PRELIMINARY HYDROLOGY STUDY

FOR

RANCHO ESTUDILLO PLAZA COMMERCIAL DEVELOPMENT

Prepared by:

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PARCEL MAP 37231
RANCHO ESTUDILLO PLAZA
PRELIMINARY HYDROLOGY STUDY

NARRATIVE:

Rancho Estudillo Plaza is a proposed 8.8 acre commercial project located at the northeast corner of the intersection of Sanderson Avenue and Seventh Street in the City of San Jacinto. The project proposes various tenants including two major retail stores, two drive thru restaurants and a service station/convenience store. The site is currently undeveloped.

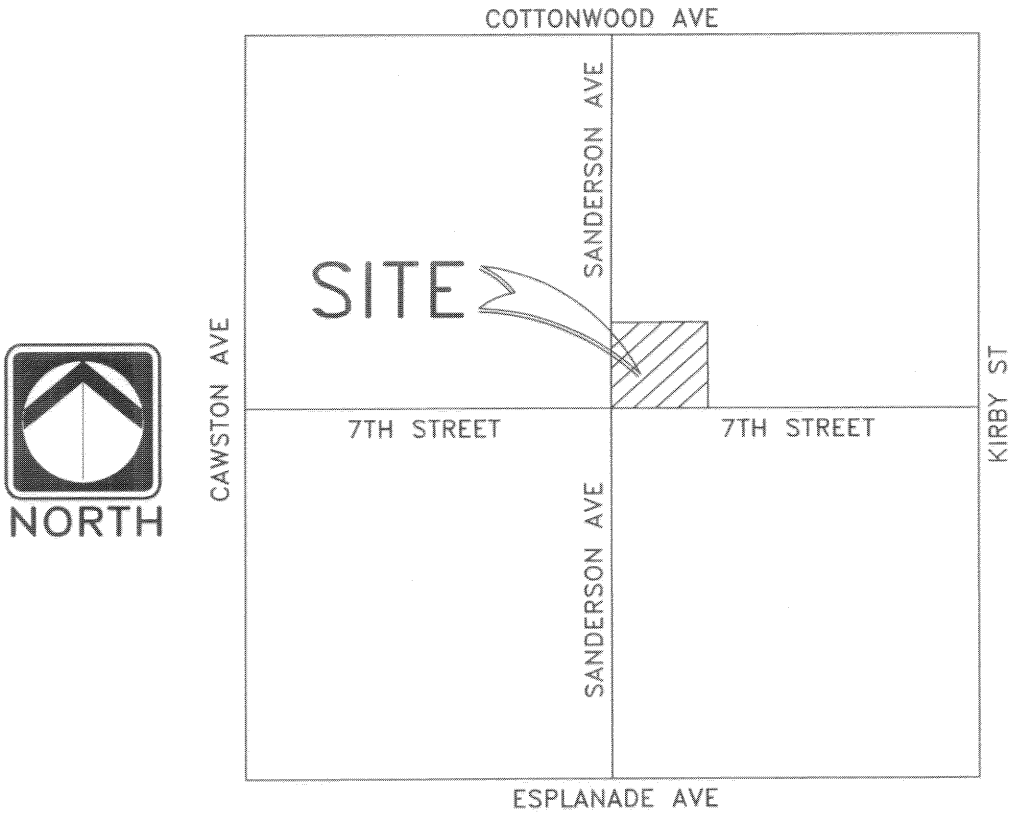
The site is relatively flat with a gradient of approximately 0.25 percent to the northwest. The property naturally drains to improved Sanderson Avenue.

Stormwater mitigation for this project includes a combination of water quality mitigation storage in infiltration trenches and sub-surface detention. The basin has been preliminarily sized to detain the difference in runoff volume between the developed and undeveloped condition 10-year, 24 hour storm, in accordance with Riverside County Flood Control and Water Conservation District preliminary design criteria. The property has acceptable infiltration rates based on site specific testing. It is anticipated that the sub-surface detention facility will drain within 72 hours of a storm event.

The following report includes rational hydrology calculations for the 10-year and 100-year recurrence interval for the undeveloped and developed condition. The result of the calculations is summarized below:

Rational Hydrology Runoff Summary

Drainage Area Designation	Area (Ac)	Tc (min)	Q_{10}(cfs)	Q_{100} (cfs)
Offsite	15.2	33	10.2	17.2
Total Site – Undeveloped	8.2	37	4.9	8.2
Total Site - Developed	7.6	14	11.0	16.4



VICINITY MAP

N.T.S.

