

# HYDROLOGY REPORT

for

## TRACT 37857

Located in the City of Jurupa Valley  
County of Riverside

Prepared For:

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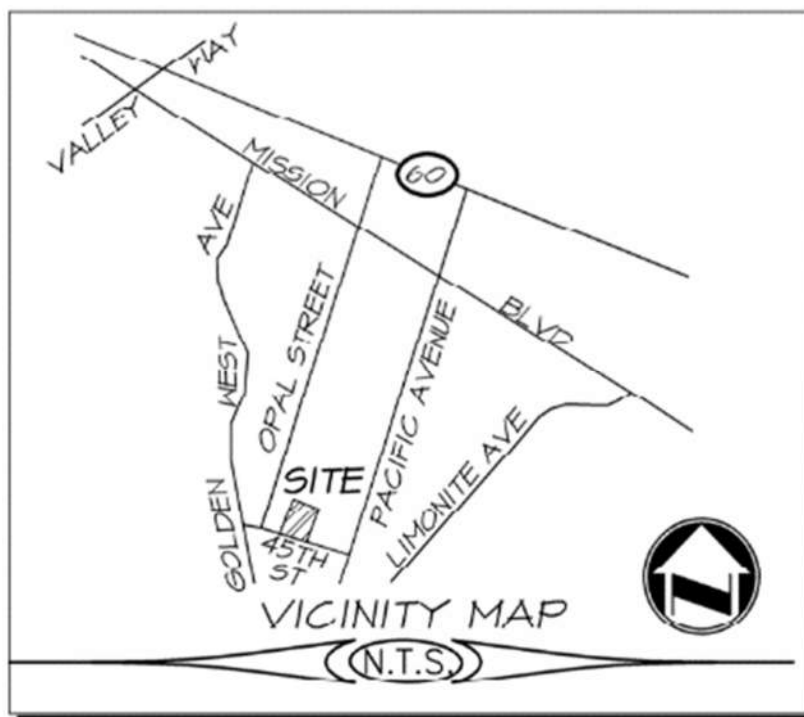
## 1. Purpose

This Hydrology Report has been prepared in order to obtain entitlement approval of Tract 37857. Adkan Engineers has prepared this study to ensure that adequate size and proper operation of drainage facilities are incorporated into the Post-Development project site.

## 2. Project Description

The proposed project is located north of 45<sup>th</sup> street between Opal Street and Pacific Avenue in the City of Jurupa Valley. The site will have 36 lots for residential development, recreational lot and associated improvements. Offsite area from the west will drain to the site. On and offsite runoff will be treated with a Bio-retention Basins located at the southeast corner of the site.

### A. Vicinity Map



## 3. Pre-Development Hydrology

Site is vacant with no existing structures or roads on the site. All flows from the site flow towards the east and south east towards Pacific Avenue to the Sunnyslope Channel.

## 4. Post-Development Hydrology

Onsite low flow runoff from the proposed development will flow into a onsite stormwater treatment area (Bio-retention basin) located at the south east corner of the site along 45<sup>th</sup> Street. The bioretention basin is sized for water quality and drain to the approved flood control channel near Pacific Avenue and 45<sup>th</sup> Street.

## 5. Method of Analysis

The site hydrology was based upon Riverside County Flood Control and Water Conservation District Hydrology Manual, from which pertinent soil and rainfall information was obtained.

Storm flows were determined by the “RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM”, Riverside County Flood Control & Water Conservation District 1978 Hydrology Manual, produced by Bondamin Engineering.

The site was also analyzed by the “SYNTHETIC UNIT HYDROLOGY METHOD COMPUTER PROGRAM”, Riverside County Flood Control & Water Conservation District 1978 Hydrology Manual, produced by Bondamin Engineering.

## 6. Summary of Findings

Offsite and onsite flows surrounding the site will be collected by the Sunnyslope Channel east of Pacific Avenue and will be adequately sized to convey the 100-year storm event. All onsite flows will be treated using the proposed bio-retention basin prior to leaving the site. The bioretention basin will have a primary outflow structure for the proposed Q100 and secondary outlet structure for emergency outflow in the event the primary out flow structure fails.

The Extended Basin will have a primary outlet with an grated inlet elevation of 841 and a weir length of 16 linear feet. The Q100 water surface elevation will rise to a potential 841.41. An spillway has been placed in the event of failure at 841.45 and will have a ponded Q100 elevation of 841.72, **providing over 2' of freeboard to the nearest pad elevation from the ponding emergency overflow elevation.** The top of basin is at an elevation of 842, so in the event that the emergency overflow would fail, stormwater could overtop the basin and follow the existing flow path to the Northeast.

The proposed extended detention basin has been sized to store the entire 2 year 24 hour storm event. A low flow pump will be placed within the basin to drain the low The A low flow pump will be provided within the basin to empty the remaining 2 year storm event within 72 hours. The remaining 100 year event will pass through the basin and outlet through and under sidewalk drain to the curb on 45th street.

Orifice Equation  
 $Q=Cd(1/4\pi D^2)\sqrt{2gh}$   
 Weir Equation

$(Q/(Weir\ Length * Weir\ Coefficient))^{2/3}$

Q100 Elevation Weir Calc	
Inlet Weir Calc 4' X 4'	
Crest Wier Elev.	841.00
Q100	14.23 cfs
Weir Length	16
Weir Coeff.	3.33
H Weir	0.41473
<b>Q100 Elevation</b>	<b>841.41</b>

Q100 Elevation Weir Calc	
Emergency Spillway	
Crest Wier Elev.	841.45
Q100	14.23 cfs
Weir Length	30
Weir Coeff.	3.33
H Weir	0.27275
<b>Q100 Elevation</b>	<b>841.72</b>

### 7. Conclusion

The hydrologic calculations provided herein substantiate the design of the Post-Development project and indicate the following:

- The Post-Development facilities demonstrate the ability to convey the 100 year storm events.

Based on the Hydrology and Hydraulic analysis conducted and results shown herein and part thereof, it is our conclusion this project **does not** negatively impact the local community or watershed goals.

## **Section 1**

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**Post-Development 10 & 100 year Hydrology Offsite & Onsite  
(Rational Method)**

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0  
Rational Hydrology Study Date: 06/13/23 File:pro10.out

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

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

Program License Serial Number 5006

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 1.000 to Point/Station 2.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

Initial area flow distance = 408.000(Ft.)  
Top (of initial area) elevation = 860.000(Ft.)  
Bottom (of initial area) elevation = 845.400(Ft.)  
Difference in elevation = 14.600(Ft.)  
Slope = 0.03578 s(percent)= 3.58  
TC = k(0.480)\*[(length^3)/(elevation change)]^0.2  
Initial area time of concentration = 10.346 min.  
Rainfall intensity = 2.130(In/Hr) for a 10.0 year storm  
SINGLE FAMILY (1 Acre Lot)  
Runoff Coefficient = 0.663  
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 = 0.800; Impervious fraction = 0.200  
Initial subarea runoff = 3.570(CFS)  
Total initial stream area = 2.530(Ac.)  
Pervious area fraction = 0.800

\*\*\*\*\*  
Process from Point/Station 2.000 to Point/Station 3.000  
\*\*\*\* STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

Top of street segment elevation = 845.400(Ft.)  
End of street segment elevation = 841.900(Ft.)  
Length of street segment = 480.000(Ft.)  
Height of curb above gutter flowline = 6.0(In.)  
Width of half street (curb to crown) = 18.000(Ft.)  
Distance from crown to crossfall grade break = 16.000(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 [1] side(s) of the street  
Distance from curb to property line = 4.000(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 = 4.622(CFS)  
Depth of flow = 0.401(Ft.); Average velocity = 2.303(Ft/s)  
Streetflow hydraulics at midpoint of street travel:

Halfstreet flow width = 13.711(Ft.)  
 Flow velocity = 2.30(Ft/s)  
 Travel time = 3.47 min. TC = 13.82 min.  
 Adding area flow to street  
 CONDOMINIUM subarea type  
 Runoff Coefficient = 0.785  
 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 = 0.350; Impervious fraction = 0.650  
 Rainfall intensity = 1.816(In/Hr) for a 10.0 year storm  
 Subarea runoff = 2.124(CFS) for 1.490(Ac.)  
 Total runoff = 5.694(CFS) Total area = 4.020(Ac.)  
 Street flow at end of street = 5.694(CFS)  
 Half street flow at end of street = 5.694(CFS)  
 Depth of flow = 0.425(Ft.), Average velocity = 2.422(Ft/s)  
 Flow width (from curb towards crown)= 14.915(Ft.)

+-----+  
 Process from Point/Station 3.000 to Point/Station 3.500  
 \*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*

Upstream point/station elevation = 841.900(Ft.)  
 Downstream point/station elevation = 839.000(Ft.)  
 Pipe length = 39.00(Ft.) Manning's N = 0.013  
 No. of pipes = 1 Required pipe flow = 5.694(CFS)  
 Nearest computed pipe diameter = 12.00(In.)  
 Calculated individual pipe flow = 5.694(CFS)  
 Normal flow depth in pipe = 6.60(In.)  
 Flow top width inside pipe = 11.94(In.)  
 Critical Depth = 11.35(In.)  
 Pipe flow velocity = 12.86(Ft/s)  
 Travel time through pipe = 0.05 min.  
 Time of concentration (TC) = 13.87 min.

+-----+  
 Process from Point/Station 3.500 to Point/Station 3.500  
 \*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*

Along Main Stream number: 1 in normal stream number 1  
 Stream flow area = 4.020(Ac.)  
 Runoff from this stream = 5.694(CFS)  
 Time of concentration = 13.87 min.  
 Rainfall intensity = 1.813(In/Hr)

+-----+  
 Process from Point/Station 4.000 to Point/Station 5.000  
 \*\*\* INITIAL AREA EVALUATION \*\*\*

Initial area flow distance = 570.000(Ft.)  
 Top (of initial area) elevation = 845.000(Ft.)  
 Bottom (of initial area) elevation = 841.900(Ft.)  
 Difference in elevation = 3.100(Ft.)  
 Slope = 0.00544 s(percent)= 0.54  
 $TC = k(0.370) * [(length^3)/(elevation change)]^{0.2}$   
 Initial area time of concentration = 13.288 min.  
 Rainfall intensity = 1.856(In/Hr) for a 10.0 year storm  
 CONDOMINIUM subarea type  
 Runoff Coefficient = 0.786  
 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 = 0.350; Impervious fraction = 0.650  
 Initial subarea runoff = 3.196(CFS)  
 Total initial stream area = 2.190(Ac.)  
 Pervious area fraction = 0.350

+-----+  
 Process from Point/Station 5.000 to Point/Station 3.500  
 \*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*

Upstream point/station elevation = 841.900(Ft.)  
 Downstream point/station elevation = 839.000(Ft.)  
 Pipe length = 7.00(Ft.) Manning's N = 0.013  
 No. of pipes = 1 Required pipe flow = 3.196(CFS)  
 Nearest computed pipe diameter = 6.00(In.)  
 Calculated individual pipe flow = 3.196(CFS)  
 Normal flow depth in pipe = 4.39(In.)



Flow top width inside pipe = 5.32(In.)  
 Critical depth could not be calculated.  
 Pipe flow velocity = 20.77(Ft/s)  
 Travel time through pipe = 0.01 min.  
 Time of concentration (TC) = 13.29 min.

\*\*\*\*\*  
 Process from Point/Station 3.500 to Point/Station 3.500  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

Along Main Stream number: 1 in normal stream number 2  
 Stream flow area = 2.190(Ac.)  
 Runoff from this stream = 3.196(CFS)  
 Time of concentration = 13.29 min.  
 Rainfall intensity = 1.856(In/Hr)  
 Summary of stream data:

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

1	5.694	13.87	1.813
2	3.196	13.29	1.856

Largest stream flow has longer time of concentration  
 Qp = 5.694 + sum of  

$$Q_p = \frac{Q_b}{3.196} * \frac{I_a}{I_b} = 3.122$$
  
 Qp = 8.817

Total of 2 streams to confluence:  
 Flow rates before confluence point:  
 5.694 3.196  
 Area of streams before confluence:  
 4.020 2.190  
 Results of confluence:  
 Total flow rate = 8.817(CFS)  
 Time of concentration = 13.869 min.  
 Effective stream area after confluence = 6.210(Ac.)

\*\*\*\*\*  
 Process from Point/Station 3.500 to Point/Station 6.000  
 \*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

Upstream point/station elevation = 839.000(Ft.)  
 Downstream point/station elevation = 838.500(Ft.)  
 Pipe length = 24.00(Ft.) Manning's N = 0.013  
 No. of pipes = 1 Required pipe flow = 8.817(CFS)  
 Nearest computed pipe diameter = 15.00(In.)  
 Calculated individual pipe flow = 8.817(CFS)  
 Normal flow depth in pipe = 11.63(In.)  
 Flow top width inside pipe = 12.53(In.)  
 Critical Depth = 13.79(In.)  
 Pipe flow velocity = 8.64(Ft/s)  
 Travel time through pipe = 0.05 min.  
 Time of concentration (TC) = 13.92 min.

\*\*\*\*\*  
 Process from Point/Station 6.000 to Point/Station 7.000  
 \*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

UNDEVELOPED (good cover) subarea  
 Runoff Coefficient = 0.612  
 Decimal fraction soil group A = 0.000  
 Decimal fraction soil group B = 1.000  
 Decimal fraction soil group C = 0.000  
 Decimal fraction soil group D = 0.000  
 RI index for soil(AMC 2) = 61.00  
 Pervious area fraction = 1.000; Impervious fraction = 0.000  
 Time of concentration = 13.92 min.  
 Rainfall intensity = 1.809(In/Hr) for a 10.0 year storm  
 Subarea runoff = 0.188(CFS) for 0.170(Ac.)  
 Total runoff = 9.005(CFS) Total area = 6.380(Ac.)  
 End of computations, total study area = 6.38 (Ac.)  
 The following figures may  
 be used for a unit hydrograph study of the same area.  
 Area averaged pervious area fraction(Ap) = 0.546  
 Area averaged RI index number = 56.1

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2014 Version 9.0  
Rational Hydrology Study Date: 06/13/23 File:pro100.out

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

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

Program License Serial Number 5006

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 1.000 to Point/Station 2.000  
\*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

Initial area flow distance = 408.000(Ft.)  
Top (of initial area) elevation = 860.000(Ft.)  
Bottom (of initial area) elevation = 845.400(Ft.)  
Difference in elevation = 14.600(Ft.)  
Slope = 0.03578 s(percent)= 3.58  
TC = k(0.480)\*[(length^3)/(elevation change)]^0.2  
Initial area time of concentration = 10.346 min.  
Rainfall intensity = 3.155(In/Hr) for a 100.0 year storm  
SINGLE FAMILY (1 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 = 0.800; Impervious fraction = 0.200  
Initial subarea runoff = 5.752(CFS)  
Total initial stream area = 2.530(Ac.)  
Pervious area fraction = 0.800

\*\*\*\*\*  
Process from Point/Station 2.000 to Point/Station 3.000  
\*\*\*\* STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION \*\*\*\*

Top of street segment elevation = 845.400(Ft.)  
End of street segment elevation = 841.900(Ft.)  
Length of street segment = 480.000(Ft.)  
Height of curb above gutter flowline = 6.0(In.)  
Width of half street (curb to crown) = 18.000(Ft.)  
Distance from crown to crossfall grade break = 16.000(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 [1] side(s) of the street  
Distance from curb to property line = 4.000(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 = 7.446(CFS)  
Depth of flow = 0.459(Ft.); Average velocity = 2.584(Ft/s)  
Streetflow hydraulics at midpoint of street travel:

Halfstreet flow width = 16.597(Ft.)  
 Flow velocity = 2.58(Ft/s)  
 Travel time = 3.10 min. TC = 13.44 min.  
 Adding area flow to street  
 CONDOMINIUM subarea type  
 Runoff Coefficient = 0.813  
 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 = 0.350; Impervious fraction = 0.650  
 Rainfall intensity = 2.732(In/Hr) for a 100.0 year storm  
 Subarea runoff = 3.308(CFS) for 1.490(Ac.)  
 Total runoff = 9.060(CFS) Total area = 4.020(Ac.)  
 Street flow at end of street = 9.060(CFS)  
 Half street flow at end of street = 9.060(CFS)  
 Depth of flow = 0.485(Ft.), Average velocity = 2.711(Ft/s)  
 Flow width (from curb towards crown)= 17.933(Ft.)

\*\*\*\*\*  
 Process from Point/Station 3.000 to Point/Station 3.500  
 \*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

Upstream point/station elevation = 841.900(Ft.)  
 Downstream point/station elevation = 839.000(Ft.)  
 Pipe length = 39.00(Ft.) Manning's N = 0.013  
 No. of pipes = 1 Required pipe flow = 9.060(CFS)  
 Nearest computed pipe diameter = 12.00(In.)  
 Calculated individual pipe flow = 9.060(CFS)  
 Normal flow depth in pipe = 9.19(In.)  
 Flow top width inside pipe = 10.17(In.)  
 Critical depth could not be calculated.  
 Pipe flow velocity = 14.06(Ft/s)  
 Travel time through pipe = 0.05 min.  
 Time of concentration (TC) = 13.49 min.

\*\*\*\*\*  
 Process from Point/Station 3.500 to Point/Station 3.500  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

Along Main Stream number: 1 in normal stream number 1  
 Stream flow area = 4.020(Ac.)  
 Runoff from this stream = 9.060(CFS)  
 Time of concentration = 13.49 min.  
 Rainfall intensity = 2.727(In/Hr)

\*\*\*\*\*  
 Process from Point/Station 4.000 to Point/Station 5.000  
 \*\*\*\* INITIAL AREA EVALUATION \*\*\*\*

Initial area flow distance = 570.000(Ft.)  
 Top (of initial area) elevation = 845.000(Ft.)  
 Bottom (of initial area) elevation = 841.900(Ft.)  
 Difference in elevation = 3.100(Ft.)  
 Slope = 0.00544 s(percent)= 0.54  
 $TC = k(0.370)*[(length^3)/(elevation\ change)]^{0.2}$   
 Initial area time of concentration = 13.288 min.  
 Rainfall intensity = 2.750(In/Hr) for a 100.0 year storm  
 CONDOMINIUM subarea type  
 Runoff Coefficient = 0.813  
 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 = 0.350; Impervious fraction = 0.650  
 Initial subarea runoff = 4.896(CFS)  
 Total initial stream area = 2.190(Ac.)  
 Pervious area fraction = 0.350

\*\*\*\*\*  
 Process from Point/Station 5.000 to Point/Station 3.500  
 \*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

Upstream point/station elevation = 841.900(Ft.)  
 Downstream point/station elevation = 839.000(Ft.)  
 Pipe length = 7.00(Ft.) Manning's N = 0.013  
 No. of pipes = 1 Required pipe flow = 4.896(CFS)  
 Nearest computed pipe diameter = 9.00(In.)  
 Calculated individual pipe flow = 4.896(CFS)  
 Normal flow depth in pipe = 4.28(In.)

Flow top width inside pipe = 8.99(In.)  
 Critical depth could not be calculated.  
 Pipe flow velocity = 23.59(Ft/s)  
 Travel time through pipe = 0.00 min.  
 Time of concentration (TC) = 13.29 min.

\*\*\*\*\*  
 Process from Point/Station 3.500 to Point/Station 3.500  
 \*\*\*\* CONFLUENCE OF MINOR STREAMS \*\*\*\*

Along Main Stream number: 1 in normal stream number 2  
 Stream flow area = 2.190(Ac.)  
 Runoff from this stream = 4.896(CFS)  
 Time of concentration = 13.29 min.  
 Rainfall intensity = 2.749(In/Hr)  
 Summary of stream data:

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

1	9.060	13.49	2.727
2	4.896	13.29	2.749

Largest stream flow has longer time of concentration  
 $Q_p = 9.060 + \text{sum of } Q_b \cdot I_a/I_b$   
 $Q_p = 4.896 * 0.992 = 4.857$   
 $Q_p = 13.917$

Total of 2 streams to confluence:  
 Flow rates before confluence point:  
 9.060 4.896  
 Area of streams before confluence:  
 4.020 2.190  
 Results of confluence:  
 Total flow rate = 13.917(CFS)  
 Time of concentration = 13.488 min.  
 Effective stream area after confluence = 6.210(Ac.)

