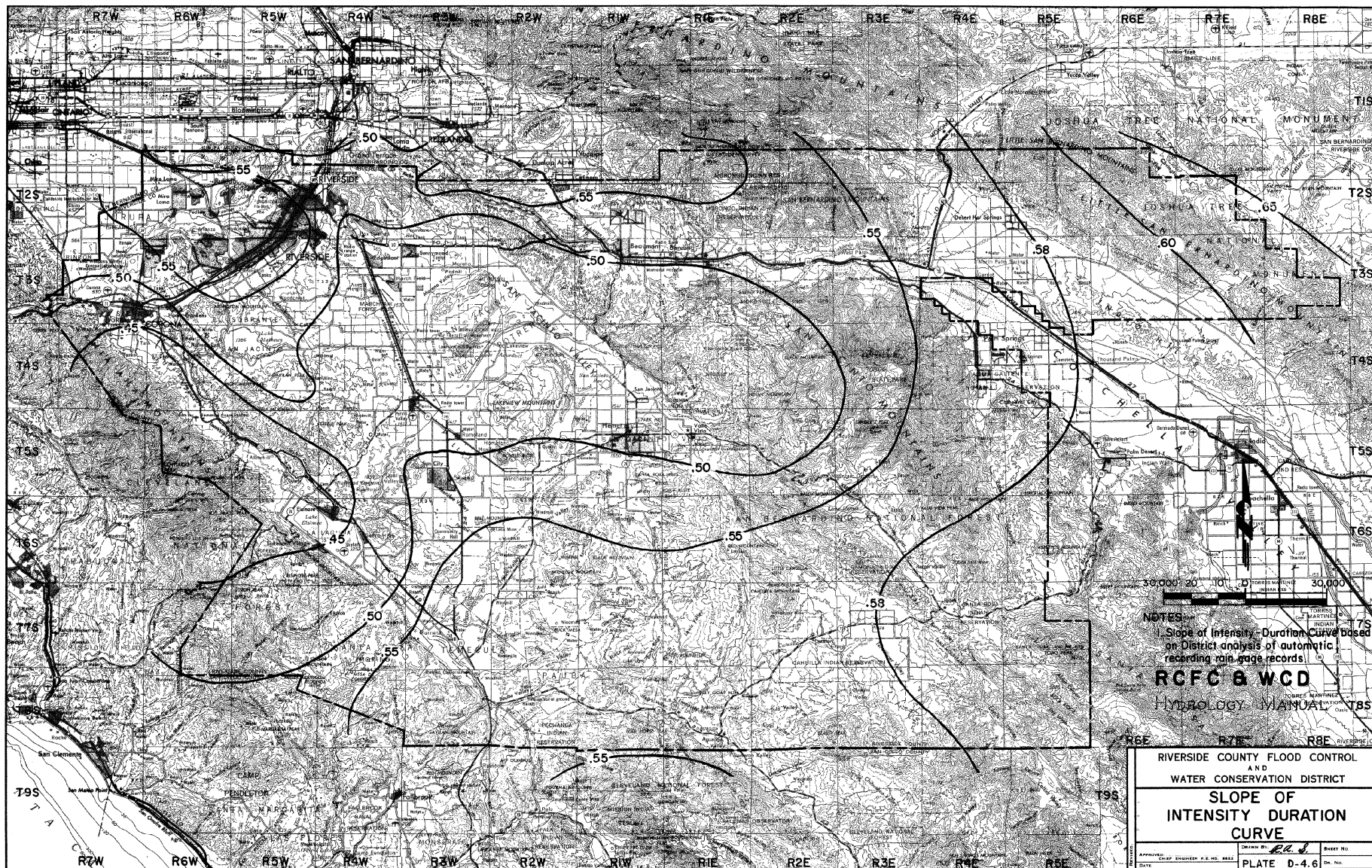
[Back to Top](#)

[US Department of Commerce](#)
[National Oceanic and Atmospheric Administration](#)
[National Weather Service](#)
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

[Disclaimer](#)