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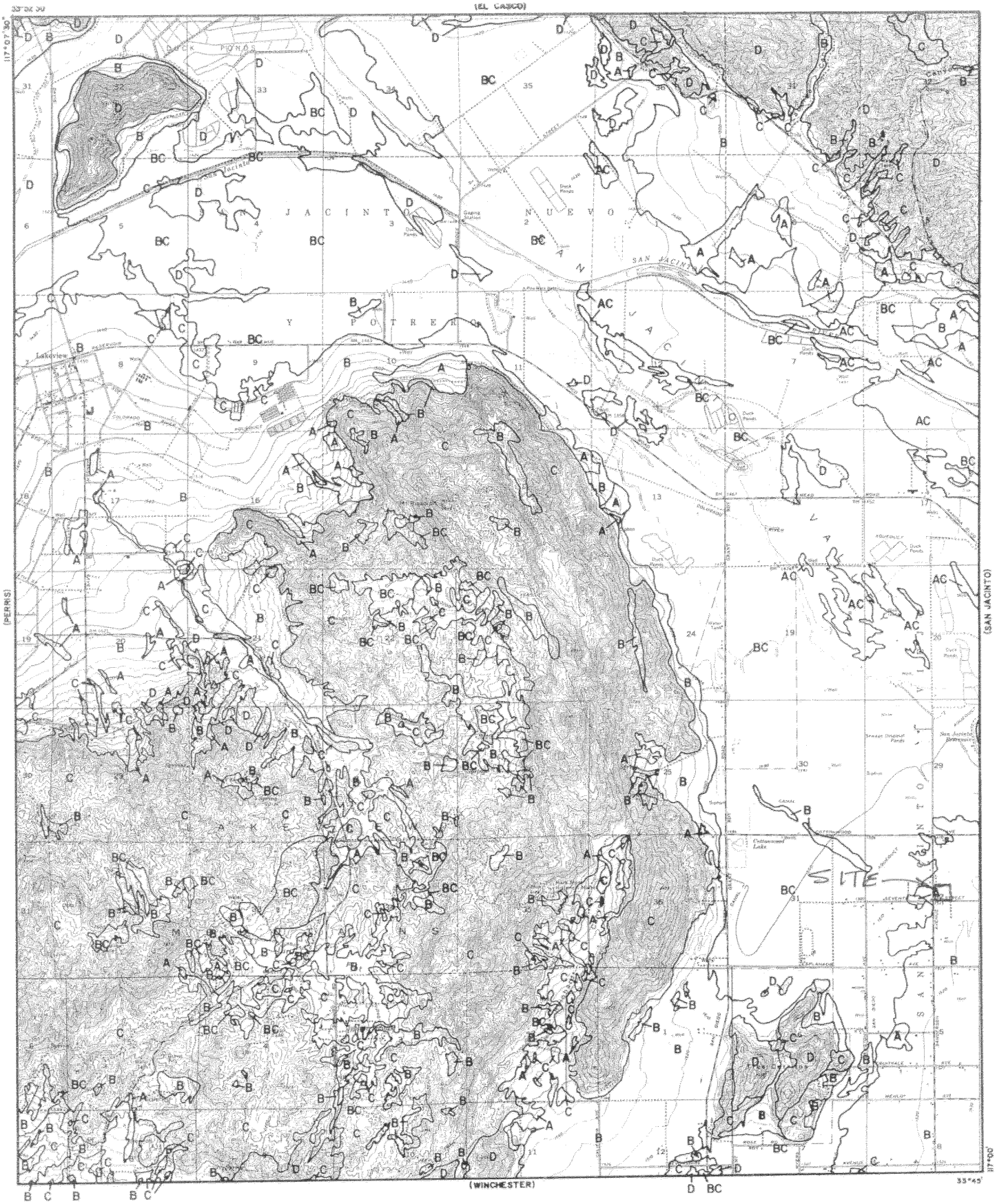