\*\*\*\*\*  
 Process from Point/Station 3.500 to Point/Station 6.000  
 \*\*\*\* PIPEFLOW TRAVEL TIME (Program estimated size) \*\*\*\*

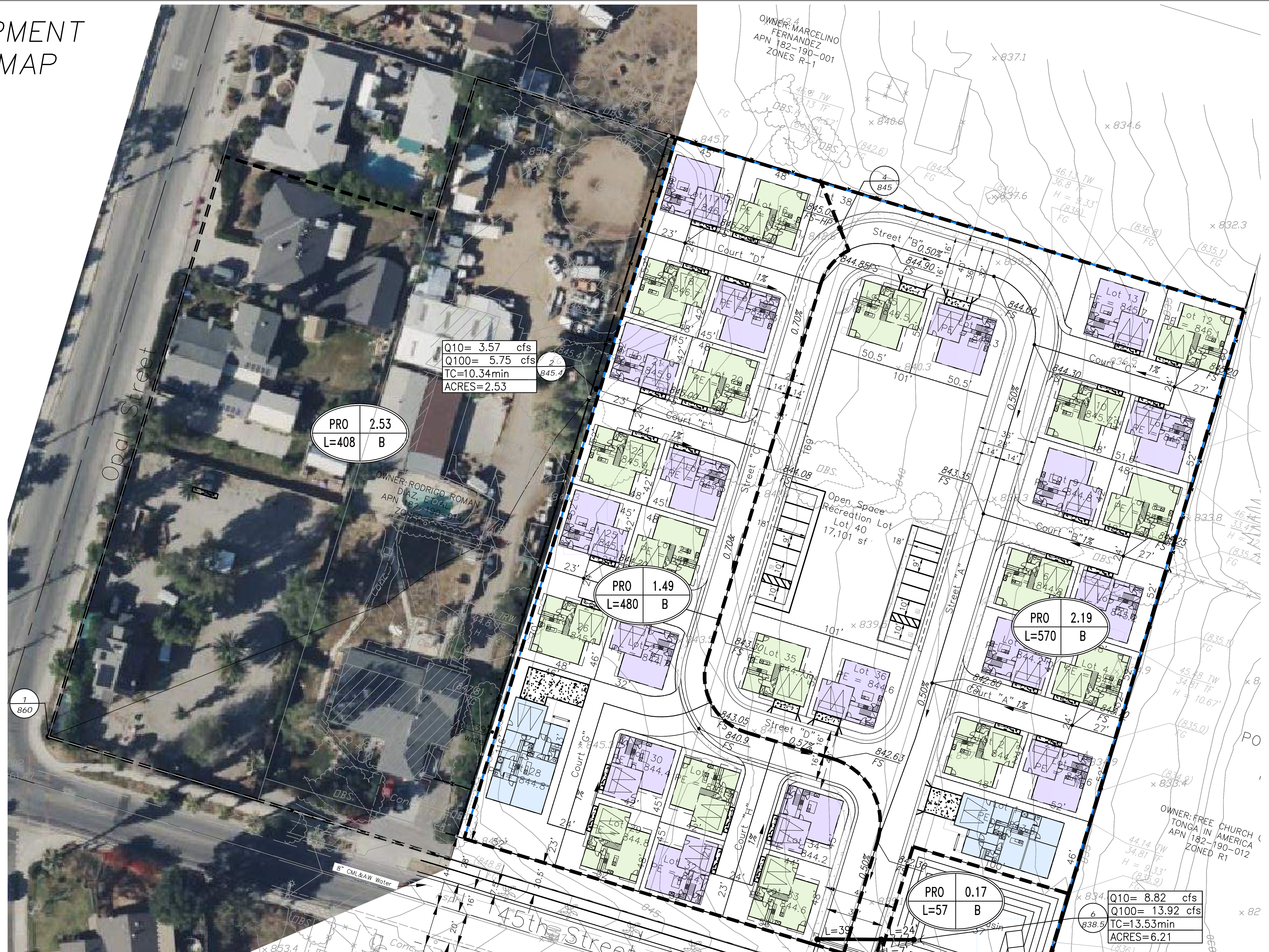
Upstream point/station elevation = 839.000(Ft.)  
 Downstream point/station elevation = 838.500(Ft.)  
 Pipe length = 24.00(Ft.) Manning's N = 0.013  
 No. of pipes = 1 Required pipe flow = 13.917(CFS)  
 Nearest computed pipe diameter = 18.00(In.)  
 Calculated individual pipe flow = 13.917(CFS)  
 Normal flow depth in pipe = 13.57(In.)  
 Flow top width inside pipe = 15.51(In.)  
 Critical Depth = 16.55(In.)  
 Pipe flow velocity = 9.73(Ft/s)  
 Travel time through pipe = 0.04 min.  
 Time of concentration (TC) = 13.53 min.

\*\*\*\*\*  
 Process from Point/Station 6.000 to Point/Station 7.000  
 \*\*\*\* SUBAREA FLOW ADDITION \*\*\*\*

UNDEVELOPED (good cover) subarea  
 Runoff Coefficient = 0.685  
 Decimal fraction soil group A = 0.000  
 Decimal fraction soil group B = 1.000  
 Decimal fraction soil group C = 0.000  
 Decimal fraction soil group D = 0.000  
 RI index for soil(AMC 2) = 61.00  
 Pervious area fraction = 1.000; Impervious fraction = 0.000  
 Time of concentration = 13.53 min.  
 Rainfall intensity = 2.723(In/Hr) for a 100.0 year storm  
 Subarea runoff = 0.317(CFS) for 0.170(Ac.)  
 Total runoff = 14.235(CFS) Total area = 6.380(Ac.)  
 End of computations, total study area = 6.38 (Ac.)  
 The following figures may be used for a unit hydrograph study of the same area.  
 Area averaged pervious area fraction(Ap) = 0.546  
 Area averaged RI index number = 56.1

# POST-DEVELOPMENT HYDROLOGY MAP

TRACT 37857



Q10= 3.57 cfs  
Q100= 5.75 cfs  
TC=10.34min  
ACRES=2.53

PRO 2.53  
L=408 B

PRO 1.49  
L=480 B

PRO 2.19  
L=570 B

PRO 0.17  
L=57 B

Q10= 8.82 cfs  
Q100= 13.92 cfs  
TC=13.53min  
ACRES=6.21

Q10= 9.00 cfs  
Q100= 14.23 cfs  
TC=13.53min  
ACRES=6.38

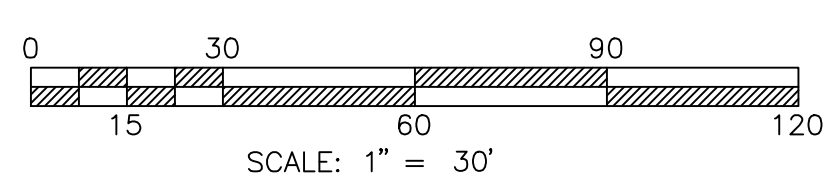
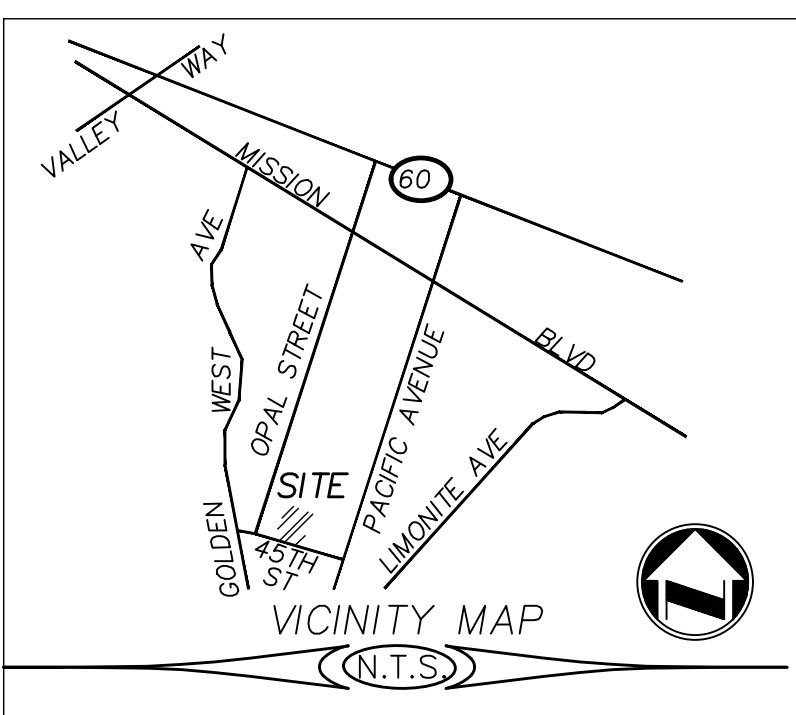
Q10= 5.69 cfs  
Q100= 9.06 cfs  
TC=13.44min  
ACRES=4.02

Q10= 3.19 cfs  
Q100= 4.89 cfs  
TC=13.29min  
ACRES=2.19

BIO BASIN  
PRIMARY  
841.41 WS ELEV.  
EMERGENCY  
841.72 WS ELEV.

### LEGEND

- | AREA   | ACRES |
|--------|-------|
| LENGTH | SOIL  |
- NODE  
 ELEV  
 Q10= cfs  
 Q100= cfs  
 TC= min  
 ACRES=
- DRAINAGE AREA BOUNDARY  
 FLOW PATH



## **Section 2**

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### **Bio-Retention Basin Outflow Calculations**

Unit Hydrograph Analysis

Copyright (C) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1  
 Study date 06/13/23 File: ex242.out

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

Program License Serial Number 5006

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

-----  
 Drainage Area = 6.38(Ac.) = 0.010 Sq. Mi.  
 Drainage Area for Depth-Area Areal Adjustment = 6.38(Ac.) = 0.010 Sq. Mi.  
 Length along longest watercourse = 776.00(Ft.)  
 Length along longest watercourse measured to centroid = 388.00(Ft.)  
 Length along longest watercourse = 0.147 Mi.  
 Length along longest watercourse measured to centroid = 0.073 Mi.  
 Difference in elevation = 25.10(Ft.)  
 Slope along watercourse = 170.7835 Ft./Mi.  
 Average Manning's 'N' = 0.030  
 Lag time = 0.049 Hr.  
 Lag time = 2.91 Min.  
 25% of lag time = 0.73 Min.  
 40% of lag time = 1.16 Min.  
 Unit time = 5.00 Min.  
 Duration of storm = 24 Hour(s)  
 User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	weighting[1*2]
6.38	2.50	15.95

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	weighting[1*2]
6.38	6.00	38.28

STORM EVENT (YEAR) = 2.00  
 Area Averaged 2-Year Rainfall = 2.500(In)  
 Area Averaged 100-Year Rainfall = 6.000(In)

Point rain (area averaged) = 2.500(In)  
 Areal adjustment factor = 100.00 %  
 Adjusted average point rain = 2.500(In)

Sub-Area Data:  
 Area(Ac.)      Runoff Index      Impervious %  
 6.380            86.00            0.080  
 Total Area Entered = 6.38(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-1	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
86.0	71.6	0.343	0.080	0.318	1.000	0.318
						Sum (F) = 0.318

Area averaged mean soil loss (F) (In/Hr) = 0.318  
 Minimum soil loss rate ((In/Hr)) = 0.159  
 (for 24 hour storm duration)  
 Soil loss rate (decimal) = 0.836

-----  
 Unit Hydrograph  
 VALLEY S-Curve

-----  
 Unit Hydrograph Data

Unit time period	Time % of lag	Distribution	Unit Hydrograph
(hrs)		Graph %	(CFS)

1	0.083	171.771	38.059	2.447
2	0.167	343.542	45.385	2.918
3	0.250	515.312	10.054	0.646
4	0.333	687.083	4.205	0.270
5	0.417	858.854	2.297	0.148
			Sum = 100.000	Sum= 6.430

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

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr)		Effective (In/Hr)
				Max	Low	
1	0.08	0.07	0.020	( 0.564)	0.017	0.003
2	0.17	0.07	0.020	( 0.562)	0.017	0.003
3	0.25	0.07	0.020	( 0.560)	0.017	0.003
4	0.33	0.10	0.030	( 0.558)	0.025	0.005
5	0.42	0.10	0.030	( 0.556)	0.025	0.005
6	0.50	0.10	0.030	( 0.554)	0.025	0.005
7	0.58	0.10	0.030	( 0.551)	0.025	0.005
8	0.67	0.10	0.030	( 0.549)	0.025	0.005
9	0.75	0.10	0.030	( 0.547)	0.025	0.005
10	0.83	0.13	0.040	( 0.545)	0.033	0.007
11	0.92	0.13	0.040	( 0.543)	0.033	0.007
12	1.00	0.13	0.040	( 0.541)	0.033	0.007
13	1.08	0.10	0.030	( 0.539)	0.025	0.005
14	1.17	0.10	0.030	( 0.536)	0.025	0.005
15	1.25	0.10	0.030	( 0.534)	0.025	0.005
16	1.33	0.10	0.030	( 0.532)	0.025	0.005
17	1.42	0.10	0.030	( 0.530)	0.025	0.005
18	1.50	0.10	0.030	( 0.528)	0.025	0.005
19	1.58	0.10	0.030	( 0.526)	0.025	0.005
20	1.67	0.10	0.030	( 0.524)	0.025	0.005
21	1.75	0.10	0.030	( 0.522)	0.025	0.005
22	1.83	0.13	0.040	( 0.520)	0.033	0.007
23	1.92	0.13	0.040	( 0.517)	0.033	0.007
24	2.00	0.13	0.040	( 0.515)	0.033	0.007
25	2.08	0.13	0.040	( 0.513)	0.033	0.007
26	2.17	0.13	0.040	( 0.511)	0.033	0.007
27	2.25	0.13	0.040	( 0.509)	0.033	0.007
28	2.33	0.13	0.040	( 0.507)	0.033	0.007
29	2.42	0.13	0.040	( 0.505)	0.033	0.007
30	2.50	0.13	0.040	( 0.503)	0.033	0.007
31	2.58	0.17	0.050	( 0.501)	0.042	0.008
32	2.67	0.17	0.050	( 0.499)	0.042	0.008
33	2.75	0.17	0.050	( 0.497)	0.042	0.008
34	2.83	0.17	0.050	( 0.495)	0.042	0.008
35	2.92	0.17	0.050	( 0.493)	0.042	0.008
36	3.00	0.17	0.050	( 0.491)	0.042	0.008
37	3.08	0.17	0.050	( 0.489)	0.042	0.008
38	3.17	0.17	0.050	( 0.487)	0.042	0.008
39	3.25	0.17	0.050	( 0.485)	0.042	0.008
40	3.33	0.17	0.050	( 0.482)	0.042	0.008
41	3.42	0.17	0.050	( 0.480)	0.042	0.008
42	3.50	0.17	0.050	( 0.478)	0.042	0.008
43	3.58	0.17	0.050	( 0.476)	0.042	0.008
44	3.67	0.17	0.050	( 0.474)	0.042	0.008
45	3.75	0.17	0.050	( 0.472)	0.042	0.008
46	3.83	0.20	0.060	( 0.470)	0.050	0.010
47	3.92	0.20	0.060	( 0.468)	0.050	0.010
48	4.00	0.20	0.060	( 0.467)	0.050	0.010
49	4.08	0.20	0.060	( 0.465)	0.050	0.010
50	4.17	0.20	0.060	( 0.463)	0.050	0.010
51	4.25	0.20	0.060	( 0.461)	0.050	0.010
52	4.33	0.23	0.070	( 0.459)	0.059	0.011
53	4.42	0.23	0.070	( 0.457)	0.059	0.011
54	4.50	0.23	0.070	( 0.455)	0.059	0.011
55	4.58	0.23	0.070	( 0.453)	0.059	0.011
56	4.67	0.23	0.070	( 0.451)	0.059	0.011
57	4.75	0.23	0.070	( 0.449)	0.059	0.011
58	4.83	0.27	0.080	( 0.447)	0.067	0.013
59	4.92	0.27	0.080	( 0.445)	0.067	0.013
60	5.00	0.27	0.080	( 0.443)	0.067	0.013
61	5.08	0.20	0.060	( 0.441)	0.050	0.010
62	5.17	0.20	0.060	( 0.439)	0.050	0.010
63	5.25	0.20	0.060	( 0.437)	0.050	0.010
64	5.33	0.23	0.070	( 0.435)	0.059	0.011
65	5.42	0.23	0.070	( 0.434)	0.059	0.011
66	5.50	0.23	0.070	( 0.432)	0.059	0.011
67	5.58	0.27	0.080	( 0.430)	0.067	0.013
68	5.67	0.27	0.080	( 0.428)	0.067	0.013
69	5.75	0.27	0.080	( 0.426)	0.067	0.013
70	5.83	0.27	0.080	( 0.424)	0.067	0.013
71	5.92	0.27	0.080	( 0.422)	0.067	0.013



72	6.00	0.27	0.080	(	0.420)	0.067	0.013	
73	6.08	0.30	0.090	(	0.418)	0.075	0.015	
74	6.17	0.30	0.090	(	0.417)	0.075	0.015	
75	6.25	0.30	0.090	(	0.415)	0.075	0.015	
76	6.33	0.30	0.090	(	0.413)	0.075	0.015	
77	6.42	0.30	0.090	(	0.411)	0.075	0.015	
78	6.50	0.30	0.090	(	0.409)	0.075	0.015	
79	6.58	0.33	0.100	(	0.407)	0.084	0.016	
80	6.67	0.33	0.100	(	0.406)	0.084	0.016	
81	6.75	0.33	0.100	(	0.404)	0.084	0.016	
82	6.83	0.33	0.100	(	0.402)	0.084	0.016	
83	6.92	0.33	0.100	(	0.400)	0.084	0.016	
84	7.00	0.33	0.100	(	0.398)	0.084	0.016	
85	7.08	0.33	0.100	(	0.396)	0.084	0.016	
86	7.17	0.33	0.100	(	0.395)	0.084	0.016	
87	7.25	0.33	0.100	(	0.393)	0.084	0.016	
88	7.33	0.37	0.110	(	0.391)	0.092	0.018	
89	7.42	0.37	0.110	(	0.389)	0.092	0.018	
90	7.50	0.37	0.110	(	0.387)	0.092	0.018	
91	7.58	0.40	0.120	(	0.386)	0.100	0.020	
92	7.67	0.40	0.120	(	0.384)	0.100	0.020	
93	7.75	0.40	0.120	(	0.382)	0.100	0.020	
94	7.83	0.43	0.130	(	0.380)	0.109	0.021	
95	7.92	0.43	0.130	(	0.379)	0.109	0.021	
96	8.00	0.43	0.130	(	0.377)	0.109	0.021	
97	8.08	0.50	0.150	(	0.375)	0.125	0.025	
98	8.17	0.50	0.150	(	0.373)	0.125	0.025	
99	8.25	0.50	0.150	(	0.372)	0.125	0.025	
100	8.33	0.50	0.150	(	0.370)	0.125	0.025	
101	8.42	0.50	0.150	(	0.368)	0.125	0.025	
102	8.50	0.50	0.150	(	0.366)	0.125	0.025	
103	8.58	0.53	0.160	(	0.365)	0.134	0.026	
104	8.67	0.53	0.160	(	0.363)	0.134	0.026	
105	8.75	0.53	0.160	(	0.361)	0.134	0.026	
106	8.83	0.57	0.170	(	0.360)	0.142	0.028	
107	8.92	0.57	0.170	(	0.358)	0.142	0.028	
108	9.00	0.57	0.170	(	0.356)	0.142	0.028	
109	9.08	0.63	0.190	(	0.354)	0.159	0.031	
110	9.17	0.63	0.190	(	0.353)	0.159	0.031	
111	9.25	0.63	0.190	(	0.351)	0.159	0.031	
112	9.33	0.67	0.200	(	0.349)	0.167	0.033	
113	9.42	0.67	0.200	(	0.348)	0.167	0.033	
114	9.50	0.67	0.200	(	0.346)	0.167	0.033	
115	9.58	0.70	0.210	(	0.344)	0.176	0.034	
116	9.67	0.70	0.210	(	0.343)	0.176	0.034	
117	9.75	0.70	0.210	(	0.341)	0.176	0.034	
118	9.83	0.73	0.220	(	0.340)	0.184	0.036	
119	9.92	0.73	0.220	(	0.338)	0.184	0.036	
120	10.00	0.73	0.220	(	0.336)	0.184	0.036	
121	10.08	0.50	0.150	(	0.335)	0.125	0.025	
122	10.17	0.50	0.150	(	0.333)	0.125	0.025	
123	10.25	0.50	0.150	(	0.331)	0.125	0.025	
124	10.33	0.50	0.150	(	0.330)	0.125	0.025	
125	10.42	0.50	0.150	(	0.328)	0.125	0.025	
126	10.50	0.50	0.150	(	0.327)	0.125	0.025	
127	10.58	0.67	0.200	(	0.325)	0.167	0.033	
128	10.67	0.67	0.200	(	0.323)	0.167	0.033	
129	10.75	0.67	0.200	(	0.322)	0.167	0.033	
130	10.83	0.67	0.200	(	0.320)	0.167	0.033	
131	10.92	0.67	0.200	(	0.319)	0.167	0.033	
132	11.00	0.67	0.200	(	0.317)	0.167	0.033	
133	11.08	0.63	0.190	(	0.316)	0.159	0.031	
134	11.17	0.63	0.190	(	0.314)	0.159	0.031	
135	11.25	0.63	0.190	(	0.312)	0.159	0.031	
136	11.33	0.63	0.190	(	0.311)	0.159	0.031	
137	11.42	0.63	0.190	(	0.309)	0.159	0.031	
138	11.50	0.63	0.190	(	0.308)	0.159	0.031	
139	11.58	0.57	0.170	(	0.306)	0.142	0.028	
140	11.67	0.57	0.170	(	0.305)	0.142	0.028	
141	11.75	0.57	0.170	(	0.303)	0.142	0.028	
142	11.83	0.60	0.180	(	0.302)	0.150	0.030	
143	11.92	0.60	0.180	(	0.300)	0.150	0.030	
144	12.00	0.60	0.180	(	0.299)	0.150	0.030	
145	12.08	0.83	0.250	(	0.297)	0.209	0.041	
146	12.17	0.83	0.250	(	0.296)	0.209	0.041	
147	12.25	0.83	0.250	(	0.294)	0.209	0.041	
148	12.33	0.87	0.260	(	0.293)	0.217	0.043	
149	12.42	0.87	0.260	(	0.291)	0.217	0.043	
150	12.50	0.87	0.260	(	0.290)	0.217	0.043	
151	12.58	0.93	0.280	(	0.288)	0.234	0.046	
152	12.67	0.93	0.280	(	0.287)	0.234	0.046	
153	12.75	0.93	0.280	(	0.285)	0.234	0.046	
154	12.83	0.97	0.290	(	0.284)	0.242	0.048	
155	12.92	0.97	0.290	(	0.283)	0.242	0.048	
156	13.00	0.97	0.290	(	0.281)	0.242	0.048	
157	13.08	1.13	0.340	(	0.280	(	0.284)	0.060