Appendix B

Plate D-4.6 of the Hydrology Manual



Appendix C
Hydrologic Soil Data

Custom Soil Resource Report Soil Map



Custom Soil Resource Report

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

Water Features



Streams and Canals

Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

Background



Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

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

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

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

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

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

Soil Survey Area: Western Riverside Area, California
Survey Area Data: Version 16, Aug 30, 2023

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

Date(s) aerial images were photographed: Mar 17, 2022—Jun 12, 2022

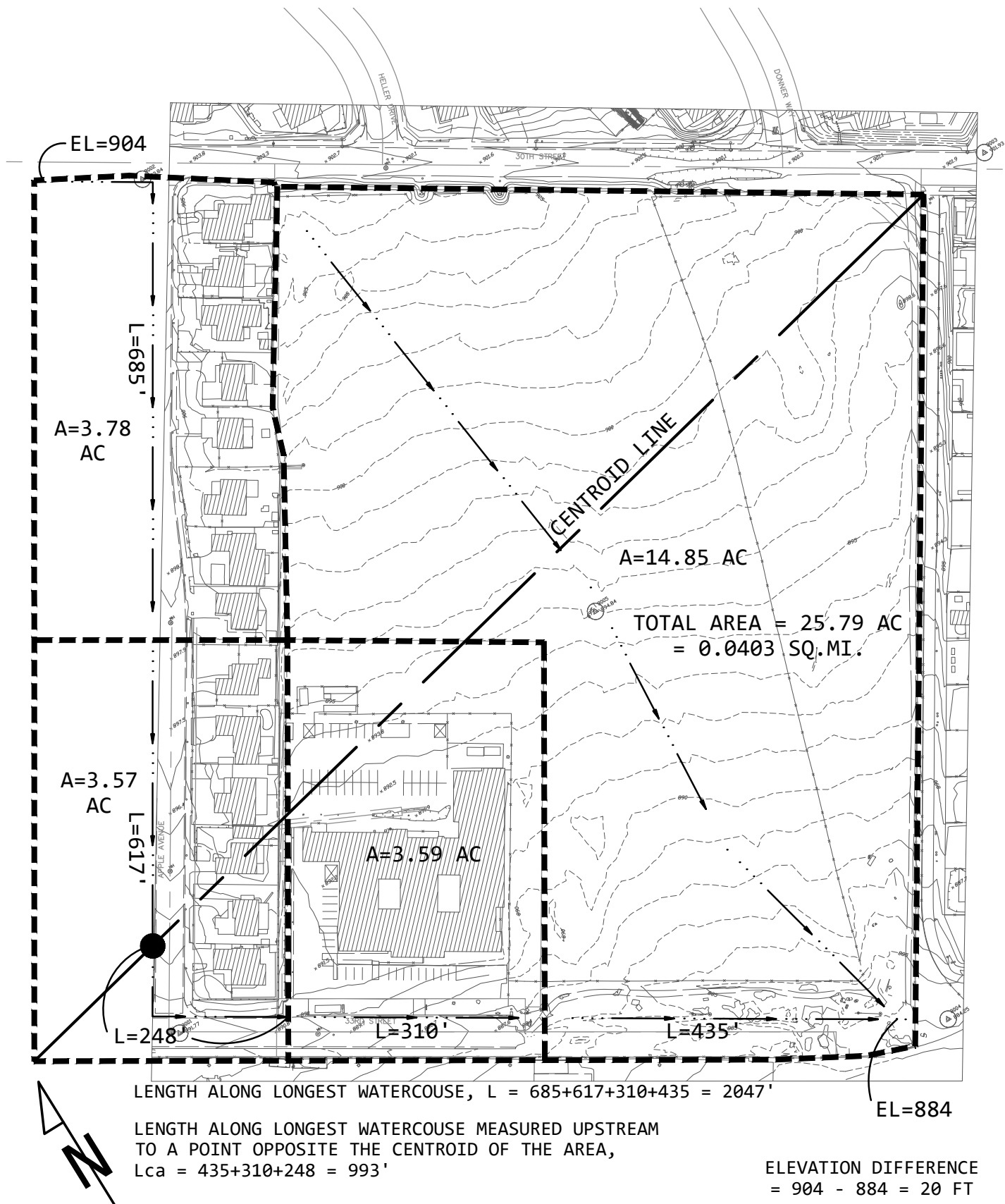
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