LEGEND

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

RCFC & WCD

HYDROLOGY MANUAL

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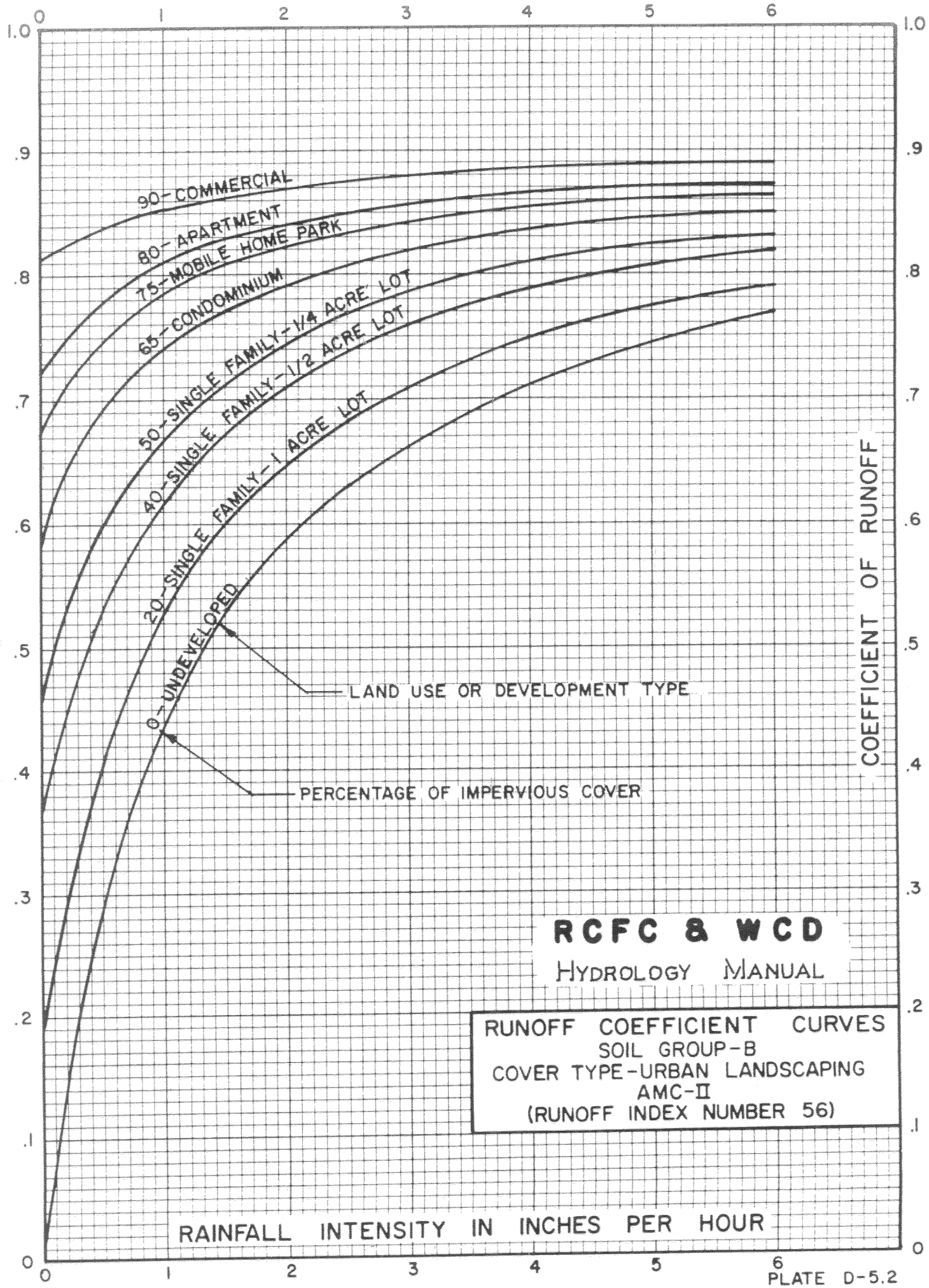
HYDROLOGIC SOILS GROUP MAP FOR LAKEVIEW

RAINFALL INTENSITY—INCHES PER HOUR

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

STANDARD INTENSITY-DURATION CURVES DATA



RCFC & WCD

HYDROLOGY MANUAL

RUNOFF COEFFICIENT CURVES
SOIL GROUP-B
COVER TYPE-URBAN LANDSCAPING
AMC-II
(RUNOFF INDEX NUMBER 56)

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
NATURAL COVERS -					
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
URBAN COVERS -					
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
AGRICULTURAL COVERS -					
Fallow (Land plowed but not tilled or seeded)		76	85	90	92

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RUNOFF INDEX NUMBERS FOR PERVIOUS AREA

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
AGRICULTURAL COVERS (cont.) -					
Legumes, Close Seeded (Alfalfa, sweetclover, timothy, etc.)	Poor	66	77	85	89
	Good	58	72	81	85
Orchards, Deciduous (Apples, apricots, pears, walnuts, etc.)		See Note 4			
Orchards, Evergreen (Citrus, avocados, etc.)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
Pasture, Dryland (Annual grasses)	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Pasture, Irrigated (Legumes and perennial grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
Row Crops (Field crops - tomatoes, sugar beets, etc.)	Poor	72	81	88	91
	Good	67	78	85	89
Small Grain (Wheat, oats, barley, etc.)	Poor	65	76	84	88
	Good	63	75	83	87
Vineyard		See Note 4			

Notes:

1. All runoff index (RI) numbers are for Antecedent Moisture Condition (AMC) II.

2. Quality of cover definitions:
   Poor-Heavily grazed or regularly burned areas. Less than 50 percent of the ground surface is protected by plant cover or brush and tree canopy.
   Fair-Moderate cover with 50 percent to 75 percent of the ground surface protected.
   Good-Heavy or dense cover with more than 75 percent of the ground surface protected.