158	13.17	1.13	0.340	0.278	( 0.284)	0.062
159	13.25	1.13	0.340	0.277	( 0.284)	0.063
160	13.33	1.13	0.340	0.276	( 0.284)	0.064
161	13.42	1.13	0.340	0.274	( 0.284)	0.066
162	13.50	1.13	0.340	0.273	( 0.284)	0.067
163	13.58	0.77	0.230	( 0.271)	0.192	0.038
164	13.67	0.77	0.230	( 0.270)	0.192	0.038
165	13.75	0.77	0.230	( 0.269)	0.192	0.038
166	13.83	0.77	0.230	( 0.267)	0.192	0.038
167	13.92	0.77	0.230	( 0.266)	0.192	0.038
168	14.00	0.77	0.230	( 0.264)	0.192	0.038
169	14.08	0.90	0.270	( 0.263)	0.226	0.044
170	14.17	0.90	0.270	( 0.262)	0.226	0.044
171	14.25	0.90	0.270	( 0.260)	0.226	0.044
172	14.33	0.87	0.260	( 0.259)	0.217	0.043
173	14.42	0.87	0.260	( 0.258)	0.217	0.043
174	14.50	0.87	0.260	( 0.256)	0.217	0.043
175	14.58	0.87	0.260	( 0.255)	0.217	0.043
176	14.67	0.87	0.260	( 0.254)	0.217	0.043
177	14.75	0.87	0.260	( 0.253)	0.217	0.043
178	14.83	0.83	0.250	( 0.251)	0.209	0.041
179	14.92	0.83	0.250	( 0.250)	0.209	0.041
180	15.00	0.83	0.250	( 0.249)	0.209	0.041
181	15.08	0.80	0.240	( 0.247)	0.201	0.039
182	15.17	0.80	0.240	( 0.246)	0.201	0.039
183	15.25	0.80	0.240	( 0.245)	0.201	0.039
184	15.33	0.77	0.230	( 0.244)	0.192	0.038
185	15.42	0.77	0.230	( 0.242)	0.192	0.038
186	15.50	0.77	0.230	( 0.241)	0.192	0.038
187	15.58	0.63	0.190	( 0.240)	0.159	0.031
188	15.67	0.63	0.190	( 0.239)	0.159	0.031
189	15.75	0.63	0.190	( 0.237)	0.159	0.031
190	15.83	0.63	0.190	( 0.236)	0.159	0.031
191	15.92	0.63	0.190	( 0.235)	0.159	0.031
192	16.00	0.63	0.190	( 0.234)	0.159	0.031
193	16.08	0.13	0.040	( 0.233)	0.033	0.007
194	16.17	0.13	0.040	( 0.231)	0.033	0.007
195	16.25	0.13	0.040	( 0.230)	0.033	0.007
196	16.33	0.13	0.040	( 0.229)	0.033	0.007
197	16.42	0.13	0.040	( 0.228)	0.033	0.007
198	16.50	0.13	0.040	( 0.227)	0.033	0.007
199	16.58	0.10	0.030	( 0.226)	0.025	0.005
200	16.67	0.10	0.030	( 0.224)	0.025	0.005
201	16.75	0.10	0.030	( 0.223)	0.025	0.005
202	16.83	0.10	0.030	( 0.222)	0.025	0.005
203	16.92	0.10	0.030	( 0.221)	0.025	0.005
204	17.00	0.10	0.030	( 0.220)	0.025	0.005
205	17.08	0.17	0.050	( 0.219)	0.042	0.008
206	17.17	0.17	0.050	( 0.218)	0.042	0.008
207	17.25	0.17	0.050	( 0.217)	0.042	0.008
208	17.33	0.17	0.050	( 0.216)	0.042	0.008
209	17.42	0.17	0.050	( 0.214)	0.042	0.008
210	17.50	0.17	0.050	( 0.213)	0.042	0.008
211	17.58	0.17	0.050	( 0.212)	0.042	0.008
212	17.67	0.17	0.050	( 0.211)	0.042	0.008
213	17.75	0.17	0.050	( 0.210)	0.042	0.008
214	17.83	0.13	0.040	( 0.209)	0.033	0.007
215	17.92	0.13	0.040	( 0.208)	0.033	0.007
216	18.00	0.13	0.040	( 0.207)	0.033	0.007
217	18.08	0.13	0.040	( 0.206)	0.033	0.007
218	18.17	0.13	0.040	( 0.205)	0.033	0.007
219	18.25	0.13	0.040	( 0.204)	0.033	0.007
220	18.33	0.13	0.040	( 0.203)	0.033	0.007
221	18.42	0.13	0.040	( 0.202)	0.033	0.007
222	18.50	0.13	0.040	( 0.201)	0.033	0.007
223	18.58	0.10	0.030	( 0.200)	0.025	0.005
224	18.67	0.10	0.030	( 0.199)	0.025	0.005
225	18.75	0.10	0.030	( 0.198)	0.025	0.005
226	18.83	0.07	0.020	( 0.197)	0.017	0.003
227	18.92	0.07	0.020	( 0.196)	0.017	0.003
228	19.00	0.07	0.020	( 0.195)	0.017	0.003
229	19.08	0.10	0.030	( 0.194)	0.025	0.005
230	19.17	0.10	0.030	( 0.194)	0.025	0.005
231	19.25	0.10	0.030	( 0.193)	0.025	0.005
232	19.33	0.13	0.040	( 0.192)	0.033	0.007
233	19.42	0.13	0.040	( 0.191)	0.033	0.007
234	19.50	0.13	0.040	( 0.190)	0.033	0.007
235	19.58	0.10	0.030	( 0.189)	0.025	0.005
236	19.67	0.10	0.030	( 0.188)	0.025	0.005
237	19.75	0.10	0.030	( 0.187)	0.025	0.005
238	19.83	0.07	0.020	( 0.187)	0.017	0.003
239	19.92	0.07	0.020	( 0.186)	0.017	0.003
240	20.00	0.07	0.020	( 0.185)	0.017	0.003
241	20.08	0.10	0.030	( 0.184)	0.025	0.005
242	20.17	0.10	0.030	( 0.183)	0.025	0.005
243	20.25	0.10	0.030	( 0.182)	0.025	0.005



1+45	0.0044	0.03	Q				
1+50	0.0046	0.04	Q				
1+55	0.0049	0.04	Q				
2+ 0	0.0052	0.04	Q				
2+ 5	0.0055	0.04	Q				
2+10	0.0058	0.04	QV				
2+15	0.0061	0.04	QV				
2+20	0.0064	0.04	QV				
2+25	0.0066	0.04	QV				
2+30	0.0069	0.04	QV				
2+35	0.0073	0.05	QV				
2+40	0.0076	0.05	QV				
2+45	0.0080	0.05	QV				
2+50	0.0083	0.05	QV				
2+55	0.0087	0.05	QV				
3+ 0	0.0091	0.05	QV				
3+ 5	0.0094	0.05	QV				
3+10	0.0098	0.05	QV				
3+15	0.0101	0.05	QV				
3+20	0.0105	0.05	QV				
3+25	0.0109	0.05	QV				
3+30	0.0112	0.05	Q V				
3+35	0.0116	0.05	Q V				
3+40	0.0120	0.05	Q V				
3+45	0.0123	0.05	Q V				
3+50	0.0127	0.06	Q V				
3+55	0.0131	0.06	Q V				
4+ 0	0.0136	0.06	Q V				
4+ 5	0.0140	0.06	Q V				
4+10	0.0144	0.06	Q V				
4+15	0.0149	0.06	Q V				
4+20	0.0153	0.07	Q V				
4+25	0.0158	0.07	Q V				
4+30	0.0163	0.07	Q V				
4+35	0.0168	0.07	Q V				
4+40	0.0174	0.07	Q V				
4+45	0.0179	0.07	Q V				
4+50	0.0184	0.08	Q V				
4+55	0.0190	0.08	Q V				
5+ 0	0.0195	0.08	Q V				
5+ 5	0.0201	0.08	Q V				
5+10	0.0205	0.07	Q V				
5+15	0.0210	0.06	Q V				
5+20	0.0214	0.07	Q V				
5+25	0.0219	0.07	Q V				
5+30	0.0224	0.07	Q V				
5+35	0.0230	0.08	Q V				
5+40	0.0235	0.08	Q V				
5+45	0.0241	0.08	Q V				
5+50	0.0247	0.08	Q V				
5+55	0.0253	0.08	Q V				
6+ 0	0.0259	0.08	Q V				
6+ 5	0.0265	0.09	Q V				
6+10	0.0271	0.09	Q V				
6+15	0.0278	0.09	Q V				
6+20	0.0284	0.09	Q V				
6+25	0.0291	0.09	Q V				
6+30	0.0297	0.09	Q V				
6+35	0.0304	0.10	Q V				
6+40	0.0311	0.10	Q V				
6+45	0.0318	0.10	Q V				
6+50	0.0326	0.11	Q V				
6+55	0.0333	0.11	Q V				
7+ 0	0.0340	0.11	Q V				
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7+10	0.0355	0.11	Q V				
7+15	0.0362	0.11	Q V				
7+20	0.0370	0.11	Q V				
7+25	0.0377	0.11	Q V				
7+30	0.0385	0.12	Q V				
7+35	0.0394	0.12	Q V				
7+40	0.0402	0.12	Q V				
7+45	0.0411	0.13	Q V				
7+50	0.0420	0.13	Q V				
7+55	0.0429	0.14	Q V				
8+ 0	0.0439	0.14	Q V				
8+ 5	0.0449	0.14	Q V				
8+10	0.0459	0.15	Q V				
8+15	0.0470	0.16	Q V				
8+20	0.0481	0.16	Q V				
8+25	0.0492	0.16	Q V				
8+30	0.0503	0.16	Q V				
8+35	0.0514	0.16	Q V				
8+40	0.0525	0.17	Q V				
8+45	0.0537	0.17	Q V				
8+50	0.0549	0.17	Q V				

8+55	0.0561	0.18	Q	V			
9+ 0	0.0573	0.18	Q	V			
9+ 5	0.0586	0.19	Q	V			
9+10	0.0600	0.20	Q	V			
9+15	0.0614	0.20	Q	V			
9+20	0.0628	0.20	Q	V			
9+25	0.0642	0.21	Q	V			
9+30	0.0657	0.21	Q	V			
9+35	0.0671	0.21	Q	V			
9+40	0.0686	0.22	Q	V			
9+45	0.0702	0.22	Q	V			
9+50	0.0717	0.23	Q	V			
9+55	0.0733	0.23	Q	V			
10+ 0	0.0749	0.23	Q	V			
10+ 5	0.0763	0.20	Q	V			
10+10	0.0775	0.17	Q	V			
10+15	0.0786	0.16	Q	V			
10+20	0.0797	0.16	Q	V			
10+25	0.0808	0.16	Q	V			
10+30	0.0819	0.16	Q	V			
10+35	0.0831	0.18	Q	V			
10+40	0.0845	0.20	Q	V			
10+45	0.0859	0.21	Q	V			
10+50	0.0874	0.21	Q	V			
10+55	0.0888	0.21	Q	V			
11+ 0	0.0903	0.21	Q	V			
11+ 5	0.0917	0.21	Q	V			
11+10	0.0931	0.20	Q	V			
11+15	0.0945	0.20	Q	V			
11+20	0.0959	0.20	Q	V			
11+25	0.0972	0.20	Q	V			
11+30	0.0986	0.20	Q	V			
11+35	0.1000	0.19	Q	V			
11+40	0.1012	0.18	Q	V			
11+45	0.1025	0.18	Q	V			
11+50	0.1037	0.18	Q	V			
11+55	0.1050	0.19	Q	V			
12+ 0	0.1063	0.19	Q	V			
12+ 5	0.1078	0.22	Q	V			
12+10	0.1096	0.25	Q	V			
12+15	0.1113	0.26	Q	V			
12+20	0.1132	0.27	Q	V			
12+25	0.1150	0.27	Q	V			
12+30	0.1169	0.27	Q	V			
12+35	0.1189	0.28	Q	V			
12+40	0.1209	0.29	Q	V			
12+45	0.1229	0.29	Q	V			
12+50	0.1250	0.30	Q	V			
12+55	0.1271	0.30	Q	V			
13+ 0	0.1292	0.31	Q	V			
13+ 5	0.1315	0.34	Q	V			
13+10	0.1341	0.38	Q	V			
13+15	0.1368	0.39	Q	V			
13+20	0.1396	0.41	Q	V			
13+25	0.1425	0.42	Q	V			
13+30	0.1454	0.42	Q	V			
13+35	0.1478	0.36	Q	V			
13+40	0.1497	0.27	Q	V			
13+45	0.1515	0.25	Q	V			
13+50	0.1532	0.25	Q	V			
13+55	0.1549	0.24	Q	V			
14+ 0	0.1565	0.24	Q	V			
14+ 5	0.1583	0.26	Q	V			
14+10	0.1602	0.28	Q	V			
14+15	0.1622	0.28	Q	V			
14+20	0.1641	0.28	Q	V			
14+25	0.1660	0.28	Q	V			
14+30	0.1679	0.27	Q	V			
14+35	0.1698	0.27	Q	V			
14+40	0.1717	0.27	Q	V			
14+45	0.1736	0.27	Q	V			
14+50	0.1754	0.27	Q	V			
14+55	0.1772	0.27	Q	V			
15+ 0	0.1791	0.26	Q	V			
15+ 5	0.1809	0.26	Q	V			
15+10	0.1826	0.25	Q	V			
15+15	0.1844	0.25	Q	V			
15+20	0.1861	0.25	Q	V			
15+25	0.1878	0.24	Q	V			
15+30	0.1894	0.24	Q	V			
15+35	0.1910	0.23	Q	V			
15+40	0.1924	0.21	Q	V			
15+45	0.1938	0.20	Q	V			
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15+55	0.1966	0.20	Q	V			
16+ 0	0.1980	0.20	Q	V			

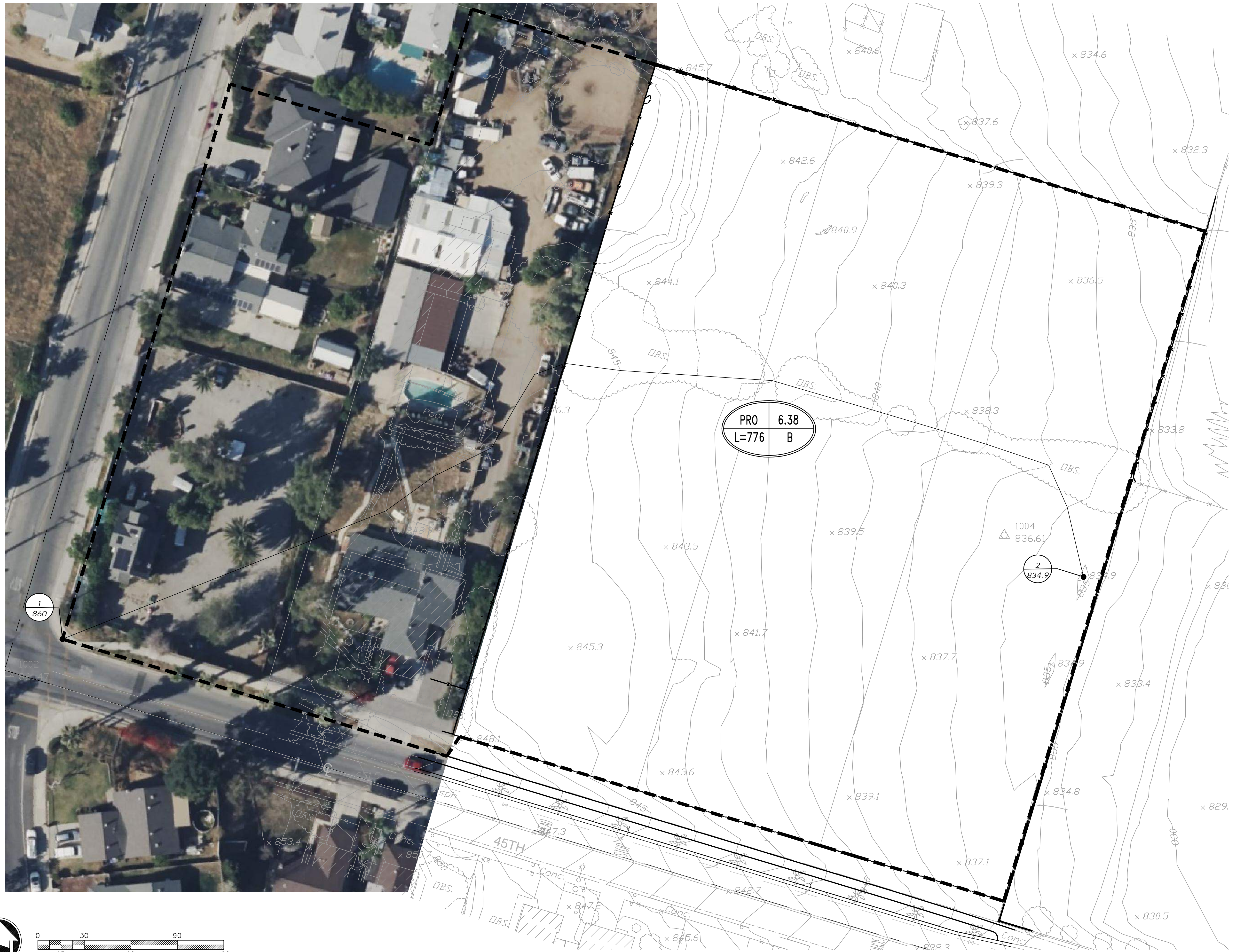
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16+20	0.2001	0.05	Q				V
16+25	0.2004	0.04	Q				V
16+30	0.2007	0.04	Q				V
16+35	0.2009	0.04	Q				V
16+40	0.2012	0.03	Q				V
16+45	0.2014	0.03	Q				V
16+50	0.2016	0.03	Q				V
16+55	0.2018	0.03	Q				V
17+ 0	0.2020	0.03	Q				V
17+ 5	0.2023	0.04	Q				V
17+10	0.2027	0.05	Q				V
17+15	0.2030	0.05	Q				V
17+20	0.2034	0.05	Q				V
17+25	0.2037	0.05	Q				V
17+30	0.2041	0.05	Q				V
17+35	0.2045	0.05	Q				V
17+40	0.2048	0.05	Q				V
17+45	0.2052	0.05	Q				V
17+50	0.2055	0.05	Q				V
17+55	0.2058	0.04	Q				V
18+ 0	0.2061	0.04	Q				V
18+ 5	0.2064	0.04	Q				V
18+10	0.2067	0.04	Q				V
18+15	0.2070	0.04	Q				V
18+20	0.2073	0.04	Q				V
18+25	0.2076	0.04	Q				V
18+30	0.2079	0.04	Q				V
18+35	0.2081	0.04	Q				V
18+40	0.2084	0.03	Q				V
18+45	0.2086	0.03	Q				V
18+50	0.2088	0.03	Q				V
18+55	0.2089	0.02	Q				V
19+ 0	0.2091	0.02	Q				V
19+ 5	0.2093	0.03	Q				V
19+10	0.2095	0.03	Q				V
19+15	0.2097	0.03	Q				V
19+20	0.2099	0.04	Q				V
19+25	0.2102	0.04	Q				V
19+30	0.2105	0.04	Q				V
19+35	0.2107	0.04	Q				V
19+40	0.2110	0.03	Q				V
19+45	0.2112	0.03	Q				V
19+50	0.2114	0.03	Q				V
19+55	0.2115	0.02	Q				V
20+ 0	0.2117	0.02	Q				V
20+ 5	0.2119	0.03	Q				V
20+10	0.2121	0.03	Q				V
20+15	0.2123	0.03	Q				V
20+20	0.2125	0.03	Q				V
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20+30	0.2129	0.03	Q				V
20+35	0.2132	0.03	Q				V
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20+45	0.2136	0.03	Q				V
20+50	0.2138	0.03	Q				V
20+55	0.2139	0.02	Q				V
21+ 0	0.2141	0.02	Q				V
21+ 5	0.2143	0.03	Q				V
21+10	0.2145	0.03	Q				V
21+15	0.2147	0.03	Q				V
21+20	0.2149	0.03	Q				V
21+25	0.2150	0.02	Q				V
21+30	0.2152	0.02	Q				V
21+35	0.2154	0.03	Q				V
21+40	0.2156	0.03	Q				V
21+45	0.2158	0.03	Q				V
21+50	0.2160	0.03	Q				V
21+55	0.2161	0.02	Q				V
22+ 0	0.2163	0.02	Q				V
22+ 5	0.2164	0.03	Q				V
22+10	0.2167	0.03	Q				V
22+15	0.2169	0.03	Q				V
22+20	0.2171	0.03	Q				V
22+25	0.2172	0.02	Q				V
22+30	0.2174	0.02	Q				V
22+35	0.2175	0.02	Q				V
22+40	0.2177	0.02	Q				V
22+45	0.2178	0.02	Q				V
22+50	0.2179	0.02	Q				V
22+55	0.2181	0.02	Q				V
23+ 0	0.2182	0.02	Q				V
23+ 5	0.2184	0.02	Q				V
23+10	0.2185	0.02	Q				V