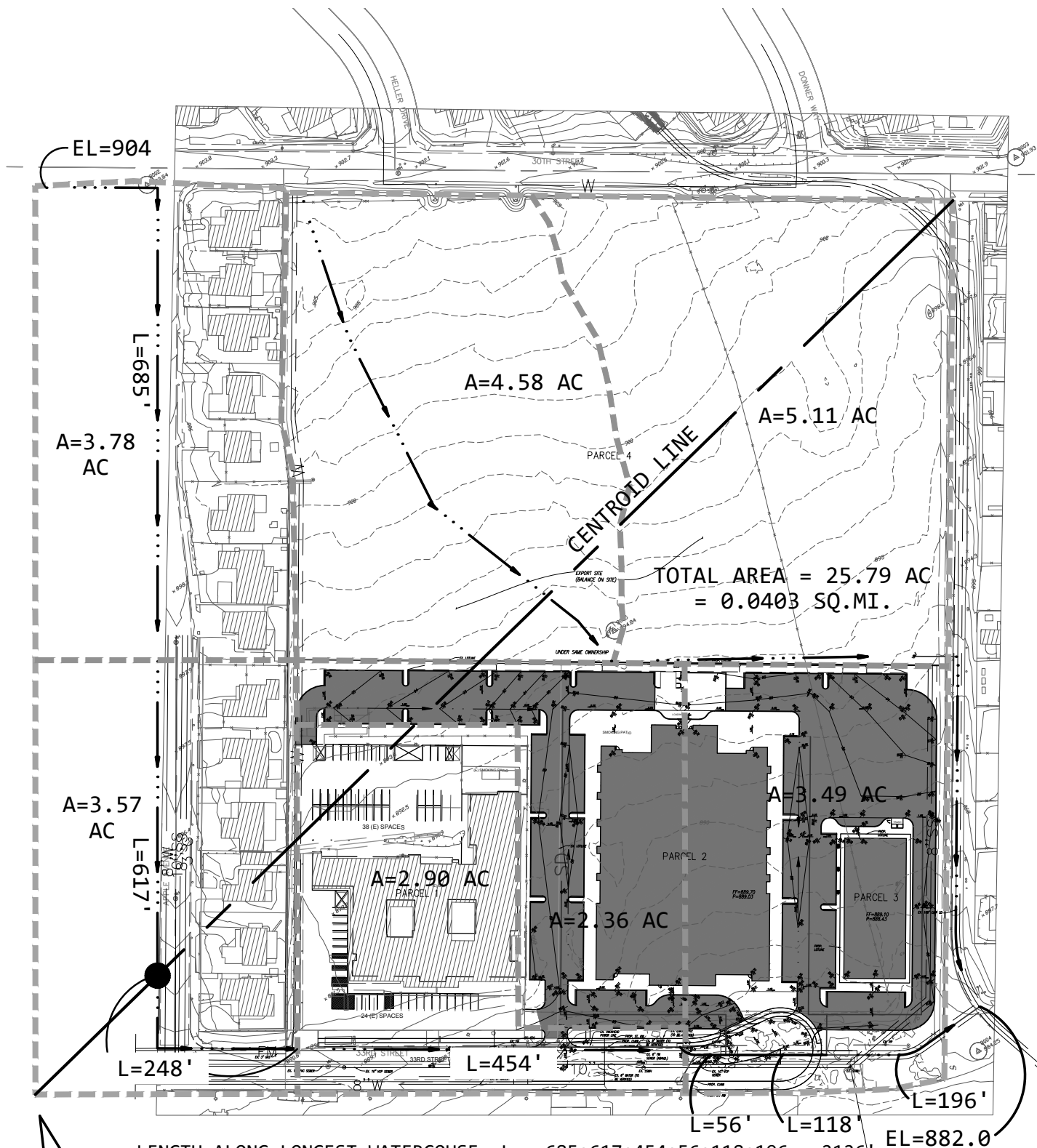
Custom Soil Resource Report

Absence of an entry indicates that the data were not estimated. The asterisk '**' denotes the representative texture; other possible textures follow the dash. The criteria for determining the hydrologic soil group for individual soil components is found in the National Engineering Handbook, Chapter 7 issued May 2007(<http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba>). Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Engineering Properties—Western Riverside Area, California														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			<i>In</i>				<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>	<i>L-R-H</i>
DaD2—Delhi fine sand, 2 to 15 percent slopes, wind-eroded														