3. See Plate C-2 for a detailed description of cover types.

4. Use runoff index numbers based on ground cover type. See discussion under "Cover Type Descriptions" on Plate C-2.

5. Reference Bibliography item 17.

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RUNOFF INDEX NUMBERS FOR PERVIOUS AREA

ACTUAL IMPERVIOUS COVER

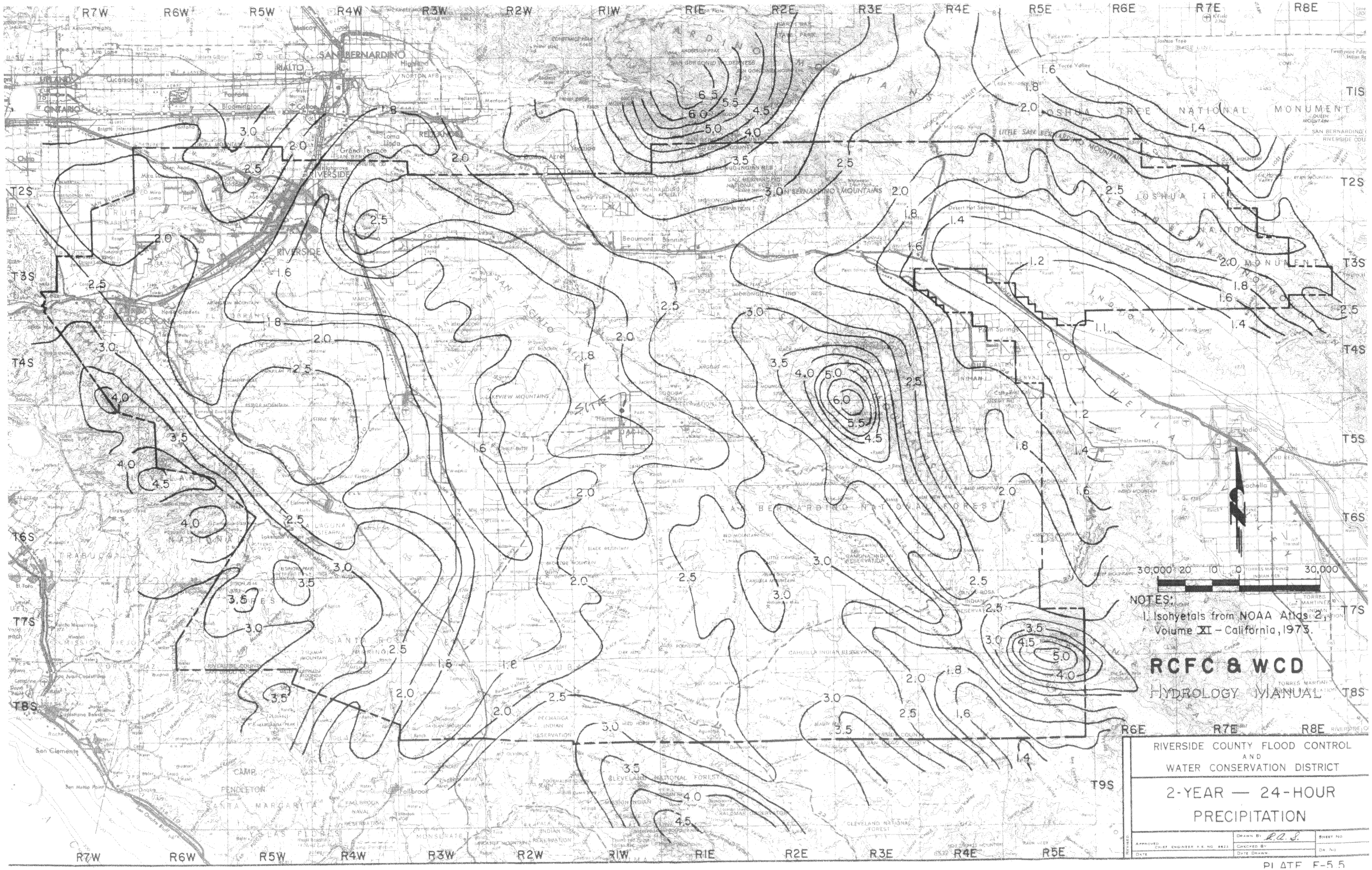
Land Use (1)	Range-Percent	Recommended Value For Average Conditions-Percent(2)
Natural or Agriculture	0 - 10	0
Single Family Residential: (3)		
40,000 S. F. (1 Acre) Lots	10 - 25	20
20,000 S. F. (½ Acre) Lots	30 - 45	40
7,200 - 10,000 S. F. Lots	45 - 55	50
Multiple Family Residential:		