23+15	0.2187	0.02	Q				V
23+20	0.2188	0.02	Q				V
23+25	0.2190	0.02	Q				V
23+30	0.2191	0.02	Q				V
23+35	0.2193	0.02	Q				V
23+40	0.2194	0.02	Q				V
23+45	0.2195	0.02	Q				V
23+50	0.2197	0.02	Q				V
23+55	0.2198	0.02	Q				V
24+ 0	0.2200	0.02	Q				V
24+ 5	0.2201	0.01	Q				V
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24+20	0.2201	0.00	Q				V

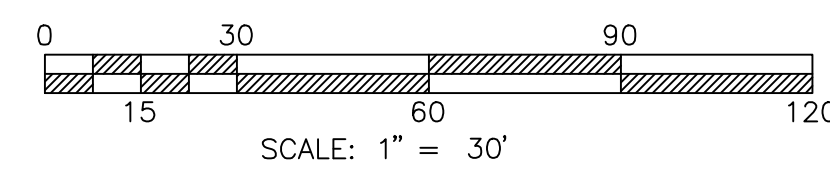
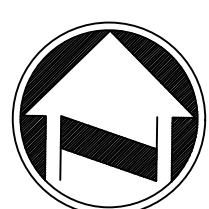
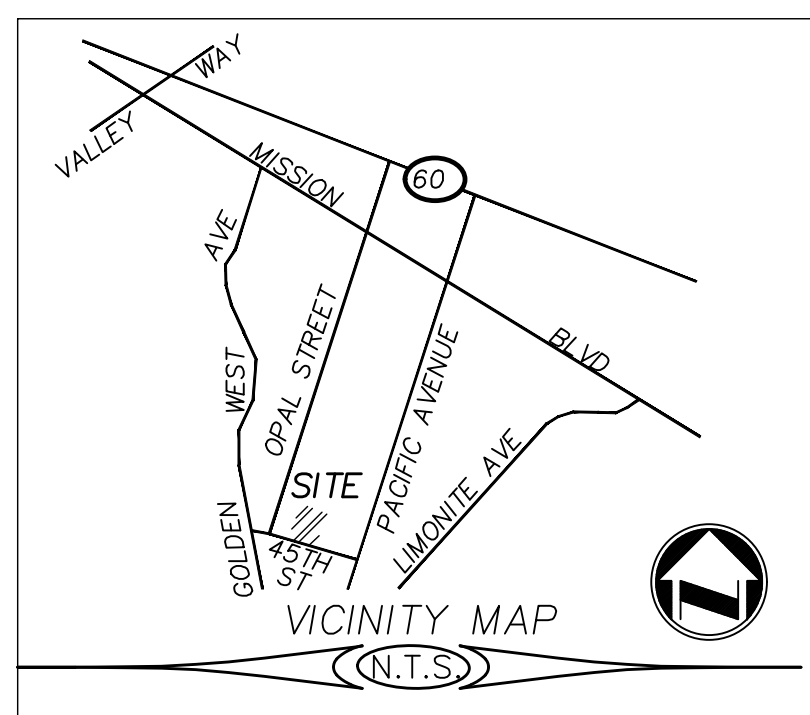
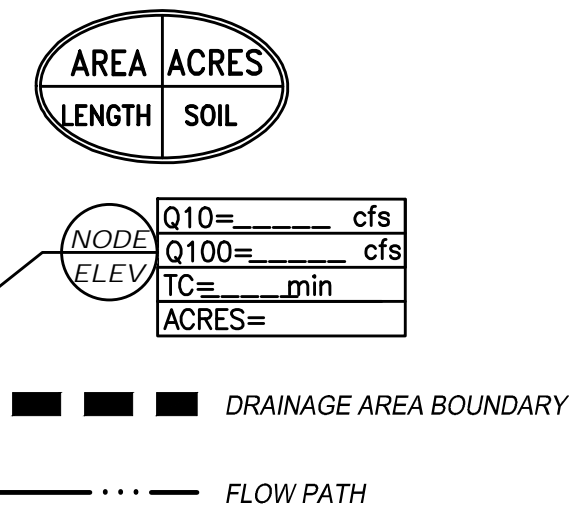
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# PRE-DEVELOPMENT HYDROLOGY MAP

TRACT 37857



### LEGEND



PRE-DEVELOPMENT  
HYDROLOGY MAP  
PREPARATION DATE : AUGUST 2021  
REVISION DATE : JUNE 2023  
JOB NUMBER : 10120  
PLAN PREPARED BY:

**adkan ENGINEERS**  
Civil Engineering • Surveying • Planning  
6879 Airport Drive, Riverside, CA 92504  
Tel:(951) 688-0241, Fax:(951) 688-0599



Unit Hydrograph Analysis

Copyright (C) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1  
 Study date 06/13/23 File: pro2242.out

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

Program License Serial Number 5006

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

English Units used in output format

-----  
 Drainage Area = 6.38(Ac.) = 0.010 Sq. Mi.  
 Drainage Area for Depth-Area Areal Adjustment = 6.38(Ac.) = 0.010 Sq. Mi.  
 Length along longest watercourse = 1010.00(Ft.)  
 Length along longest watercourse measured to centroid = 505.00(Ft.)  
 Length along longest watercourse = 0.191 Mi.  
 Length along longest watercourse measured to centroid = 0.096 Mi.  
 Difference in elevation = 22.00(Ft.)  
 Slope along watercourse = 115.0099 Ft./Mi.  
 Average Manning's 'N' = 0.015  
 Lag time = 0.032 Hr.  
 Lag time = 1.92 Min.  
 25% of lag time = 0.48 Min.  
 40% of lag time = 0.77 Min.  
 Unit time = 5.00 Min.  
 Duration of storm = 24 Hour(s)  
 User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	weighting[1*2]
6.38	2.50	15.95

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	weighting[1*2]
6.38	6.00	38.28

STORM EVENT (YEAR) = 2.00  
 Area Averaged 2-Year Rainfall = 2.500(In)  
 Area Averaged 100-Year Rainfall = 6.000(In)

Point rain (area averaged) = 2.500(In)  
 Areal adjustment factor = 100.00 %  
 Adjusted average point rain = 2.500(In)

Sub-Area Data:  
 Area(Ac.)      Runoff Index      Impervious %  
 6.380            56.00            0.470  
 Total Area Entered = 6.38(Ac.)

RI	RI	Infil. Rate	Impervious	Adj. Infil. Rate	Area%	F
AMC2	AMC-1	(In/Hr)	(Dec.%)	(In/Hr)	(Dec.)	(In/Hr)
56.0	36.0	0.706	0.470	0.407	1.000	0.407
						Sum (F) = 0.407

Area averaged mean soil loss (F) (In/Hr) = 0.407  
 Minimum soil loss rate ((In/Hr)) = 0.204  
 (for 24 hour storm duration)  
 Soil loss rate (decimal) = 0.524

-----  
 Unit Hydrograph  
 VALLEY S-Curve

-----  
 Unit Hydrograph Data

Unit time period	Time % of lag	Distribution	Unit Hydrograph
(hrs)		Graph %	(CFS)

1	0.083	260.834	52.270	3.361
2	0.167	521.669	39.392	2.533
3	0.250	782.503	6.679	0.429
4	0.333	1043.338	1.659	0.107
			Sum = 100.000	Sum= 6.430

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

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr)		Effective (In/Hr)
				Max	Low	
1	0.08	0.07	0.020	( 0.722)	0.010	0.010
2	0.17	0.07	0.020	( 0.719)	0.010	0.010
3	0.25	0.07	0.020	( 0.717)	0.010	0.010
4	0.33	0.10	0.030	( 0.714)	0.016	0.014
5	0.42	0.10	0.030	( 0.711)	0.016	0.014
6	0.50	0.10	0.030	( 0.708)	0.016	0.014
7	0.58	0.10	0.030	( 0.705)	0.016	0.014
8	0.67	0.10	0.030	( 0.703)	0.016	0.014
9	0.75	0.10	0.030	( 0.700)	0.016	0.014
10	0.83	0.13	0.040	( 0.697)	0.021	0.019
11	0.92	0.13	0.040	( 0.694)	0.021	0.019
12	1.00	0.13	0.040	( 0.692)	0.021	0.019
13	1.08	0.10	0.030	( 0.689)	0.016	0.014
14	1.17	0.10	0.030	( 0.686)	0.016	0.014
15	1.25	0.10	0.030	( 0.684)	0.016	0.014
16	1.33	0.10	0.030	( 0.681)	0.016	0.014
17	1.42	0.10	0.030	( 0.678)	0.016	0.014
18	1.50	0.10	0.030	( 0.675)	0.016	0.014
19	1.58	0.10	0.030	( 0.673)	0.016	0.014
20	1.67	0.10	0.030	( 0.670)	0.016	0.014
21	1.75	0.10	0.030	( 0.667)	0.016	0.014
22	1.83	0.13	0.040	( 0.665)	0.021	0.019
23	1.92	0.13	0.040	( 0.662)	0.021	0.019
24	2.00	0.13	0.040	( 0.659)	0.021	0.019
25	2.08	0.13	0.040	( 0.657)	0.021	0.019
26	2.17	0.13	0.040	( 0.654)	0.021	0.019
27	2.25	0.13	0.040	( 0.651)	0.021	0.019
28	2.33	0.13	0.040	( 0.649)	0.021	0.019
29	2.42	0.13	0.040	( 0.646)	0.021	0.019
30	2.50	0.13	0.040	( 0.643)	0.021	0.019
31	2.58	0.17	0.050	( 0.641)	0.026	0.024
32	2.67	0.17	0.050	( 0.638)	0.026	0.024
33	2.75	0.17	0.050	( 0.635)	0.026	0.024
34	2.83	0.17	0.050	( 0.633)	0.026	0.024
35	2.92	0.17	0.050	( 0.630)	0.026	0.024
36	3.00	0.17	0.050	( 0.628)	0.026	0.024
37	3.08	0.17	0.050	( 0.625)	0.026	0.024
38	3.17	0.17	0.050	( 0.622)	0.026	0.024
39	3.25	0.17	0.050	( 0.620)	0.026	0.024
40	3.33	0.17	0.050	( 0.617)	0.026	0.024
41	3.42	0.17	0.050	( 0.615)	0.026	0.024
42	3.50	0.17	0.050	( 0.612)	0.026	0.024
43	3.58	0.17	0.050	( 0.610)	0.026	0.024
44	3.67	0.17	0.050	( 0.607)	0.026	0.024
45	3.75	0.17	0.050	( 0.604)	0.026	0.024
46	3.83	0.20	0.060	( 0.602)	0.031	0.029
47	3.92	0.20	0.060	( 0.599)	0.031	0.029
48	4.00	0.20	0.060	( 0.597)	0.031	0.029
49	4.08	0.20	0.060	( 0.594)	0.031	0.029
50	4.17	0.20	0.060	( 0.592)	0.031	0.029
51	4.25	0.20	0.060	( 0.589)	0.031	0.029
52	4.33	0.23	0.070	( 0.587)	0.037	0.033
53	4.42	0.23	0.070	( 0.584)	0.037	0.033
54	4.50	0.23	0.070	( 0.582)	0.037	0.033
55	4.58	0.23	0.070	( 0.579)	0.037	0.033
56	4.67	0.23	0.070	( 0.577)	0.037	0.033
57	4.75	0.23	0.070	( 0.574)	0.037	0.033
58	4.83	0.27	0.080	( 0.572)	0.042	0.038
59	4.92	0.27	0.080	( 0.569)	0.042	0.038
60	5.00	0.27	0.080	( 0.567)	0.042	0.038
61	5.08	0.20	0.060	( 0.564)	0.031	0.029
62	5.17	0.20	0.060	( 0.562)	0.031	0.029
63	5.25	0.20	0.060	( 0.559)	0.031	0.029
64	5.33	0.23	0.070	( 0.557)	0.037	0.033
65	5.42	0.23	0.070	( 0.555)	0.037	0.033
66	5.50	0.23	0.070	( 0.552)	0.037	0.033
67	5.58	0.27	0.080	( 0.550)	0.042	0.038
68	5.67	0.27	0.080	( 0.547)	0.042	0.038
69	5.75	0.27	0.080	( 0.545)	0.042	0.038
70	5.83	0.27	0.080	( 0.543)	0.042	0.038
71	5.92	0.27	0.080	( 0.540)	0.042	0.038
72	6.00	0.27	0.080	( 0.538)	0.042	0.038

73	6.08	0.30	0.090	( 0.535)	0.047	0.043
74	6.17	0.30	0.090	( 0.533)	0.047	0.043
75	6.25	0.30	0.090	( 0.531)	0.047	0.043
76	6.33	0.30	0.090	( 0.528)	0.047	0.043
77	6.42	0.30	0.090	( 0.526)	0.047	0.043
78	6.50	0.30	0.090	( 0.523)	0.047	0.043
79	6.58	0.33	0.100	( 0.521)	0.052	0.048
80	6.67	0.33	0.100	( 0.519)	0.052	0.048
81	6.75	0.33	0.100	( 0.516)	0.052	0.048
82	6.83	0.33	0.100	( 0.514)	0.052	0.048
83	6.92	0.33	0.100	( 0.512)	0.052	0.048
84	7.00	0.33	0.100	( 0.509)	0.052	0.048
85	7.08	0.33	0.100	( 0.507)	0.052	0.048
86	7.17	0.33	0.100	( 0.505)	0.052	0.048
87	7.25	0.33	0.100	( 0.503)	0.052	0.048
88	7.33	0.37	0.110	( 0.500)	0.058	0.052
89	7.42	0.37	0.110	( 0.498)	0.058	0.052
90	7.50	0.37	0.110	( 0.496)	0.058	0.052
91	7.58	0.40	0.120	( 0.493)	0.063	0.057
92	7.67	0.40	0.120	( 0.491)	0.063	0.057
93	7.75	0.40	0.120	( 0.489)	0.063	0.057
94	7.83	0.43	0.130	( 0.487)	0.068	0.062
95	7.92	0.43	0.130	( 0.484)	0.068	0.062
96	8.00	0.43	0.130	( 0.482)	0.068	0.062
97	8.08	0.50	0.150	( 0.480)	0.079	0.071
98	8.17	0.50	0.150	( 0.478)	0.079	0.071
99	8.25	0.50	0.150	( 0.475)	0.079	0.071
100	8.33	0.50	0.150	( 0.473)	0.079	0.071
101	8.42	0.50	0.150	( 0.471)	0.079	0.071
102	8.50	0.50	0.150	( 0.469)	0.079	0.071
103	8.58	0.53	0.160	( 0.467)	0.084	0.076
104	8.67	0.53	0.160	( 0.464)	0.084	0.076
105	8.75	0.53	0.160	( 0.462)	0.084	0.076
106	8.83	0.57	0.170	( 0.460)	0.089	0.081
107	8.92	0.57	0.170	( 0.458)	0.089	0.081
108	9.00	0.57	0.170	( 0.456)	0.089	0.081
109	9.08	0.63	0.190	( 0.454)	0.100	0.090
110	9.17	0.63	0.190	( 0.451)	0.100	0.090
111	9.25	0.63	0.190	( 0.449)	0.100	0.090
112	9.33	0.67	0.200	( 0.447)	0.105	0.095
113	9.42	0.67	0.200	( 0.445)	0.105	0.095
114	9.50	0.67	0.200	( 0.443)	0.105	0.095
115	9.58	0.70	0.210	( 0.441)	0.110	0.100
116	9.67	0.70	0.210	( 0.439)	0.110	0.100
117	9.75	0.70	0.210	( 0.436)	0.110	0.100
118	9.83	0.73	0.220	( 0.434)	0.115	0.105
119	9.92	0.73	0.220	( 0.432)	0.115	0.105
120	10.00	0.73	0.220	( 0.430)	0.115	0.105
121	10.08	0.50	0.150	( 0.428)	0.079	0.071
122	10.17	0.50	0.150	( 0.426)	0.079	0.071
123	10.25	0.50	0.150	( 0.424)	0.079	0.071
124	10.33	0.50	0.150	( 0.422)	0.079	0.071
125	10.42	0.50	0.150	( 0.420)	0.079	0.071
126	10.50	0.50	0.150	( 0.418)	0.079	0.071
127	10.58	0.67	0.200	( 0.416)	0.105	0.095
128	10.67	0.67	0.200	( 0.414)	0.105	0.095
129	10.75	0.67	0.200	( 0.412)	0.105	0.095
130	10.83	0.67	0.200	( 0.410)	0.105	0.095
131	10.92	0.67	0.200	( 0.408)	0.105	0.095
132	11.00	0.67	0.200	( 0.406)	0.105	0.095
133	11.08	0.63	0.190	( 0.404)	0.100	0.090
134	11.17	0.63	0.190	( 0.402)	0.100	0.090
135	11.25	0.63	0.190	( 0.400)	0.100	0.090
136	11.33	0.63	0.190	( 0.398)	0.100	0.090
137	11.42	0.63	0.190	( 0.396)	0.100	0.090
138	11.50	0.63	0.190	( 0.394)	0.100	0.090
139	11.58	0.57	0.170	( 0.392)	0.089	0.081
140	11.67	0.57	0.170	( 0.390)	0.089	0.081
141	11.75	0.57	0.170	( 0.388)	0.089	0.081
142	11.83	0.60	0.180	( 0.386)	0.094	0.086
143	11.92	0.60	0.180	( 0.384)	0.094	0.086
144	12.00	0.60	0.180	( 0.382)	0.094	0.086
145	12.08	0.83	0.250	( 0.380)	0.131	0.119
146	12.17	0.83	0.250	( 0.378)	0.131	0.119
147	12.25	0.83	0.250	( 0.376)	0.131	0.119
148	12.33	0.87	0.260	( 0.375)	0.136	0.124
149	12.42	0.87	0.260	( 0.373)	0.136	0.124
150	12.50	0.87	0.260	( 0.371)	0.136	0.124
151	12.58	0.93	0.280	( 0.369)	0.147	0.133
152	12.67	0.93	0.280	( 0.367)	0.147	0.133
153	12.75	0.93	0.280	( 0.365)	0.147	0.133
154	12.83	0.97	0.290	( 0.363)	0.152	0.138
155	12.92	0.97	0.290	( 0.362)	0.152	0.138
156	13.00	0.97	0.290	( 0.360)	0.152	0.138
157	13.08	1.13	0.340	( 0.358)	0.178	0.162
158	13.17	1.13	0.340	( 0.356)	0.178	0.162