Delhi	85	A	0-10	Fine sand	SP-SM, SM	A-1, A-2, A-3	0- 0- 0	0- 0- 0	100-100-100	100-100-100	40-55-70	5-15- 25	15-18-20	NP
			10-48	Sand, fine sand	SM, SP-SM	A-1, A-2, A-3	0- 0- 0	0- 0- 0	100-100-100	100-100-100	40-55-70	5-15- 25	15-18-20	NP
			48-60	Fine sandy loam	SM	A-4	0- 0- 0	0- 0- 0	100-100-100	100-100-100	65-73-80	35-43-50	20-25-30	NP-3 -5
GyC2—Greenfield sandy loam, 2 to 8 percent slopes, eroded														
Greenfield	85	A	0-26	Sandy loam	SM	A-2, A-4	0- 0- 0	0- 0- 0	95-98-100	75-88-100	50-63-75	25-38-50	20-25-30	NP-3 -5
			26-43	Fine sandy loam, sandy loam, coarse sandy loam	SM	A-2, A-4	0- 0- 0	0- 0- 0	80-90-100	75-88-100	50-63-75	25-38-50	20-25-30	NP-3 -5
			43-60	Loam	ML	A-4	0- 0- 0	0- 0- 0	80-90-100	75-88-100	65-75-85	50-55-60	25-30-35	5-8 -10
			60-72	Stratified loamy sand to sandy loam	SM	A-2	0- 0- 0	0- 0- 0	70-85-100	60-80-100	50-60-70	15-25-35	15-20-25	NP