Condominiums	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.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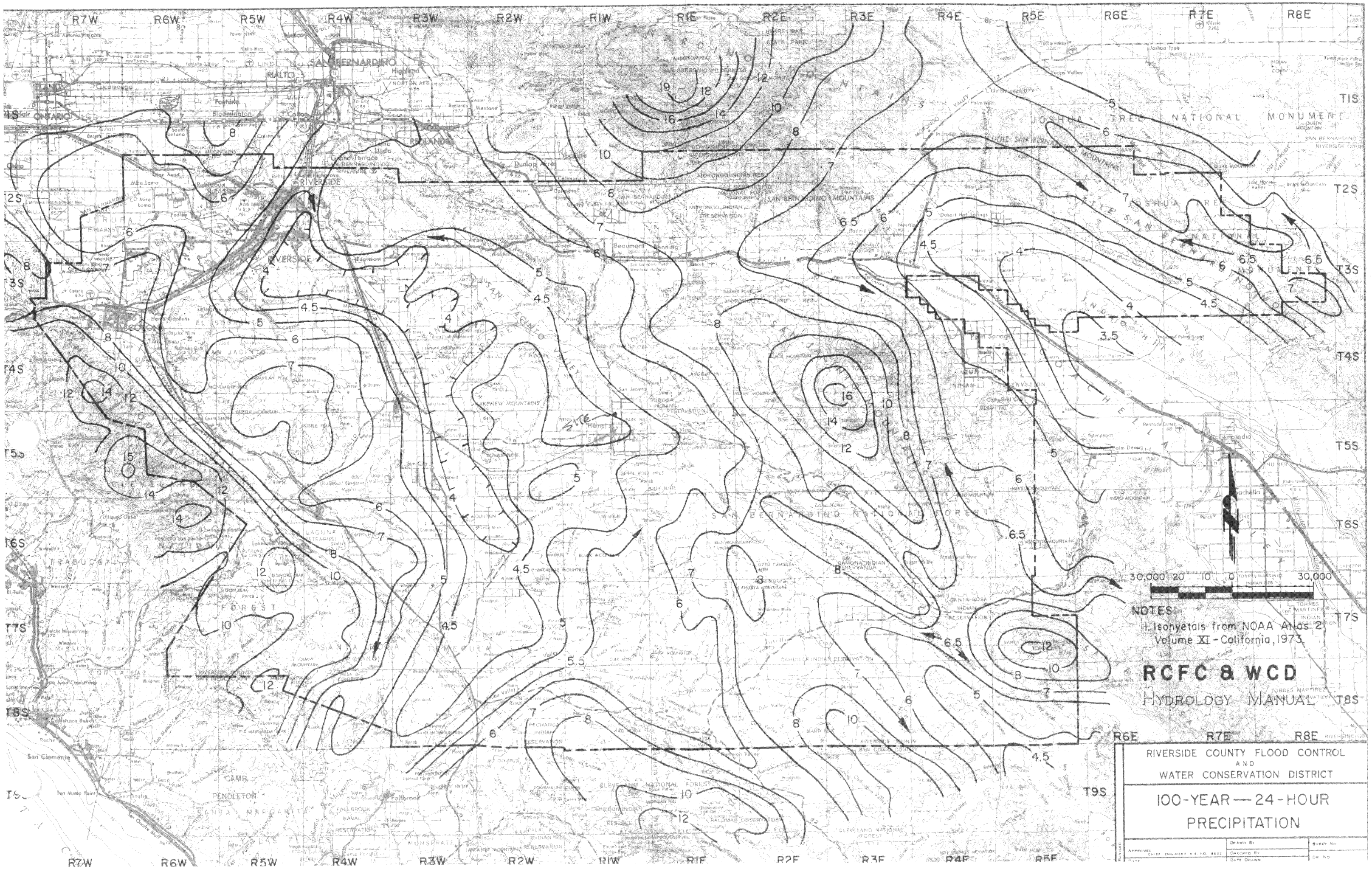
T7S
T8S
T9S
SAN BERNARDINO
RIALTO
ONTARIO
RIVERSIDE
SITE
JOSHUA TREE NATIONAL MONUMENT
SAN BERNARDINO MOUNTAINS
SAN JACINTO MOUNTAINS
SAN JACINTO VALLEY
SAN GORGONIO WILDERNESS
SAN BERNARDINO NATIONAL FOREST
CLEVELAND NATIONAL FOREST
CAMP PENDLETON
30,000 20 10 0 30,000
NOTES:
1. Isohyetals from NOAA Atlas 2, Volume XI - California, 1973.
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
2-YEAR — 24-HOUR PRECIPITATION
DRAWN BY R.A.S.
CHECKED BY
DATE DRAWN
SHEET NO.
DR. NO.
APPROVED CHIEF ENGINEER R.E. NO. 8823
DATE
REVISED