159	13.25	1.13	0.340	( 0.354)	0.178	0.162
160	13.33	1.13	0.340	( 0.352)	0.178	0.162
161	13.42	1.13	0.340	( 0.351)	0.178	0.162
162	13.50	1.13	0.340	( 0.349)	0.178	0.162
163	13.58	0.77	0.230	( 0.347)	0.121	0.109
164	13.67	0.77	0.230	( 0.345)	0.121	0.109
165	13.75	0.77	0.230	( 0.344)	0.121	0.109
166	13.83	0.77	0.230	( 0.342)	0.121	0.109
167	13.92	0.77	0.230	( 0.340)	0.121	0.109
168	14.00	0.77	0.230	( 0.338)	0.121	0.109
169	14.08	0.90	0.270	( 0.337)	0.141	0.129
170	14.17	0.90	0.270	( 0.335)	0.141	0.129
171	14.25	0.90	0.270	( 0.333)	0.141	0.129
172	14.33	0.87	0.260	( 0.332)	0.136	0.124
173	14.42	0.87	0.260	( 0.330)	0.136	0.124
174	14.50	0.87	0.260	( 0.328)	0.136	0.124
175	14.58	0.87	0.260	( 0.326)	0.136	0.124
176	14.67	0.87	0.260	( 0.325)	0.136	0.124
177	14.75	0.87	0.260	( 0.323)	0.136	0.124
178	14.83	0.83	0.250	( 0.321)	0.131	0.119
179	14.92	0.83	0.250	( 0.320)	0.131	0.119
180	15.00	0.83	0.250	( 0.318)	0.131	0.119
181	15.08	0.80	0.240	( 0.317)	0.126	0.114
182	15.17	0.80	0.240	( 0.315)	0.126	0.114
183	15.25	0.80	0.240	( 0.313)	0.126	0.114
184	15.33	0.77	0.230	( 0.312)	0.121	0.109
185	15.42	0.77	0.230	( 0.310)	0.121	0.109
186	15.50	0.77	0.230	( 0.309)	0.121	0.109
187	15.58	0.63	0.190	( 0.307)	0.100	0.090
188	15.67	0.63	0.190	( 0.305)	0.100	0.090
189	15.75	0.63	0.190	( 0.304)	0.100	0.090
190	15.83	0.63	0.190	( 0.302)	0.100	0.090
191	15.92	0.63	0.190	( 0.301)	0.100	0.090
192	16.00	0.63	0.190	( 0.299)	0.100	0.090
193	16.08	0.13	0.040	( 0.298)	0.021	0.019
194	16.17	0.13	0.040	( 0.296)	0.021	0.019
195	16.25	0.13	0.040	( 0.295)	0.021	0.019
196	16.33	0.13	0.040	( 0.293)	0.021	0.019
197	16.42	0.13	0.040	( 0.292)	0.021	0.019
198	16.50	0.13	0.040	( 0.290)	0.021	0.019
199	16.58	0.10	0.030	( 0.289)	0.016	0.014
200	16.67	0.10	0.030	( 0.287)	0.016	0.014
201	16.75	0.10	0.030	( 0.286)	0.016	0.014
202	16.83	0.10	0.030	( 0.284)	0.016	0.014
203	16.92	0.10	0.030	( 0.283)	0.016	0.014
204	17.00	0.10	0.030	( 0.281)	0.016	0.014
205	17.08	0.17	0.050	( 0.280)	0.026	0.024
206	17.17	0.17	0.050	( 0.279)	0.026	0.024
207	17.25	0.17	0.050	( 0.277)	0.026	0.024
208	17.33	0.17	0.050	( 0.276)	0.026	0.024
209	17.42	0.17	0.050	( 0.274)	0.026	0.024
210	17.50	0.17	0.050	( 0.273)	0.026	0.024
211	17.58	0.17	0.050	( 0.272)	0.026	0.024
212	17.67	0.17	0.050	( 0.270)	0.026	0.024
213	17.75	0.17	0.050	( 0.269)	0.026	0.024
214	17.83	0.13	0.040	( 0.268)	0.021	0.019
215	17.92	0.13	0.040	( 0.266)	0.021	0.019
216	18.00	0.13	0.040	( 0.265)	0.021	0.019
217	18.08	0.13	0.040	( 0.264)	0.021	0.019
218	18.17	0.13	0.040	( 0.262)	0.021	0.019
219	18.25	0.13	0.040	( 0.261)	0.021	0.019
220	18.33	0.13	0.040	( 0.260)	0.021	0.019
221	18.42	0.13	0.040	( 0.259)	0.021	0.019
222	18.50	0.13	0.040	( 0.257)	0.021	0.019
223	18.58	0.10	0.030	( 0.256)	0.016	0.014
224	18.67	0.10	0.030	( 0.255)	0.016	0.014
225	18.75	0.10	0.030	( 0.254)	0.016	0.014
226	18.83	0.07	0.020	( 0.252)	0.010	0.010
227	18.92	0.07	0.020	( 0.251)	0.010	0.010
228	19.00	0.07	0.020	( 0.250)	0.010	0.010
229	19.08	0.10	0.030	( 0.249)	0.016	0.014
230	19.17	0.10	0.030	( 0.248)	0.016	0.014
231	19.25	0.10	0.030	( 0.246)	0.016	0.014
232	19.33	0.13	0.040	( 0.245)	0.021	0.019
233	19.42	0.13	0.040	( 0.244)	0.021	0.019
234	19.50	0.13	0.040	( 0.243)	0.021	0.019
235	19.58	0.10	0.030	( 0.242)	0.016	0.014
236	19.67	0.10	0.030	( 0.241)	0.016	0.014
237	19.75	0.10	0.030	( 0.240)	0.016	0.014
238	19.83	0.07	0.020	( 0.239)	0.010	0.010
239	19.92	0.07	0.020	( 0.238)	0.010	0.010
240	20.00	0.07	0.020	( 0.237)	0.010	0.010
241	20.08	0.10	0.030	( 0.236)	0.016	0.014
242	20.17	0.10	0.030	( 0.234)	0.016	0.014
243	20.25	0.10	0.030	( 0.233)	0.016	0.014
244	20.33	0.10	0.030	( 0.232)	0.016	0.014



1+50	0.0137	0.11	Q				
1+55	0.0145	0.12	Q				
2+ 0	0.0153	0.12	Q				
2+ 5	0.0162	0.12	QV				
2+10	0.0170	0.12	QV				
2+15	0.0179	0.12	QV				
2+20	0.0187	0.12	QV				
2+25	0.0195	0.12	QV				
2+30	0.0204	0.12	QV				
2+35	0.0213	0.14	QV				
2+40	0.0224	0.15	QV				
2+45	0.0234	0.15	QV				
2+50	0.0245	0.15	QV				
2+55	0.0255	0.15	QV				
3+ 0	0.0266	0.15	QV				
3+ 5	0.0277	0.15	QV				
3+10	0.0287	0.15	QV				
3+15	0.0298	0.15	QV				
3+20	0.0308	0.15	QV				
3+25	0.0319	0.15	Q V				
3+30	0.0329	0.15	Q V				
3+35	0.0340	0.15	Q V				
3+40	0.0350	0.15	Q V				
3+45	0.0361	0.15	Q V				
3+50	0.0373	0.17	Q V				
3+55	0.0385	0.18	Q V				
4+ 0	0.0398	0.18	Q V				
4+ 5	0.0410	0.18	Q V				
4+10	0.0423	0.18	Q V				
4+15	0.0436	0.18	Q V				
4+20	0.0449	0.20	Q V				
4+25	0.0464	0.21	Q V				
4+30	0.0479	0.21	Q V				
4+35	0.0493	0.21	Q V				
4+40	0.0508	0.21	Q V				
4+45	0.0523	0.21	Q V				
4+50	0.0539	0.23	Q V				
4+55	0.0555	0.24	Q V				
5+ 0	0.0572	0.24	Q V				
5+ 5	0.0587	0.21	Q V				
5+10	0.0600	0.19	Q V				
5+15	0.0613	0.18	Q V				
5+20	0.0626	0.20	Q V				
5+25	0.0641	0.21	Q V				
5+30	0.0656	0.21	Q V				
5+35	0.0672	0.23	Q V				
5+40	0.0688	0.24	Q V				
5+45	0.0705	0.24	Q V				
5+50	0.0722	0.24	Q V				
5+55	0.0739	0.24	Q V				
6+ 0	0.0756	0.24	Q V				
6+ 5	0.0774	0.26	Q V				
6+10	0.0793	0.27	Q V				
6+15	0.0812	0.28	Q V				
6+20	0.0831	0.28	Q V				
6+25	0.0849	0.28	Q V				
6+30	0.0868	0.28	Q V				
6+35	0.0889	0.29	Q V				
6+40	0.0909	0.30	Q V				
6+45	0.0931	0.31	Q V				
6+50	0.0952	0.31	Q V				
6+55	0.0973	0.31	Q V				
7+ 0	0.0994	0.31	Q V				
7+ 5	0.1015	0.31	Q V				
7+10	0.1036	0.31	Q V				
7+15	0.1057	0.31	Q V				
7+20	0.1079	0.32	Q V				
7+25	0.1102	0.33	Q V				
7+30	0.1125	0.34	Q V				
7+35	0.1150	0.35	Q V				
7+40	0.1175	0.36	Q V				
7+45	0.1200	0.37	Q V				
7+50	0.1227	0.38	Q V				
7+55	0.1254	0.40	Q V				
8+ 0	0.1281	0.40	Q V				
8+ 5	0.1311	0.43	Q V				
8+10	0.1342	0.45	Q V				
8+15	0.1374	0.46	Q V				
8+20	0.1405	0.46	Q V				
8+25	0.1437	0.46	Q V				
8+30	0.1469	0.46	Q V				
8+35	0.1501	0.48	Q V				
8+40	0.1535	0.49	Q V				
8+45	0.1569	0.49	Q V				
8+50	0.1603	0.51	Q V				
8+55	0.1639	0.52	Q V				

9+ 0	0.1675	0.52	Q	V		
9+ 5	0.1713	0.55	Q	V		
9+10	0.1753	0.58	Q	V		
9+15	0.1793	0.58	Q	V		
9+20	0.1834	0.60	Q	V		
9+25	0.1876	0.61	Q	V		
9+30	0.1918	0.61	Q	V		
9+35	0.1961	0.63	Q	V		
9+40	0.2005	0.64	Q	V		
9+45	0.2050	0.64	Q	V		
9+50	0.2095	0.66	Q	V		
9+55	0.2141	0.67	Q	V		
10+ 0	0.2188	0.67	Q	V		
10+ 5	0.2226	0.56	Q	V		
10+10	0.2259	0.48	Q	V		
10+15	0.2291	0.46	Q	V		
10+20	0.2323	0.46	Q	V		
10+25	0.2354	0.46	Q	V		
10+30	0.2386	0.46	Q	V		
10+35	0.2423	0.54	Q	V		
10+40	0.2464	0.60	Q	V		
10+45	0.2506	0.61	Q	V		
10+50	0.2549	0.61	Q	V		
10+55	0.2591	0.61	Q	V		
11+ 0	0.2633	0.61	Q	V		
11+ 5	0.2674	0.60	Q	V		
11+10	0.2714	0.58	Q	V		
11+15	0.2754	0.58	Q	V		
11+20	0.2794	0.58	Q	V		
11+25	0.2834	0.58	Q	V		
11+30	0.2875	0.58	Q	V		
11+35	0.2912	0.55	Q	V		
11+40	0.2949	0.53	Q	V		
11+45	0.2985	0.52	Q	V		
11+50	0.3021	0.54	Q	V		
11+55	0.3059	0.55	Q	V		
12+ 0	0.3097	0.55	Q	V		
12+ 5	0.3143	0.66	Q	V		
12+10	0.3194	0.75	Q	V		
12+15	0.3247	0.76	Q	V		
12+20	0.3301	0.78	Q	V		
12+25	0.3355	0.79	Q	V		
12+30	0.3410	0.80	Q	V		
12+35	0.3467	0.83	Q	V		
12+40	0.3526	0.85	Q	V		
12+45	0.3585	0.86	Q	V		
12+50	0.3645	0.87	Q	V		
12+55	0.3706	0.89	Q	V		
13+ 0	0.3767	0.89	Q	V		
13+ 5	0.3834	0.97	Q	V		
13+10	0.3905	1.03	Q	V		
13+15	0.3976	1.04	Q	V		
13+20	0.4048	1.04	Q	V		
13+25	0.4120	1.04	Q	V		
13+30	0.4191	1.04	Q	V		
13+35	0.4251	0.87	Q	V		
13+40	0.4301	0.73	Q	V		
13+45	0.4350	0.71	Q	V		
13+50	0.4399	0.70	Q	V		
13+55	0.4447	0.70	Q	V		
14+ 0	0.4496	0.70	Q	V		
14+ 5	0.4549	0.77	Q	V		
14+10	0.4605	0.82	Q	V		
14+15	0.4662	0.82	Q	V		
14+20	0.4717	0.81	Q	V		
14+25	0.4772	0.80	Q	V		
14+30	0.4827	0.80	Q	V		
14+35	0.4882	0.80	Q	V		
14+40	0.4937	0.80	Q	V		
14+45	0.4992	0.80	Q	V		
14+50	0.5046	0.78	Q	V		
14+55	0.5098	0.77	Q	V		
15+ 0	0.5151	0.77	Q	V		
15+ 5	0.5203	0.75	Q	V		
15+10	0.5254	0.74	Q	V		
15+15	0.5304	0.74	Q	V		
15+20	0.5354	0.72	Q	V		
15+25	0.5402	0.71	Q	V		
15+30	0.5451	0.70	Q	V		
15+35	0.5495	0.64	Q	V		
15+40	0.5536	0.59	Q	V		
15+45	0.5576	0.58	Q	V		
15+50	0.5616	0.58	Q	V		
15+55	0.5656	0.58	Q	V		
16+ 0	0.5696	0.58	Q	V		
16+ 5	0.5720	0.34	Q	V		

16+10	0.5731	0.16	Q				V
16+15	0.5740	0.13	Q				V
16+20	0.5748	0.12	Q				V
16+25	0.5757	0.12	Q				V
16+30	0.5765	0.12	Q				V
16+35	0.5772	0.11	Q				V
16+40	0.5779	0.09	Q				V
16+45	0.5785	0.09	Q				V
16+50	0.5792	0.09	Q				V
16+55	0.5798	0.09	Q				V
17+ 0	0.5804	0.09	Q				V
17+ 5	0.5813	0.12	Q				V
17+10	0.5823	0.15	Q				V
17+15	0.5834	0.15	Q				V
17+20	0.5844	0.15	Q				V
17+25	0.5855	0.15	Q				V
17+30	0.5865	0.15	Q				V
17+35	0.5876	0.15	Q				V
17+40	0.5886	0.15	Q				V
17+45	0.5897	0.15	Q				V
17+50	0.5906	0.14	Q				V
17+55	0.5915	0.13	Q				V
18+ 0	0.5923	0.12	Q				V
18+ 5	0.5932	0.12	Q				V
18+10	0.5940	0.12	Q				V
18+15	0.5949	0.12	Q				V
18+20	0.5957	0.12	Q				V
18+25	0.5965	0.12	Q				V
18+30	0.5974	0.12	Q				V
18+35	0.5981	0.11	Q				V
18+40	0.5988	0.09	Q				V
18+45	0.5994	0.09	Q				V
18+50	0.5999	0.08	Q				V
18+55	0.6004	0.06	Q				V
19+ 0	0.6008	0.06	Q				V
19+ 5	0.6013	0.08	Q				V
19+10	0.6019	0.09	Q				V
19+15	0.6026	0.09	Q				V
19+20	0.6033	0.11	Q				V
19+25	0.6041	0.12	Q				V
19+30	0.6050	0.12	Q				V
19+35	0.6057	0.11	Q				V
19+40	0.6064	0.09	Q				V
19+45	0.6070	0.09	Q				V
19+50	0.6075	0.08	Q				V
19+55	0.6080	0.06	Q				V
20+ 0	0.6084	0.06	Q				V
20+ 5	0.6089	0.08	Q				V
20+10	0.6095	0.09	Q				V
20+15	0.6102	0.09	Q				V
20+20	0.6108	0.09	Q				V
20+25	0.6114	0.09	Q				V
20+30	0.6121	0.09	Q				V
20+35	0.6127	0.09	Q				V
20+40	0.6133	0.09	Q				V
20+45	0.6140	0.09	Q				V
20+50	0.6145	0.08	Q				V
20+55	0.6149	0.06	Q				V
21+ 0	0.6153	0.06	Q				V
21+ 5	0.6159	0.08	Q				V
21+10	0.6165	0.09	Q				V
21+15	0.6171	0.09	Q				V
21+20	0.6176	0.08	Q				V
21+25	0.6181	0.06	Q				V
21+30	0.6185	0.06	Q				V
21+35	0.6190	0.08	Q				V
21+40	0.6197	0.09	Q				V
21+45	0.6203	0.09	Q				V
21+50	0.6208	0.08	Q				V
21+55	0.6213	0.06	Q				V
22+ 0	0.6217	0.06	Q				V
22+ 5	0.6222	0.08	Q				V
22+10	0.6228	0.09	Q				V
22+15	0.6235	0.09	Q				V
22+20	0.6240	0.08	Q				V
22+25	0.6244	0.06	Q				V
22+30	0.6248	0.06	Q				V
22+35	0.6253	0.06	Q				V
22+40	0.6257	0.06	Q				V
22+45	0.6261	0.06	Q				V
22+50	0.6265	0.06	Q				V
22+55	0.6269	0.06	Q				V
23+ 0	0.6274	0.06	Q				V
23+ 5	0.6278	0.06	Q				V
23+10	0.6282	0.06	Q				V
23+15	0.6286	0.06	Q				V

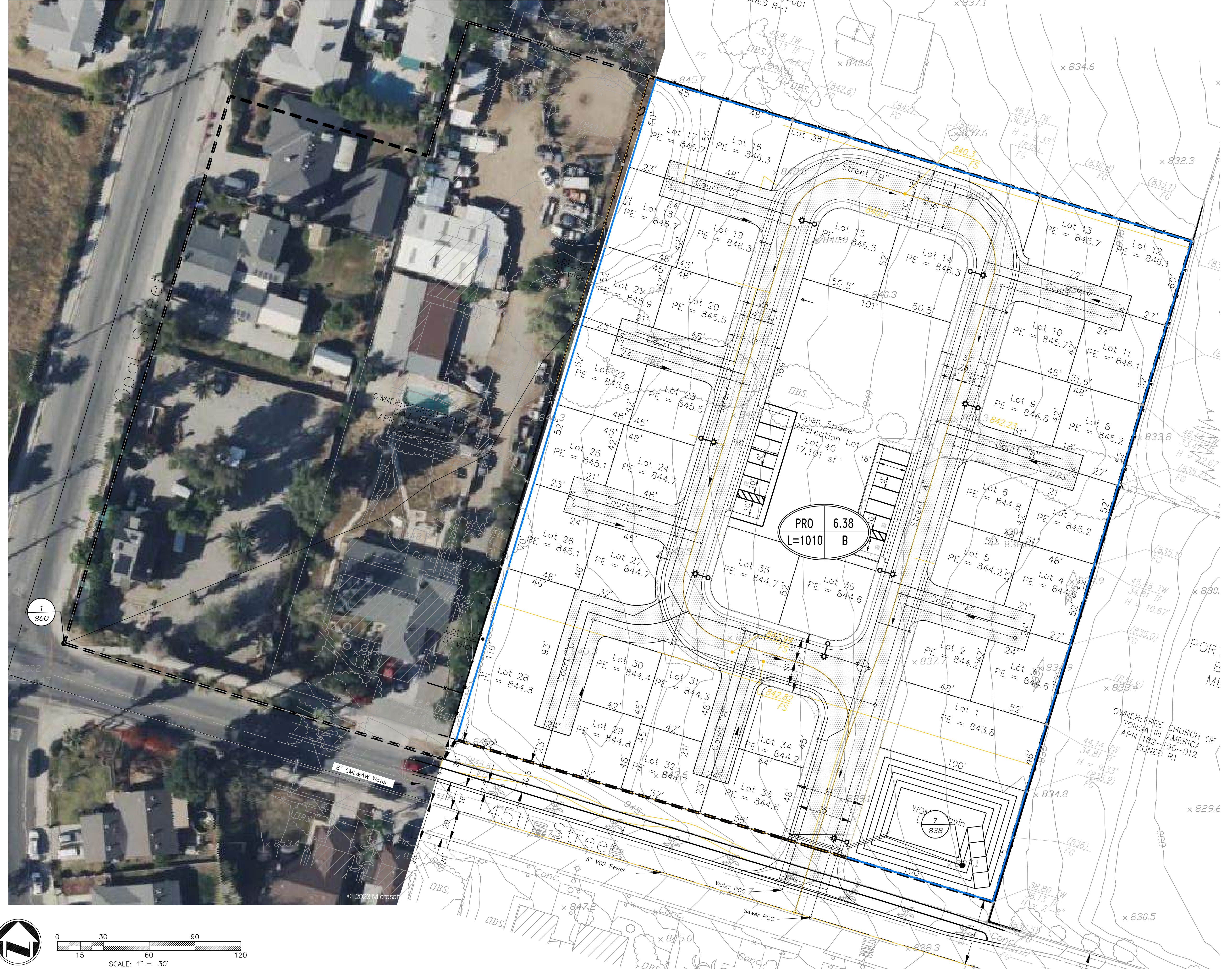


23+20	0.6291	0.06	Q				V
23+25	0.6295	0.06	Q				V
23+30	0.6299	0.06	Q				V
23+35	0.6303	0.06	Q				V
23+40	0.6307	0.06	Q				V
23+45	0.6312	0.06	Q				V
23+50	0.6316	0.06	Q				V
23+55	0.6320	0.06	Q				V
24+ 0	0.6324	0.06	Q				V
24+ 5	0.6326	0.03	Q				V
24+10	0.6327	0.01	Q				V
24+15	0.6327	0.00	Q				V