Appendix D
Hydrologic Parameters Maps
Existing and Proposed Conditions





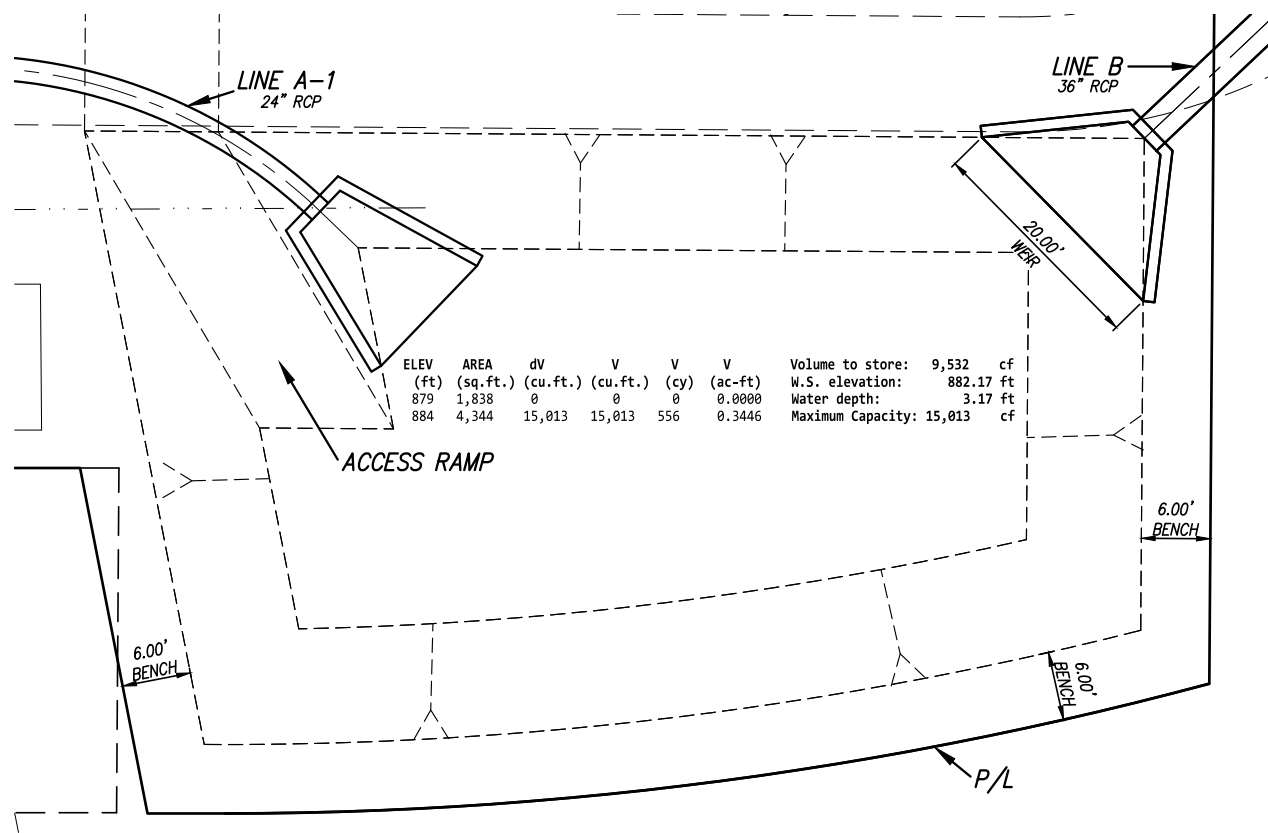
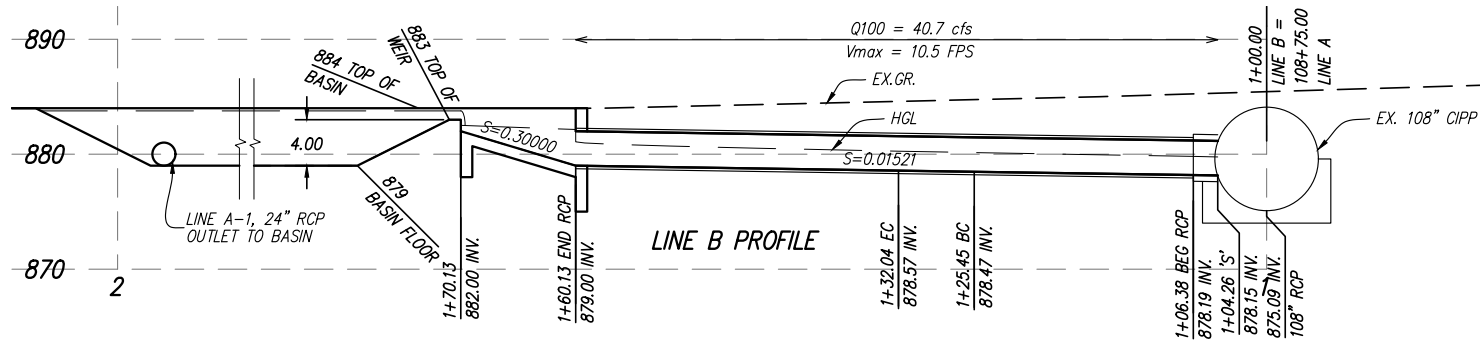
LENGTH ALONG LONGEST WATERCOUSE, $L = 685+617+454+56+118+196 = 2126'$

LENGTH ALONG LONGEST WATERCOUSE MEASURED UPSTREAM
TO A POINT OPPOSITE THE CENTROID OF THE AREA,
 $L_{ca} = 196+118+56+454+248 = 1072'$

ELEVATION DIFFERENCE
= $904 - 882 = 22$ FT

PARAMETERS FOR SYNTHETIC HYDROGRAPH ANALYSIS
PROPOSED CONDITION
SCALE: 1" = 150'

SECTION 6



RETENTION BASIN
 1"=10' SCALE