PLATE E-5.5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T9S
SAN BERNARDINO
RIALTO
RIVERSIDE
Beaumont
Banning
Hemet
Palm Springs
Indio
Coachella
Fallbrook
San Clemente
JOSHUA TREE NATIONAL MONUMENT
SAN BERNARDINO MOUNTAINS
LITTLE SAN BERNARDINO MOUNTAINS
SAN JACINTO MOUNTAINS
SAN BERNARDINO NATIONAL FOREST
CLEVELAND NATIONAL FOREST
CAMP PENDLETON
SITE
30,000 20 10 0 30,000
NOTES:
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RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
100-YEAR — 24-HOUR PRECIPITATION
DRAWN BY
CHECKED BY
DATE DRAWN
SHEET NO.
DR. NO.
APPROVED
CHIEF ENGINEER R.E. NO. 8822
REVISED

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            Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
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PARCEL MAP 37231
OFFSITE HYDROLOGY
10 YEAR STORM

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

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

----------------------------------------------------------------------


Program License Serial Number 4061

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

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

Standard intensity-duration curves data (Plate D-4.1)
For the [ San Jacinto ] area used.
10 year storm 10 minute intensity =  1.980(In/Hr)
10 year storm 60 minute intensity =  0.810(In/Hr)
100 year storm 10 minute intensity =  2.940(In/Hr)
100 year storm 60 minute intensity =  1.200(In/Hr)

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




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       1.000 to Point/Station       2.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   600.000(Ft.)
Top (of initial area) elevation =    22.700(Ft.)
Bottom (of initial area) elevation =    19.900(Ft.)
Difference in elevation =     2.800(Ft.)
Slope =    0.00467  s(percent)=       0.47
TC = k(0.710)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   26.836 min.
Rainfall intensity =      1.211(In/Hr) for a    10.0 year storm
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.602
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
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```
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      5.105(CFS)
Total initial stream area =        7.000(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       2.000 to Point/Station       3.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of natural channel elevation =     19.900(Ft.)
End of natural channel elevation =     18.000(Ft.)
Length of natural channel  =   570.000(Ft.)
Estimated mean flow rate at midpoint of channel =      8.096(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 =   1.37(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
      Normal channel slope =  0.0033
Corrected/adjusted channel slope =  0.0033
Travel time =    6.94 min.     TC =   33.78  min.


 Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.579
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
Rainfall intensity =      1.080(In/Hr) for a    10.0 year storm
Subarea runoff =      5.124(CFS) for      8.200(Ac.)
Total runoff =     10.229(CFS)      Total area =      15.200(Ac.)
End of computations, total study area =           15.20 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  69.0
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            Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
      Rational Hydrology Study        Date: 04/09/18  File:PM37231OFFSITE100YR.out
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PARCEL MAP 37231
OFFSITE HYDROLOGY
100 YEAR STORM

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

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

----------------------------------------------------------------------


Program License Serial Number 4061

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

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




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station        2.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   600.000(Ft.)
Top (of initial area) elevation =    22.700(Ft.)
Bottom (of initial area) elevation =    19.900(Ft.)
Difference in elevation =     2.800(Ft.)
Slope =    0.00467  s(percent)=       0.47
TC = k(0.710)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   26.836 min.
Rainfall intensity =      1.794(In/Hr) for a   100.0 year storm
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.675
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
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RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      8.475(CFS)
Total initial stream area =        7.000(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       2.000 to Point/Station       3.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of natural channel elevation =     19.900(Ft.)
End of natural channel elevation =     18.000(Ft.)
Length of natural channel  =   570.000(Ft.)
Estimated mean flow rate at midpoint of channel =     13.439(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 =   1.56(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
      Normal channel slope =  0.0033
Corrected/adjusted channel slope =  0.0033
Travel time =    6.10 min.     TC =   32.94  min.


 Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.657
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
Rainfall intensity =      1.620(In/Hr) for a   100.0 year storm
Subarea runoff =      8.725(CFS) for      8.200(Ac.)
Total runoff =     17.200(CFS)      Total area =      15.200(Ac.)
End of computations, total study area =           15.20 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  69.0
```

1" = 200'
N
SAN JACINTO
SITE
MON 1290
AREA = 8.2 AC
AREA = 7.0 AC
L = 570'
L = 600'
Q10 = 10.2 CFS
Q100 = 17.2 CFS
DRAINAGE AREA BOUNDARY
FLAMINGO DRIVE
PARTRIDGE
ORIOLE ROAD
SPARROW
CAMDEN
AUGUSTA COURT
MANCHESTER COURT
FINCH CIRCLE
WARICK
STREET
WINNERS CIRCLE
WEST 7TH STR
SANDERSON AVE
WARD PARK
BASIN
CLOVER
BUTTERFLY COURT
SWEET
MEADOW
DRIVE
LOOP
TALL GRASS COURT
DAISY COURT
QUAIL COURT
LARKSPUR COURT
ORCHID
LANE
WAY

```
            Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
      Rational Hydrology Study        Date: 04/09/18  File:PM37231ONSITEUNDEV10YR.out
----------------------------------------------------------------------
PARCEL MAP 37231
ONSITE HYDROLOGY
UNDEVELOPED CONDITION
10 YEAR STORM
----------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

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

----------------------------------------------------------------------


Program License Serial Number 4061

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

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

Standard intensity-duration curves data (Plate D-4.1)
For the [ San Jacinto ] area used.
10 year storm 10 minute intensity =  1.980(In/Hr)
10 year storm 60 minute intensity =  0.810(In/Hr)
100 year storm 10 minute intensity =  2.940(In/Hr)
100 year storm 60 minute intensity =  1.200(In/Hr)

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




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station        2.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   900.000(Ft.)
Top (of initial area) elevation =    17.000(Ft.)
Bottom (of initial area) elevation =    15.000(Ft.)
Difference in elevation =     2.000(Ft.)
Slope =    0.00222  s(percent)=       0.22
TC = k(0.710)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   36.610 min.
Rainfall intensity =      1.037(In/Hr) for a    10.0 year storm
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.570
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 =      4.851(CFS)
Total initial stream area =        8.200(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =            8.20 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  69.0
```

```
            Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
      Rational Hydrology Study        Date: 04/09/18  File:PM37231ONSITEUNDEV100YR.out
------------------------------------------------------------------------
PARCEL MAP 37231
ONSITE HYDROLOGY
UNDEVELOPED CONDITION
100 YEAR STORM
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

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

------------------------------------------------------------------------


Program License Serial Number 4061

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

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




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station        2.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   900.000(Ft.)
Top (of initial area) elevation =    17.000(Ft.)
Bottom (of initial area) elevation =    15.000(Ft.)
Difference in elevation =     2.000(Ft.)
Slope =    0.00222  s(percent)=       0.22
TC = k(0.710)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   36.610 min.
Rainfall intensity =      1.536(In/Hr) for a   100.0 year storm
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.648
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
```

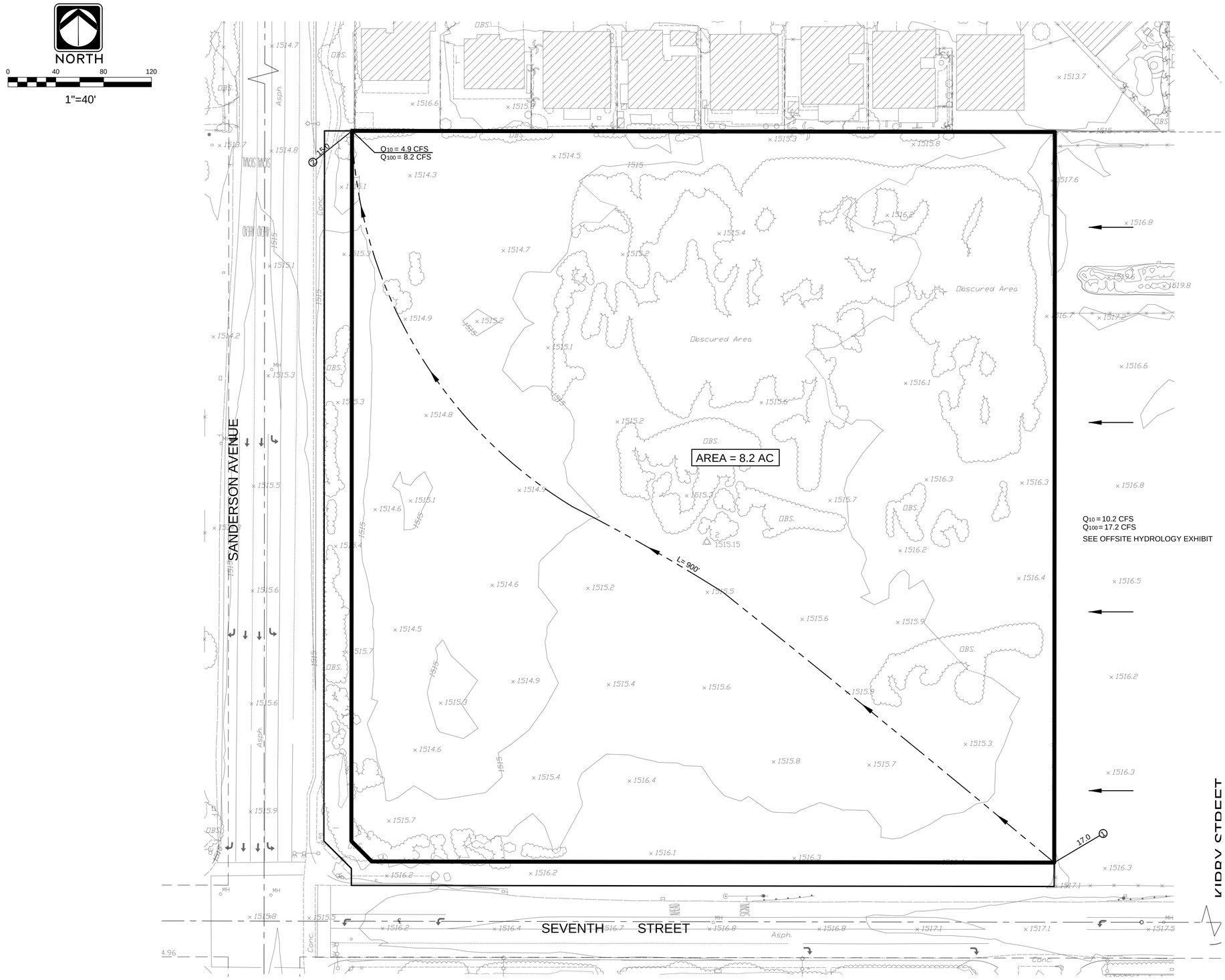
```
RI index for soil(AMC 2)   =  69.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      8.157(CFS)
Total initial stream area =        8.200(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =            8.20 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  69.0
```