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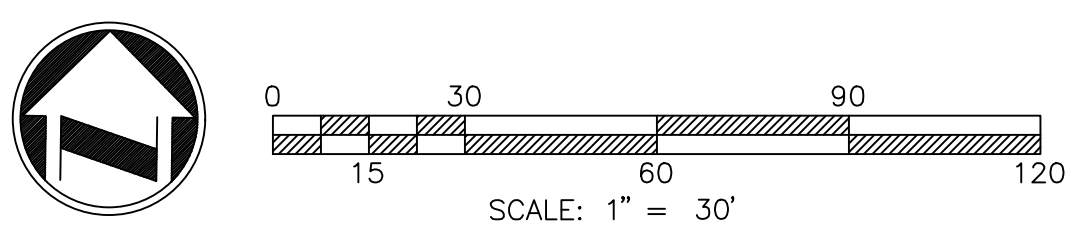
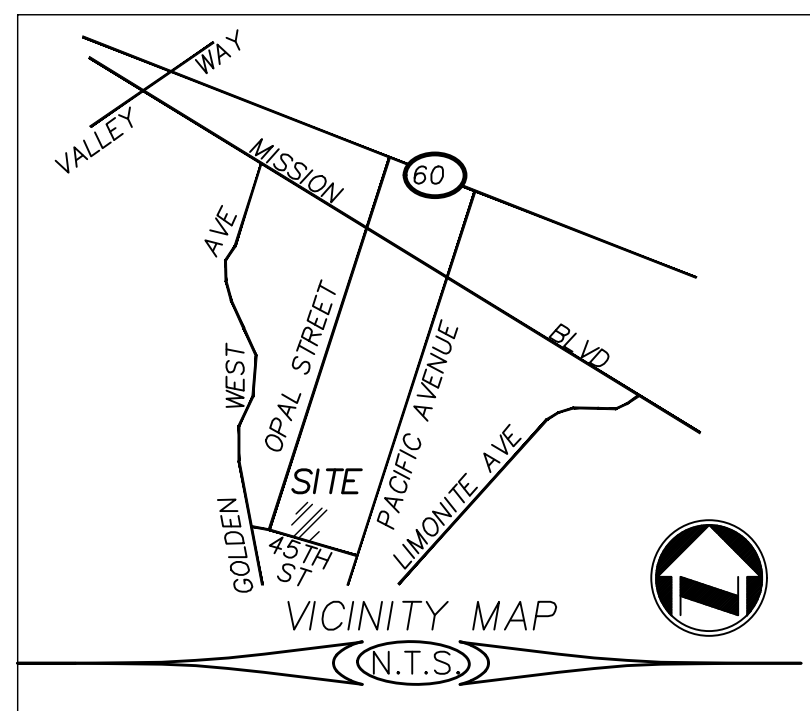
# POST-DEVELOPMENT HYDROLOGY MAP

TRACT 37857



### LEGEND

- |        |       |
|--------|-------|
| AREA   | ACRES |
| LENGTH | SOIL  |
- |        |     |
|--------|-----|
| Q10=   | cfs |
| Q100=  | cfs |
| TC=    | min |
| ACRES= |     |
- |      |  |
|------|--|
| NODE |  |
| ELEV |  |
- |     |                        |
|-----|------------------------|
| --- | DRAINAGE AREA BOUNDARY |
| --- | FLOW PATH              |



Existing		Proposed		Routing		
cfs	volume	cfs	volume	cfs	volume	depth
0.425	0.2207	1.041	0.6327	0.395	0.345	5.82

# Basin Size and Flow Calculations

## BIORETENTION BASIN

Basin Elevation	BASIN PARAMETERS					OUTLET								
	Depth	Area S.F.	Volume C.F.	Volume AC-FT	Effective Volume AC-FT	Q <sub>1</sub> Orifice Plate (cfs)	Q <sub>2</sub> Orifice Plate (cfs)	Q <sub>3</sub> Orifice Plate (cfs)	Q <sub>4</sub> Orifice Plate (cfs)	Q <sub>5</sub> Orifice Plate (cfs)	Q <sub>6</sub> Orifice Plate (cfs)	Q <sub>7</sub> Orifice Plate (cfs)	Q Weir 1 (cfs)	Q Total (cfs)
835.00	0.00	692.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
836.00	1.00	692.00	692.00	0.016	0.016	0.000	0.046	0.000	0.000	0.000	0.000	0.000	0.000	0.046
837.00	2.00	692.00	1,384.00	0.032	0.032	0.000	0.069	0.000	0.000	0.000	0.000	0.000	0.000	0.069
838.00	3.00	1,731.00	3,634.50	0.083	0.083	0.000	0.086	0.000	0.000	0.000	0.000	0.000	0.000	0.086
839.00	4.00	2,574.00	6,532.00	0.150	0.150	0.000	0.100	0.128	0.000	0.000	0.000	0.000	0.000	0.227
840.00	5.00	3,546.00	10,595.00	0.243	0.243	0.000	0.112	0.221	0.000	0.000	0.000	0.000	0.000	0.333
841.00	6.00	4,645.00	16,011.00	0.368	0.368	0.000	0.123	0.285	0.000	0.000	0.000	0.000	0.000	0.409
842.00	7.00	5,872.00	22,974.00	0.527	0.527	0.000	0.133	0.338	0.000	0.000	0.000	0.000	53.280	53.751

### SUPPORTING DESIGN PARAMETERS

Orifice Coefficient	0.66	Dia of Orifice	0.00	1.33	2.50	0.00	0.00	0.00	0.00
Gravimetric Constant	32.2 ft/s <sup>2</sup>	Eff Dia of Orifice	0.0000	0.1108	0.2083	0.0000	0.0000	0.0000	0.0000
Number of Rows	1	Area of Orifice	0.0000	0.0096	0.0341	0.0000	0.0000	0.0000	0.0000
Minimum Orifice Plate Height		Number of Orifices	1	1	1	1	1	1	1
Minimum Orifice Plate Width		Elev	0	835.2	838.5	0	0	0	0

Weir	Sharp Crest Weir Coefficient	3.33
	Length of Weir	16.00
	Elev. at Crest of Weir	841

### Bio-Retention Basin

#### Orifice Equation

$$Q = Cd(1/4\pi D^2)\sqrt{2gh}$$

#### Weir Equation

$$(Q/(Weir\ Length * Weir\ Coefficient))^{2/3}$$

Q100 Elevation Weir Calc	
Inlet Weir Calc 4' X 4'	
Crest Wier Elev.	841.00
Q100	14.23 cfs
Weir Length	16
Weir Coeff.	3.33
H Weir	0.41473
<b>Q100 Elevation</b>	<b>841.41</b>

Q100 Elevation Weir Calc	
Emergency Spillway	
Crest Wier Elev.	841.45
Q100	14.23 cfs
Weir Length	30
Weir Coeff.	3.33
H Weir	0.27275
<b>Q100 Elevation</b>	<b>841.72</b>

-----  
 Program License Serial Number 5006  
 -----

\*\*\*\*\* HYDROGRAPH INFORMATION \*\*\*\*\*  
 From study/file name: PRO2242.rte  
 \*\*\*\*\*HYDROGRAPH DATA\*\*\*\*\*  
 Number of intervals = 291  
 Time interval = 5.0 (Min.)  
 Maximum/Peak flow rate = 1.041 (CFS)  
 Total volume = 0.633 (Ac.Ft)  
 Status of hydrographs being held in storage  
 Stream 1 Stream 2 Stream 3 Stream 4 Stream 5  
 Peak (CFS) 0.000 0.000 0.000 0.000 0.000  
 Vol (Ac.Ft) 0.000 0.000 0.000 0.000 0.000  
 \*\*\*\*\*  
 ++++++  
 Process from Point/Station 1.000 to Point/Station 2.000  
 \*\*\* RETARDING BASIN ROUTING \*\*\*

-----  
 User entry of depth-outflow-storage data  
 -----

Total number of inflow hydrograph intervals = 291  
 Hydrograph time unit = 5.000 (Min.)  
 Initial depth in storage basin = 0.00(Ft.)  
 -----

Initial basin depth = 0.00 (Ft.)  
 Initial basin storage = 0.00 (Ac.Ft)  
 Initial basin outflow = 0.00 (CFS)  
 -----

Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-0*dt/2) (Ac.Ft)	(S+0*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
1.000	0.016	0.046	0.016	0.016
2.000	0.032	0.069	0.032	0.032
3.000	0.083	0.086	0.083	0.083
4.000	0.150	0.227	0.149	0.151
5.000	0.243	0.333	0.242	0.244
6.000	0.368	0.409	0.367	0.369
7.000	0.527	53.751	0.342	0.712

-----  
 Hydrograph Detention Basin Routing  
 -----

Graph values: 'I'= unit inflow; 'O'=outflow at time shown  
 -----

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	0.3	0.52	0.78	1.04	Depth (Ft.)
0.083	0.03	0.00	0.000	O				0.01
0.167	0.06	0.00	0.000	OI				0.03
0.250	0.06	0.00	0.001	OI				0.05
0.333	0.08	0.00	0.001	O I				0.08
0.417	0.09	0.01	0.002	O I				0.11
0.500	0.09	0.01	0.002	O I				0.15
0.583	0.09	0.01	0.003	O I				0.18
0.667	0.09	0.01	0.004	O I				0.22
0.750	0.09	0.01	0.004	O I				0.25
0.833	0.11	0.01	0.005	O I				0.29
0.917	0.12	0.02	0.005	O I				0.34
1.000	0.12	0.02	0.006	O I				0.38
1.083	0.11	0.02	0.007	O I				0.42
1.167	0.09	0.02	0.007	O I				0.46
1.250	0.09	0.02	0.008	O I				0.49
1.333	0.09	0.02	0.008	O I				0.52
1.417	0.09	0.03	0.009	O I				0.55
1.500	0.09	0.03	0.009	O I				0.57
1.583	0.09	0.03	0.010	O I				0.60
1.667	0.09	0.03	0.010	O I				0.63
1.750	0.09	0.03	0.010	O I				0.66
1.833	0.11	0.03	0.011	O I				0.69
1.917	0.12	0.03	0.012	O I				0.72
2.000	0.12	0.03	0.012	O I				0.76
2.083	0.12	0.04	0.013	O I				0.80
2.167	0.12	0.04	0.013	O I				0.83
2.250	0.12	0.04	0.014	O I				0.87
2.333	0.12	0.04	0.014	O I				0.90
2.417	0.12	0.04	0.015	O I				0.94
2.500	0.12	0.04	0.016	O I				0.97
2.583	0.14	0.05	0.016	O I				1.01
2.667	0.15	0.05	0.017	O I				1.05
2.750	0.15	0.05	0.018	O I				1.10

2.833	0.15	0.05	0.018	O	I					1.14
2.917	0.15	0.05	0.019	O	I					1.18
3.000	0.15	0.05	0.020	O	I					1.23
3.083	0.15	0.05	0.020	O	I					1.27
3.167	0.15	0.05	0.021	O	I					1.32
3.250	0.15	0.05	0.022	O	I					1.36
3.333	0.15	0.06	0.022	O	I					1.40
3.417	0.15	0.06	0.023	O	I					1.44
3.500	0.15	0.06	0.024	O	I					1.48
3.583	0.15	0.06	0.024	O	I					1.52
3.667	0.15	0.06	0.025	O	I					1.57
3.750	0.15	0.06	0.026	O	I					1.61
3.833	0.17	0.06	0.026	O	I					1.65
3.917	0.18	0.06	0.027	O	I					1.70
4.000	0.18	0.06	0.028	O	I					1.75
4.083	0.18	0.06	0.029	O	I					1.80
4.167	0.18	0.07	0.030	O	I					1.85
4.250	0.18	0.07	0.030	O	I					1.90
4.333	0.20	0.07	0.031	O	I					1.96
4.417	0.21	0.07	0.032	O	I					2.00
4.500	0.21	0.07	0.033	O	I					2.02
4.583	0.21	0.07	0.034	O	I					2.04
4.667	0.21	0.07	0.035	O	I					2.06
4.750	0.21	0.07	0.036	O	I					2.08
4.833	0.23	0.07	0.037	O	I					2.10
4.917	0.24	0.07	0.038	O	I					2.13
5.000	0.24	0.07	0.040	O	I					2.15
5.083	0.21	0.07	0.041	O	I					2.17
5.167	0.19	0.07	0.042	O	I					2.19
5.250	0.18	0.07	0.042	O	I					2.20
5.333	0.20	0.07	0.043	O	I					2.22
5.417	0.21	0.07	0.044	O	I					2.24
5.500	0.21	0.07	0.045	O	I					2.26
5.583	0.23	0.07	0.046	O	I					2.28
5.667	0.24	0.07	0.047	O	I					2.30
5.750	0.24	0.07	0.048	O	I					2.32
5.833	0.24	0.07	0.050	O	I					2.34
5.917	0.24	0.08	0.051	O	I					2.37
6.000	0.24	0.08	0.052	O	I					2.39
6.083	0.26	0.08	0.053	O	I					2.41
6.167	0.27	0.08	0.054	O	I					2.44
6.250	0.28	0.08	0.056	O	I					2.47
6.333	0.28	0.08	0.057	O	I					2.49
6.417	0.28	0.08	0.058	O	I					2.52
6.500	0.28	0.08	0.060	O	I					2.55
6.583	0.29	0.08	0.061	O	I					2.57
6.667	0.30	0.08	0.063	O	I					2.60
6.750	0.31	0.08	0.064	O	I					2.63
6.833	0.31	0.08	0.066	O	I					2.66
6.917	0.31	0.08	0.067	O	I					2.69
7.000	0.31	0.08	0.069	O	I					2.73
7.083	0.31	0.08	0.071	O	I					2.76
7.167	0.31	0.08	0.072	O	I					2.79
7.250	0.31	0.08	0.074	O	I					2.82
7.333	0.32	0.08	0.075	O	I					2.85
7.417	0.33	0.08	0.077	O	I					2.88
7.500	0.34	0.08	0.079	O	I					2.91
7.583	0.35	0.09	0.080	O	I					2.95
7.667	0.36	0.09	0.082	O	I					2.99
7.750	0.37	0.09	0.084	O	I					3.02
7.833	0.38	0.09	0.086	O	I					3.05
7.917	0.40	0.10	0.088	O	I					3.08
8.000	0.40	0.10	0.090	O	I					3.11
8.083	0.43	0.11	0.092	O	I					3.14
8.167	0.45	0.11	0.095	O	I					3.17
8.250	0.46	0.12	0.097	O	I					3.21
8.333	0.46	0.12	0.099	O	I					3.24
8.417	0.46	0.13	0.102	O	I					3.28
8.500	0.46	0.13	0.104	O	I					3.31
8.583	0.48	0.14	0.106	O	I					3.35
8.667	0.49	0.14	0.109	O	I					3.38
8.750	0.49	0.15	0.111	O	I					3.42
8.833	0.51	0.15	0.113	O	I					3.45
8.917	0.52	0.16	0.116	O	I					3.49
9.000	0.52	0.16	0.118	O	I					3.53
9.083	0.55	0.17	0.121	O	I					3.57
9.167	0.58	0.17	0.124	O	I					3.61
9.250	0.58	0.18	0.126	O	I					3.65
9.333	0.60	0.18	0.129	O	I					3.69
9.417	0.61	0.19	0.132	O	I					3.73
9.500	0.61	0.20	0.135	O	I					3.78
9.583	0.63	0.20	0.138	O	I					3.82
9.667	0.64	0.21	0.141	O	I					3.86
9.750	0.64	0.21	0.144	O	I					3.91
9.833	0.66	0.22	0.147	O	I					3.95
9.917	0.67	0.23	0.150	O	I					4.00

10.000	0.67	0.23	0.153	O			I			4.03
10.083	0.56	0.23	0.156	O			I			4.06
10.167	0.48	0.24	0.158	O		I				4.08
10.250	0.46	0.24	0.159	O		I				4.10
10.333	0.46	0.24	0.161	O		I				4.12
10.417	0.46	0.24	0.162	O		I				4.13
10.500	0.46	0.24	0.164	O		I				4.15
10.583	0.54	0.24	0.166	O		I				4.17
10.667	0.60	0.25	0.168	O			I			4.19
10.750	0.61	0.25	0.170	O			I			4.22
10.833	0.61	0.25	0.173	O			I			4.24
10.917	0.61	0.26	0.175	O			I			4.27
11.000	0.61	0.26	0.178	O			I			4.30
11.083	0.60	0.26	0.180	O			I			4.32
11.167	0.58	0.26	0.182	O			I			4.35
11.250	0.58	0.27	0.184	O			I			4.37
11.333	0.58	0.27	0.187	O			I			4.39
11.417	0.58	0.27	0.189	O			I			4.42
11.500	0.58	0.27	0.191	O			I			4.44
11.583	0.55	0.28	0.193	O		I				4.46
11.667	0.53	0.28	0.195	O		I				4.48
11.750	0.52	0.28	0.196	O		I				4.50
11.833	0.54	0.28	0.198	O		I				4.52
11.917	0.55	0.28	0.200	O		I				4.54
12.000	0.55	0.29	0.202	O		I				4.56
12.083	0.66	0.29	0.204	O			I			4.58
12.167	0.75	0.29	0.207	O			I			4.61
12.250	0.76	0.30	0.210	O			I			4.64
12.333	0.78	0.30	0.213	O			I			4.68
12.417	0.79	0.30	0.217	O			I			4.72
12.500	0.80	0.31	0.220	O			I			4.75
12.583	0.83	0.31	0.223	O			I			4.79
12.667	0.85	0.31	0.227	O			I			4.83
12.750	0.86	0.32	0.231	O			I			4.87
12.833	0.87	0.32	0.234	O			I			4.91
12.917	0.89	0.33	0.238	O			I			4.95
13.000	0.89	0.33	0.242	O			I			4.99
13.083	0.97	0.33	0.246	O				I		5.03
13.167	1.03	0.34	0.251	O				I		5.06
13.250	1.04	0.34	0.256	O				I		5.10
13.333	1.04	0.34	0.260	O				I		5.14
13.417	1.04	0.35	0.265	O				I		5.18
13.500	1.04	0.35	0.270	O				I		5.22
13.583	0.87	0.35	0.274	O				I		5.25
13.667	0.73	0.35	0.277	O				I		5.27
13.750	0.71	0.36	0.280	O				I		5.29
13.833	0.70	0.36	0.282	O			I			5.31
13.917	0.70	0.36	0.284	O			I			5.33
14.000	0.70	0.36	0.287	O			I			5.35
14.083	0.77	0.36	0.289	O			I			5.37
14.167	0.82	0.36	0.292	O				I		5.40
14.250	0.82	0.36	0.296	O				I		5.42
14.333	0.81	0.37	0.299	O				I		5.45
14.417	0.80	0.37	0.302	O				I		5.47
14.500	0.80	0.37	0.305	O				I		5.49
14.583	0.80	0.37	0.308	O				I		5.52
14.667	0.80	0.37	0.310	O				I		5.54
14.750	0.80	0.38	0.313	O				I		5.56
14.833	0.78	0.38	0.316	O				I		5.59
14.917	0.77	0.38	0.319	O				I		5.61
15.000	0.77	0.38	0.322	O				I		5.63
15.083	0.75	0.38	0.324	O				I		5.65
15.167	0.74	0.38	0.327	O				I		5.67
15.250	0.74	0.39	0.329	O				I		5.69
15.333	0.72	0.39	0.331	O				I		5.71
15.417	0.71	0.39	0.334	O				I		5.73
15.500	0.70	0.39	0.336	O				I		5.74
15.583	0.64	0.39	0.338	O				I		5.76
15.667	0.59	0.39	0.339	O			I			5.77
15.750	0.58	0.39	0.341	O			I			5.78
15.833	0.58	0.39	0.342	O			I			5.79
15.917	0.58	0.39	0.343	O			I			5.80
16.000	0.58	0.39	0.345	O			I			5.81
16.083	0.34	0.40	0.345	O		I				5.82
16.167	0.16	0.39	0.344	I						5.81
16.250	0.13	0.39	0.342	I						5.79
16.333	0.12	0.39	0.341	I						5.78
16.417	0.12	0.39	0.339	I						5.77
16.500	0.12	0.39	0.337	I						5.75
16.583	0.11	0.39	0.335	I						5.74
16.667	0.09	0.39	0.333	I						5.72
16.750	0.09	0.39	0.331	I						5.70
16.833	0.09	0.39	0.329	I						5.69
16.917	0.09	0.38	0.327	I						5.67
17.000	0.09	0.38	0.325	I						5.65
17.083	0.12	0.38	0.323	I						5.64

17.167	0.15	0.38	0.321	I	0	5.63
17.250	0.15	0.38	0.320	I	0	5.61
17.333	0.15	0.38	0.318	I	0	5.60
17.417	0.15	0.38	0.317	I	0	5.59
17.500	0.15	0.38	0.315	I	0	5.58
17.583	0.15	0.38	0.314	I	0	5.56
17.667	0.15	0.37	0.312	I	0	5.55
17.750	0.15	0.37	0.310	I	0	5.54
17.833	0.14	0.37	0.309	I	0	5.53
17.917	0.13	0.37	0.307	I	0	5.51
18.000	0.12	0.37	0.306	I	0	5.50
18.083	0.12	0.37	0.304	I	0	5.49
18.167	0.12	0.37	0.302	I	0	5.47
18.250	0.12	0.37	0.300	I	0	5.46
18.333	0.12	0.37	0.299	I	0	5.45
18.417	0.12	0.37	0.297	I	0	5.43
18.500	0.12	0.36	0.295	I	0	5.42
18.583	0.11	0.36	0.294	I	0	5.41
18.667	0.09	0.36	0.292	I	0	5.39
18.750	0.09	0.36	0.290	I	0	5.38
18.833	0.08	0.36	0.288	I	0	5.36
18.917	0.06	0.36	0.286	I	0	5.34
19.000	0.06	0.36	0.284	I	0	5.33
19.083	0.08	0.36	0.282	I	0	5.31
19.167	0.09	0.36	0.280	I	0	5.30
19.250	0.09	0.35	0.278	I	0	5.28
19.333	0.11	0.35	0.277	I	0	5.27
19.417	0.12	0.35	0.275	I	0	5.26
19.500	0.12	0.35	0.273	I	0	5.24
19.583	0.11	0.35	0.272	I	0	5.23
19.667	0.09	0.35	0.270	I	0	5.22
19.750	0.09	0.35	0.268	I	0	5.20
19.833	0.08	0.35	0.266	I	0	5.19
19.917	0.06	0.35	0.265	I	0	5.17
20.000	0.06	0.34	0.263	I	0	5.16
20.083	0.08	0.34	0.261	I	0	5.14
20.167	0.09	0.34	0.259	I	0	5.13
20.250	0.09	0.34	0.257	I	0	5.11
20.333	0.09	0.34	0.255	I	0	5.10
20.417	0.09	0.34	0.254	I	0	5.09
20.500	0.09	0.34	0.252	I	0	5.07
20.583	0.09	0.34	0.250	I	0	5.06
20.667	0.09	0.34	0.249	I	0	5.05
20.750	0.09	0.34	0.247	I	0	5.03
20.833	0.08	0.33	0.245	I	0	5.02
20.917	0.06	0.33	0.243	I	0	5.00
21.000	0.06	0.33	0.242	I	0	4.98
21.083	0.08	0.33	0.240	I	0	4.97
21.167	0.09	0.33	0.238	I	0	4.95
21.250	0.09	0.33	0.236	I	0	4.93
21.333	0.08	0.32	0.235	I	0	4.91
21.417	0.06	0.32	0.233	I	0	4.89
21.500	0.06	0.32	0.231	I	0	4.87
21.583	0.08	0.32	0.230	I	0	4.86
21.667	0.09	0.32	0.228	I	0	4.84
21.750	0.09	0.31	0.226	I	0	4.82
21.833	0.08	0.31	0.225	I	0	4.80
21.917	0.06	0.31	0.223	I	0	4.79
22.000	0.06	0.31	0.221	I	0	4.77
22.083	0.08	0.31	0.220	I	0	4.75
22.167	0.09	0.30	0.218	I	0	4.73
22.250	0.09	0.30	0.217	I	0	4.72
22.333	0.08	0.30	0.215	I	0	4.70
22.417	0.06	0.30	0.214	I	0	4.69
22.500	0.06	0.30	0.212	I	0	4.67
22.583	0.06	0.30	0.210	I	0	4.65
22.667	0.06	0.29	0.209	I	0	4.63
22.750	0.06	0.29	0.207	I	0	4.62
22.833	0.06	0.29	0.206	I	0	4.60
22.917	0.06	0.29	0.204	I	0	4.58
23.000	0.06	0.29	0.203	I	0	4.57
23.083	0.06	0.29	0.201	I	0	4.55
23.167	0.06	0.28	0.199	I	0	4.53
23.250	0.06	0.28	0.198	I	0	4.52
23.333	0.06	0.28	0.196	I	0	4.50
23.417	0.06	0.28	0.195	I	0	4.48
23.500	0.06	0.28	0.193	I	0	4.47
23.583	0.06	0.27	0.192	I	0	4.45
23.667	0.06	0.27	0.191	I	0	4.44
23.750	0.06	0.27	0.189	I	0	4.42
23.833	0.06	0.27	0.188	I	0	4.40
23.917	0.06	0.27	0.186	I	0	4.39
24.000	0.06	0.27	0.185	I	0	4.37
24.083	0.03	0.26	0.183	I	0	4.36
24.167	0.01	0.26	0.182	I	0	4.34
24.250	0.00	0.26	0.180	I	0	4.32



24.333	0.00	0.26	0.178	I	0	4.30
24.417	0.00	0.26	0.176	I	0	4.28
24.500	0.00	0.25	0.174	I	0	4.26
24.583	0.00	0.25	0.173	I	0	4.24
24.667	0.00	0.25	0.171	I	0	4.23
24.750	0.00	0.25	0.169	I	0	4.21
24.833	0.00	0.25	0.168	I	0	4.19
24.917	0.00	0.25	0.166	I	0	4.17
25.000	0.00	0.24	0.164	I	0	4.15
25.083	0.00	0.24	0.162	I	0	4.13
25.167	0.00	0.24	0.161	I	0	4.12
25.250	0.00	0.24	0.159	I	0	4.10
25.333	0.00	0.24	0.158	I	0	4.08
25.417	0.00	0.23	0.156	I	0	4.06
25.500	0.00	0.23	0.154	I	0	4.05
25.583	0.00	0.23	0.153	I	0	4.03
25.667	0.00	0.23	0.151	I	0	4.01
25.750	0.00	0.23	0.150	I	0	3.99
25.833	0.00	0.22	0.148	I	0	3.97
25.917	0.00	0.22	0.147	I	0	3.95
26.000	0.00	0.22	0.145	I	0	3.93
26.083	0.00	0.21	0.144	I	0	3.90
26.167	0.00	0.21	0.142	I	0	3.88
26.250	0.00	0.21	0.141	I	0	3.86
26.333	0.00	0.20	0.139	I	0	3.84
26.417	0.00	0.20	0.138	I	0	3.82
26.500	0.00	0.20	0.136	I	0	3.80
26.583	0.00	0.20	0.135	I	0	3.78
26.667	0.00	0.19	0.134	I	0	3.76
26.750	0.00	0.19	0.132	I	0	3.74
26.833	0.00	0.19	0.131	I	0	3.72
26.917	0.00	0.18	0.130	I	0	3.70
27.000	0.00	0.18	0.129	I	0	3.68
27.083	0.00	0.18	0.127	I	0	3.66
27.167	0.00	0.18	0.126	I	0	3.64
27.250	0.00	0.17	0.125	I	0	3.63
27.333	0.00	0.17	0.124	I	0	3.61
27.417	0.00	0.17	0.123	I	0	3.59
27.500	0.00	0.17	0.121	I	0	3.57
27.583	0.00	0.16	0.120	I	0	3.56
27.667	0.00	0.16	0.119	I	0	3.54
27.750	0.00	0.16	0.118	I	0	3.52
27.833	0.00	0.16	0.117	I	0	3.51
27.917	0.00	0.16	0.116	I	0	3.49
28.000	0.00	0.15	0.115	I	0	3.47
28.083	0.00	0.15	0.114	I	0	3.46
28.167	0.00	0.15	0.113	I	0	3.44
28.250	0.00	0.15	0.112	I	0	3.43
28.333	0.00	0.14	0.111	I	0	3.41
28.417	0.00	0.14	0.110	I	0	3.40
28.500	0.00	0.14	0.109	I	0	3.38
28.583	0.00	0.14	0.108	I	0	3.37
28.667	0.00	0.14	0.107	I	0	3.36
28.750	0.00	0.13	0.106	I	0	3.34
28.833	0.00	0.13	0.105	I	0	3.33
28.917	0.00	0.13	0.104	I	0	3.31
29.000	0.00	0.13	0.103	I	0	3.30
29.083	0.00	0.13	0.102	I	0	3.29
29.167	0.00	0.12	0.101	I	0	3.28
29.250	0.00	0.12	0.101	I	0	3.26
29.333	0.00	0.12	0.100	I	0	3.25
29.417	0.00	0.12	0.099	I	0	3.24
29.500	0.00	0.12	0.098	I	0	3.23
29.583	0.00	0.12	0.097	I	0	3.21
29.667	0.00	0.11	0.097	I	0	3.20
29.750	0.00	0.11	0.096	I	0	3.19
29.833	0.00	0.11	0.095	I	0	3.18
29.917	0.00	0.11	0.094	I	0	3.17
30.000	0.00	0.11	0.093	I	0	3.16
30.083	0.00	0.11	0.093	I	0	3.14
30.167	0.00	0.10	0.092	I	0	3.13
30.250	0.00	0.10	0.091	I	0	3.12
30.333	0.00	0.10	0.091	I	0	3.11
30.417	0.00	0.10	0.090	I	0	3.10
30.500	0.00	0.10	0.089	I	0	3.09

Remaining water in basin = 0.09 (Ac.Ft)  
 \*\*\*\*\*HYDROGRAPH DATA\*\*\*\*\*  
 Number of intervals = 366  
 Time interval = 5.0 (Min.)  
 Maximum/Peak flow rate = 0.395 (CFS)  
 Total volume = 0.544 (Ac.Ft)  
 Status of hydrographs being held in storage  
 Stream 1 Stream 2 Stream 3 Stream 4 Stream 5  
 Peak (CFS) 0.000 0.000 0.000 0.000 0.000  
 Vol (Ac.Ft) 0.000 0.000 0.000 0.000 0.000  
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## Section 3

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### Catch Basin Sizing

# NODE 3

## Worksheet for Curb Inlet On Grade

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Project Description	
Worksheet	NODE 3
Type	Curb Inlet On Grade
Solve For	Efficiency

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Input Data	
Discharge	9.06 cfs
Slope	0.005000 ft/ft
Gutter Width	2.00 ft
Gutter Cross Slope	0.080000 ft/ft
Road Cross Slope	0.020000 ft/ft
Mannings Coefficient	0.013
Curb Opening Length	14.00 ft
Local Depression	8.0 in
Local Depression Width	2.00 ft

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Results	
Efficiency	1.00
Intercepted Flow	9.06 cfs
Bypass Flow	0.00 cfs
Spread	16.77 ft
Depth	0.46 ft
Flow Area	2.9 ft <sup>2</sup>
Gutter Depression	1.4 in
Total Depression	9.4 in
Velocity	3.09 ft/s
Equivalent Cross Slope	0.158436 ft/ft
Length Factor	1.11
Total Interception Length	12.63 ft

# NODE 5

## Worksheet for Curb Inlet On Grade

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Project Description	
Worksheet	NODE 5
Type	Curb Inlet On Grade
Solve For	Efficiency

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Input Data	
Discharge	4.89 cfs
Slope	0.005000 ft/ft
Gutter Width	2.00 ft
Gutter Cross Slope	0.080000 ft/ft
Road Cross Slope	0.020000 ft/ft
Mannings Coefficient	0.013
Curb Opening Length	14.00 ft
Local Depression	8.0 in
Local Depression Width	2.00 ft

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Results	
Efficiency	1.00
Intercepted Flow	4.89 cfs
Bypass Flow	0.00 cfs
Spread	13.01 ft
Depth	0.38 ft
Flow Area	1.8 ft <sup>2</sup>
Gutter Depression	1.4 in
Total Depression	9.4 in
Velocity	2.70 ft/s
Equivalent Cross Slope	0.197514 ft/ft
Length Factor	1.64
Total Interception Length	8.54 ft

## Section 4

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### Riverside County Plates

RUNOFF INDEX NUMBERS OF HYDROLOGIC SOIL-COVER COMPLEXES FOR PERVIOUS AREAS-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group			
		A	B	C	D
<b><u>NATURAL COVERS -</u></b>					
Barren (Rockland, eroded and graded land)		78	86	91	93
Chaparrel, Broadleaf (Manzonita, ceanothus and scrub oak)	Poor	53	70	80	85
	Fair	40	63	75	81
	Good	31	57	71	78
Chaparrel, Narrowleaf (Chamise and redshank)	Poor	71	82	88	91
	Fair	55	72	81	86
Grass, Annual or Perennial	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Meadows or Cienegas (Areas with seasonally high water table, principal vegetation is sod forming grass)	Poor	63	77	85	88
	Fair	51	70	80	84
	Good	30	58	72	78
Open Brush (Soft wood shrubs - buckwheat, sage, etc.)	Poor	62	76	84	88
	Fair	46	66	77	83
	Good	41	63	75	81
Woodland (Coniferous or broadleaf trees predominate. Canopy density is at least 50 percent)	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	28	55	70	77
Woodland, Grass (Coniferous or broadleaf trees with canopy density from 20 to 50 percent)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
<b><u>URBAN COVERS -</u></b>					
Residential or Commercial Landscaping (Lawn, shrubs, etc.)	Good	32	56	69	75
Turf (Irrigated and mowed grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
<b><u>AGRICULTURAL COVERS -</u></b>					
Fallow (Land plowed but not tilled or seeded)		76	85	90	92

**RCFC & WCD**  
HYDROLOGY MANUAL

RUNOFF INDEX NUMBERS  
FOR  
PERVIOUS AREA

ACTUAL IMPERVIOUS COVER

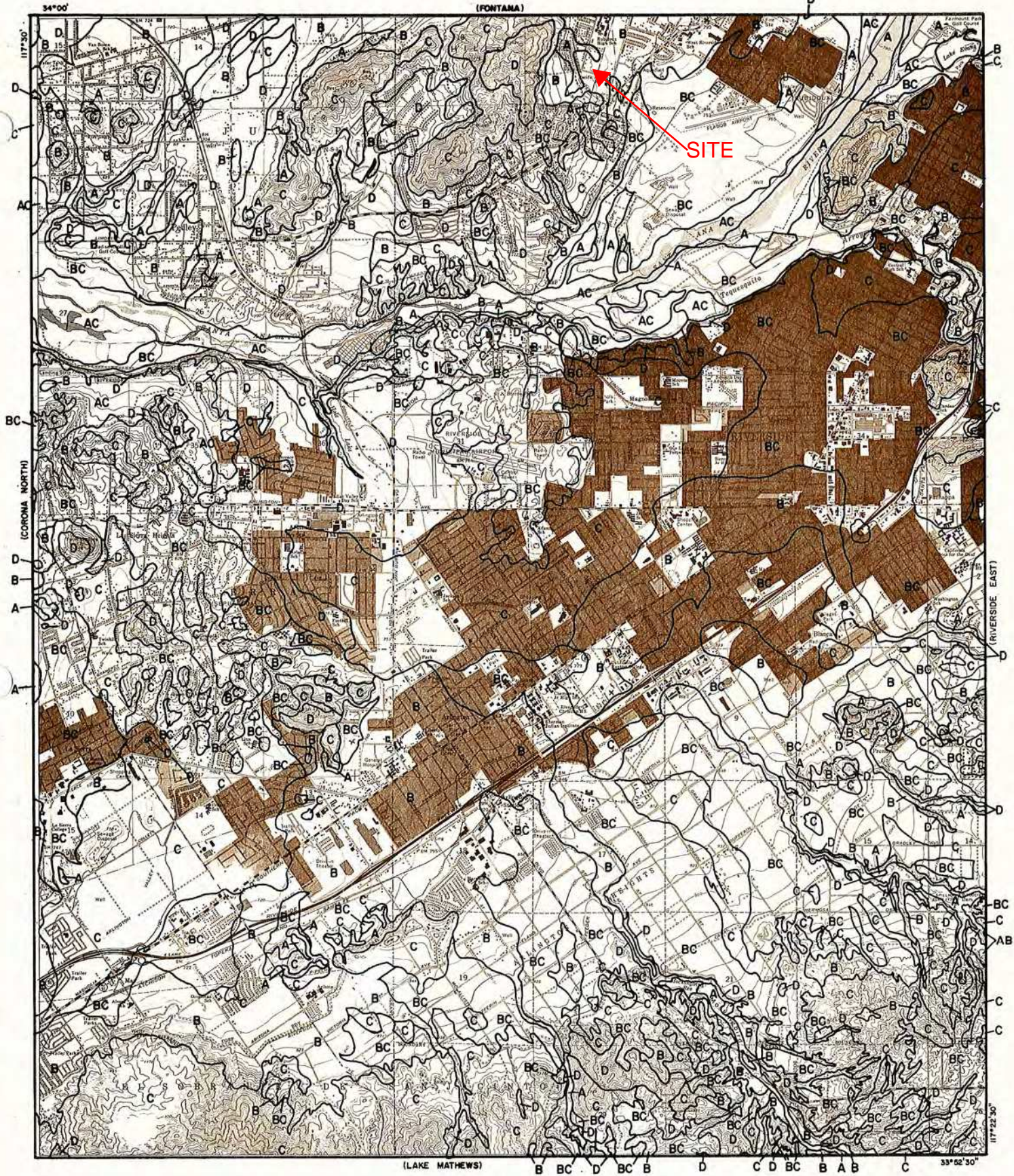
Land Use (1)	Range-Percent	Recommended Value For Average Conditions-Percent (2)
Natural or Agriculture	0 - 10	0
Single Family Residential: (3)		
40,000 S. F. (1 Acre) Lots	10 - 25	20
20,000 S. F. (½ Acre) Lots	30 - 45	40
7,200 - 10,000 S. F. Lots	45 - 55	50
Multiple Family Residential:		
Condominiums	45 - 70	65
Apartments	65 - 90	80
Mobile Home Park	60 - 85	75
Commercial, Downtown Business or Industrial	80 -100	90

Notes:

1. Land use should be based on ultimate development of the watershed. Long range master plans for the County and incorporated cities should be reviewed to insure reasonable land use assumptions.
2. Recommended values are based on average conditions which may not apply to a particular study area. The percentage impervious may vary greatly even on comparable sized lots due to differences in dwelling size, improvements, etc. Landscape practices should also be considered as it is common in some areas to use ornamental gravels underlain by impervious plastic materials in place of lawns and shrubs. A field investigation of a study area should always be made, and a review of aerial photos, where available may assist in estimating the percentage of impervious cover in developed areas.
3. For typical horse ranch subdivisions increase impervious area 5 percent over the values recommended in the table above.

**RCFC & WCD**  
HYDROLOGY MANUAL

IMPERVIOUS COVER  
FOR  
DEVELOPED AREAS



**LEGEND**

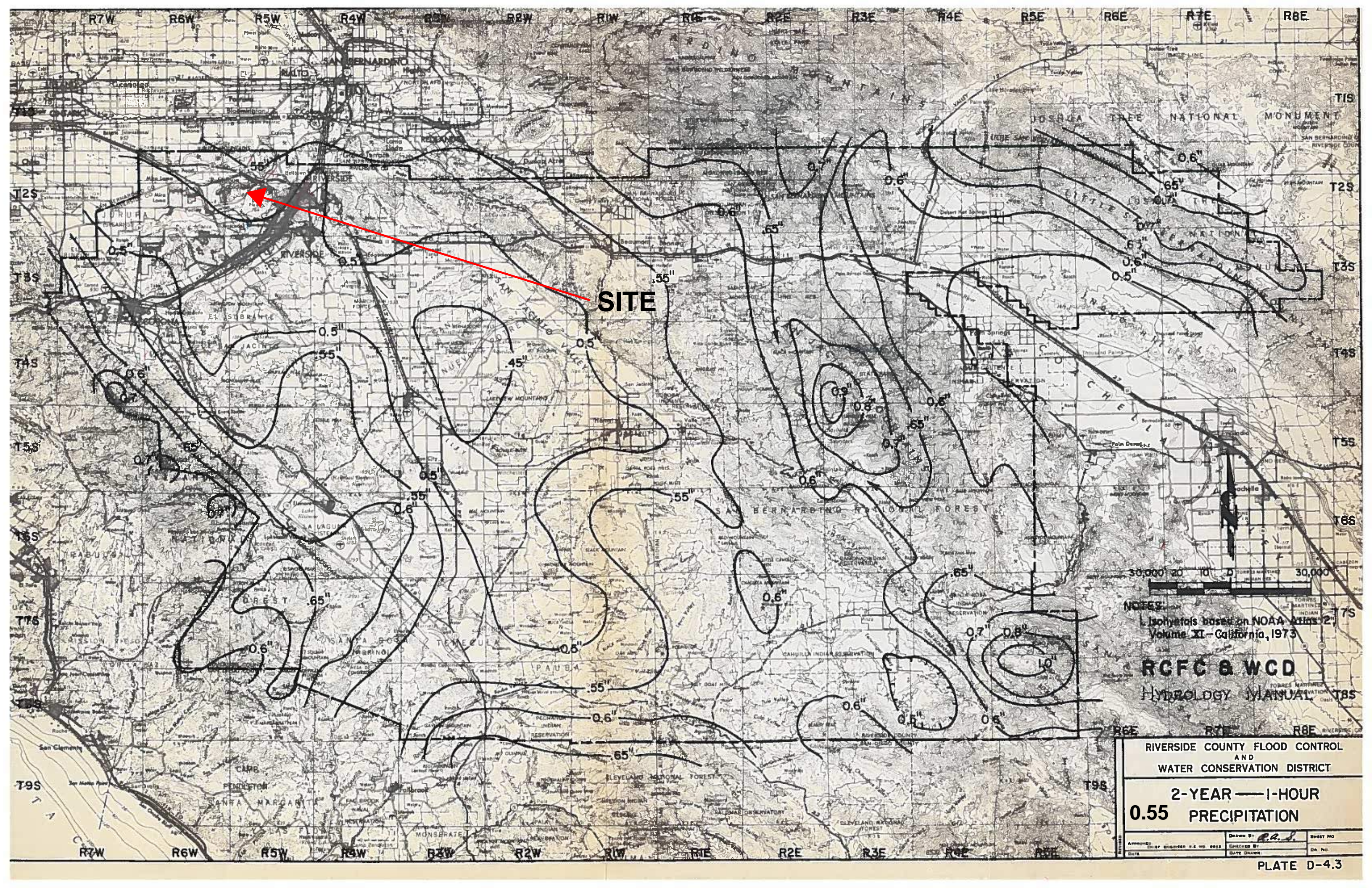
— SOILS GROUP BOUNDARY  
 A SOILS GROUP DESIGNATION

**RCFC & WCD**  
 HYDROLOGY MANUAL

0 FEET 5000

**HYDROLOGIC SOILS GROUP MAP**  
 FOR  
**B** RIVERSIDE—WEST





**SITE**

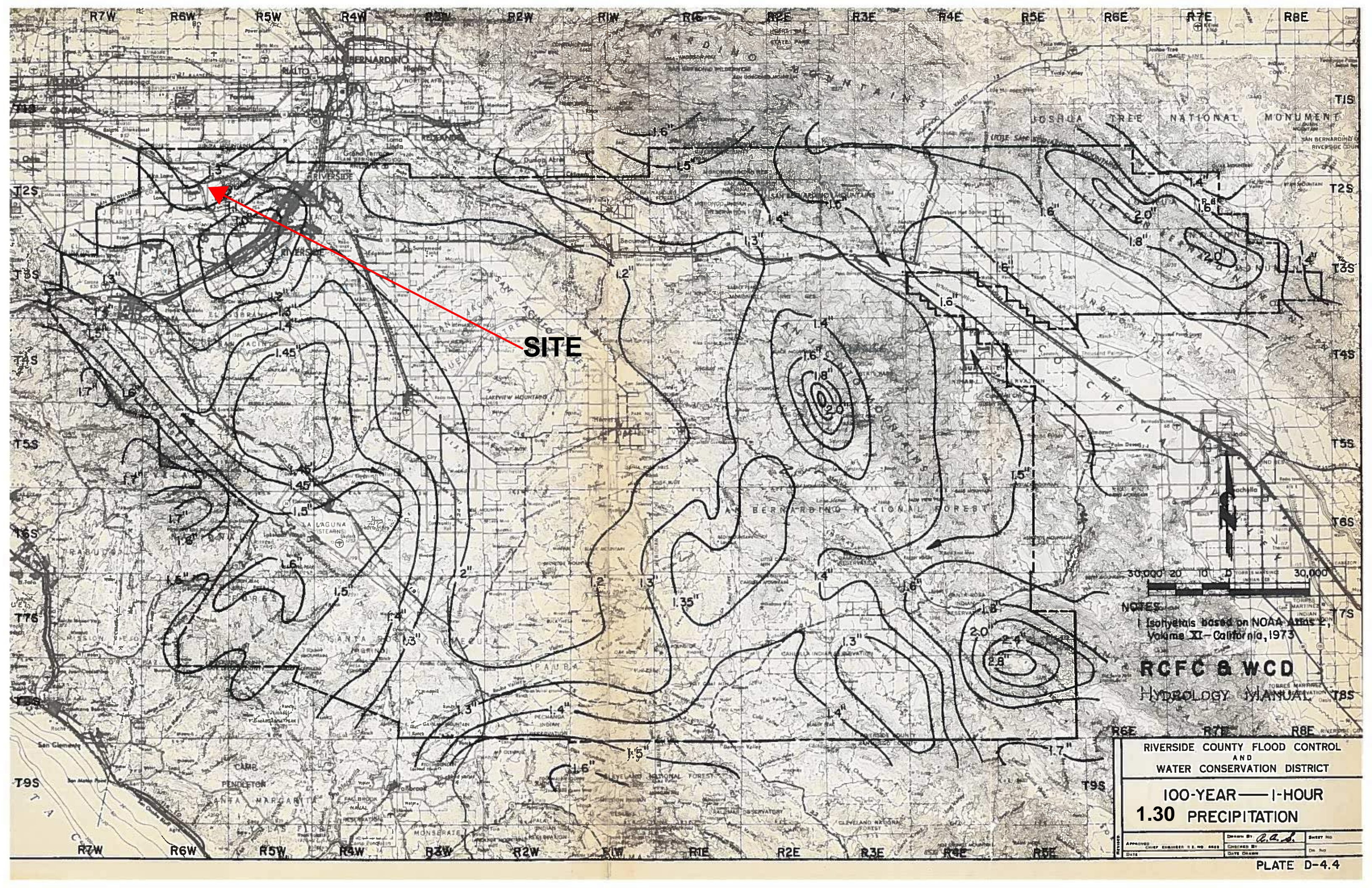
NOTES:  
 Isohyets based on NOAA Atlas 2,  
 Volume XI - California, 1973

**RCFC & WCD**  
 HYDROLOGY MANUAL

RIVERSIDE COUNTY FLOOD CONTROL  
 AND  
 WATER CONSERVATION DISTRICT

**2-YEAR — 1-HOUR  
 0.55 PRECIPITATION**

APPROVED	DATE	ENGINEER	NO. 0022	DRAWN BY	DATE	SHEET NO.



**SITE**

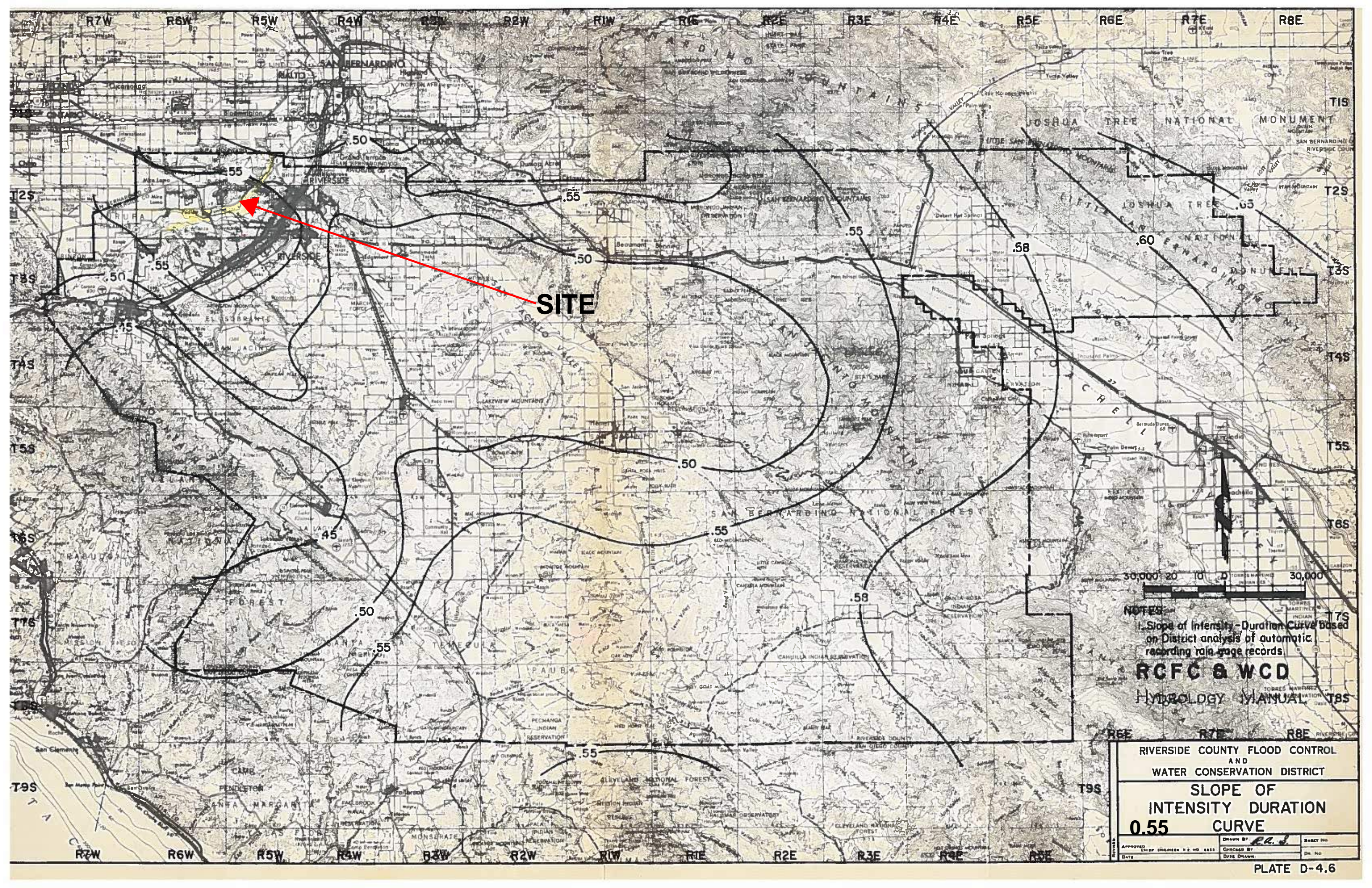
NOTES:  
1 Isohyets based on NOAA Atlas 14, Volume XI - California, 1973

**RCFC & WCD**  
HYDROLOGY MANUAL

RIVERSIDE COUNTY FLOOD CONTROL  
AND  
WATER CONSERVATION DISTRICT

**100-YEAR — 1-HOUR  
1.30 PRECIPITATION**

APPROVED: \_\_\_\_\_  
DATE: \_\_\_\_\_  
DRAWN BY: *R.A.S.*  
CHECKED BY: \_\_\_\_\_  
DATE: \_\_\_\_\_

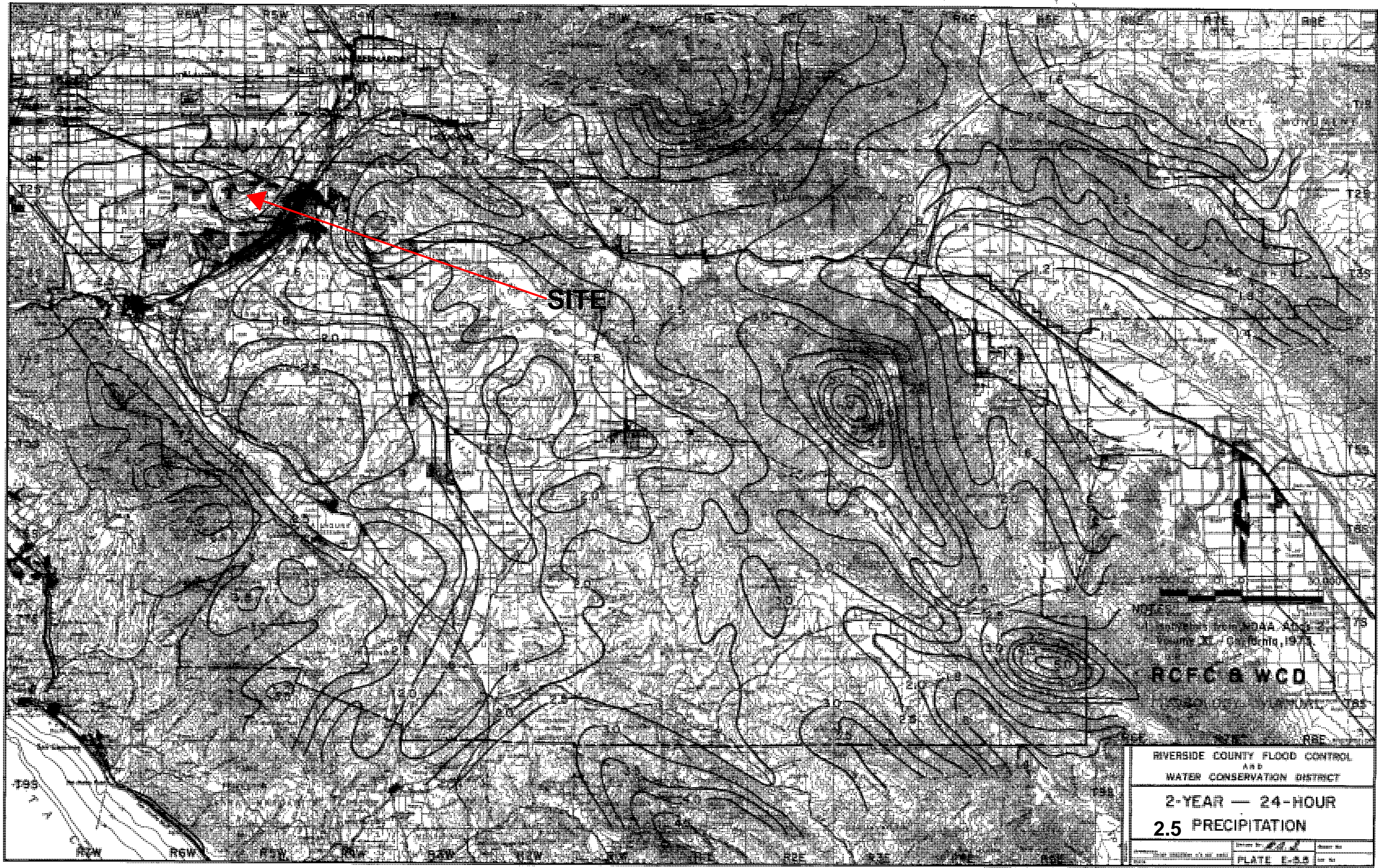


**SITE**

NOTES  
 1. Slope of Intensity-Duration Curve Based on District analysis of automatic recording rain gage records.

**RCFC & WCD**  
 HYDROLOGY MANUAL

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT		
<b>SLOPE OF INTENSITY DURATION CURVE</b>		
<b>0.55</b>		
APPROVED CHIEF ENGINEER R. E. NO. 6663	DRAWN BY R. E. J.	SHEET NO.
DATE	CHECKED BY	DR. NO.
	DATE DRAWN	



SITE

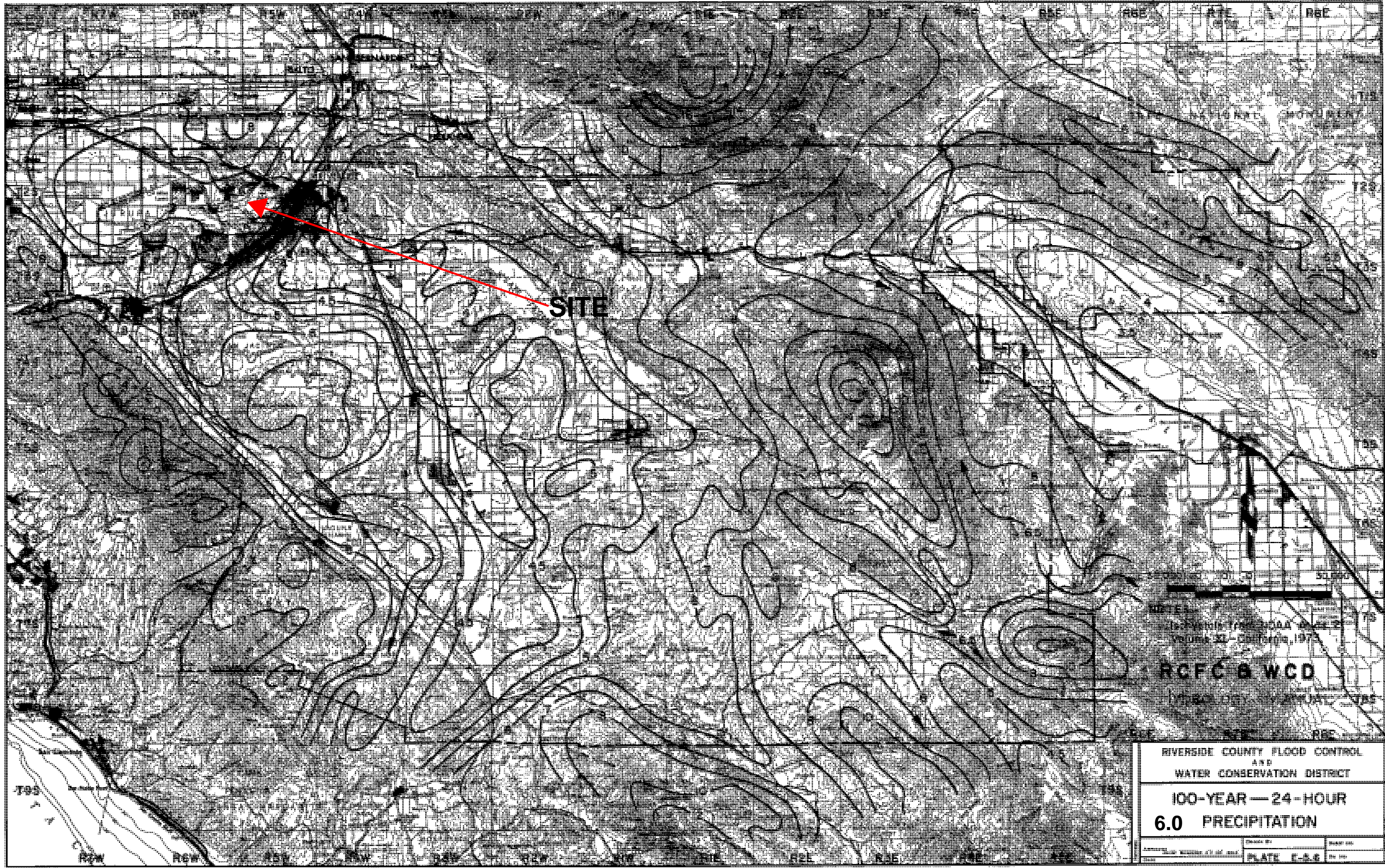
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**RCFC & WCD**

RIVERSIDE COUNTY FLOOD CONTROL  
AND  
WATER CONSERVATION DISTRICT

**2-YEAR — 24-HOUR  
2.5 PRECIPITATION**

PLATE E-22



SITE



ED 15  
100-YEAR 24-HOUR 6.0 INCH  
RIVERSIDE COUNTY, CALIFORNIA

RCFC & WCD

RIVERSIDE COUNTY FLOOD CONTROL  
AND  
WATER CONSERVATION DISTRICT

100-YEAR — 24-HOUR  
6.0 PRECIPITATION

PLATE E-88