```
            Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
      Rational Hydrology Study        Date: 04/09/18  File:PM37231ONSITEDEV10YR.out
------------------------------------------------------------------------
PARCEL MAP 37231
ONSITE HYDROLOGY
DEVELOPED CONDITION
10 YEAR STORM
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

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

------------------------------------------------------------------------


Program License Serial Number 4061

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

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

Standard intensity-duration curves data (Plate D-4.1)
For the [ San Jacinto ] area used.
10 year storm 10 minute intensity =  1.980(In/Hr)
10 year storm 60 minute intensity =  0.810(In/Hr)
100 year storm 10 minute intensity =  2.940(In/Hr)
100 year storm 60 minute intensity =  1.200(In/Hr)

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




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station        2.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   935.000(Ft.)
Top (of initial area) elevation =    18.600(Ft.)
Bottom (of initial area) elevation =    15.000(Ft.)
Difference in elevation =     3.600(Ft.)
Slope =    0.00385  s(percent)=       0.39
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.072 min.
Rainfall intensity =      1.673(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.865
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
```

```
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =     11.000(CFS)
Total initial stream area =        7.600(Ac.)
Pervious area fraction = 0.100
End of computations, total study area =            7.60 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

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

```
            Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
      Rational Hydrology Study        Date: 04/09/18  File:PM37231ONSITEDEV100YR.out
------------------------------------------------------------------------
PARCEL MAP 37231
ONSITE HYDROLOGY
DEVELOPED CONDITION
100 YEAR STORM
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

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

------------------------------------------------------------------------


Program License Serial Number 4061

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

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




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station        2.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   935.000(Ft.)
Top (of initial area) elevation =    18.600(Ft.)
Bottom (of initial area) elevation =    15.000(Ft.)
Difference in elevation =     3.600(Ft.)
Slope =    0.00385  s(percent)=       0.39
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.072 min.
Rainfall intensity =      2.478(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.873
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
```

```
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =     16.445(CFS)
Total initial stream area =        7.600(Ac.)
Pervious area fraction = 0.100
End of computations, total study area =            7.60 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

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



DATE PREPARED: MARCH, 2018

DIG ALERT
DIAL TOLL FREE
1-800-227-2600
AT LEAST TWO DAYS BEFORE YOU DIG
UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA

DATE	BY	MARK	REVISIONS	APPR.	DATE

ENGINEER — CITY
DESIGNED BY: DRAWN BY: CHECKED BY:

SEAL: REGISTERED PROFESSIONAL ENGINEER — BLAINE A. WOMER — No. 46354 — CIVIL — STATE OF CALIFORNIA

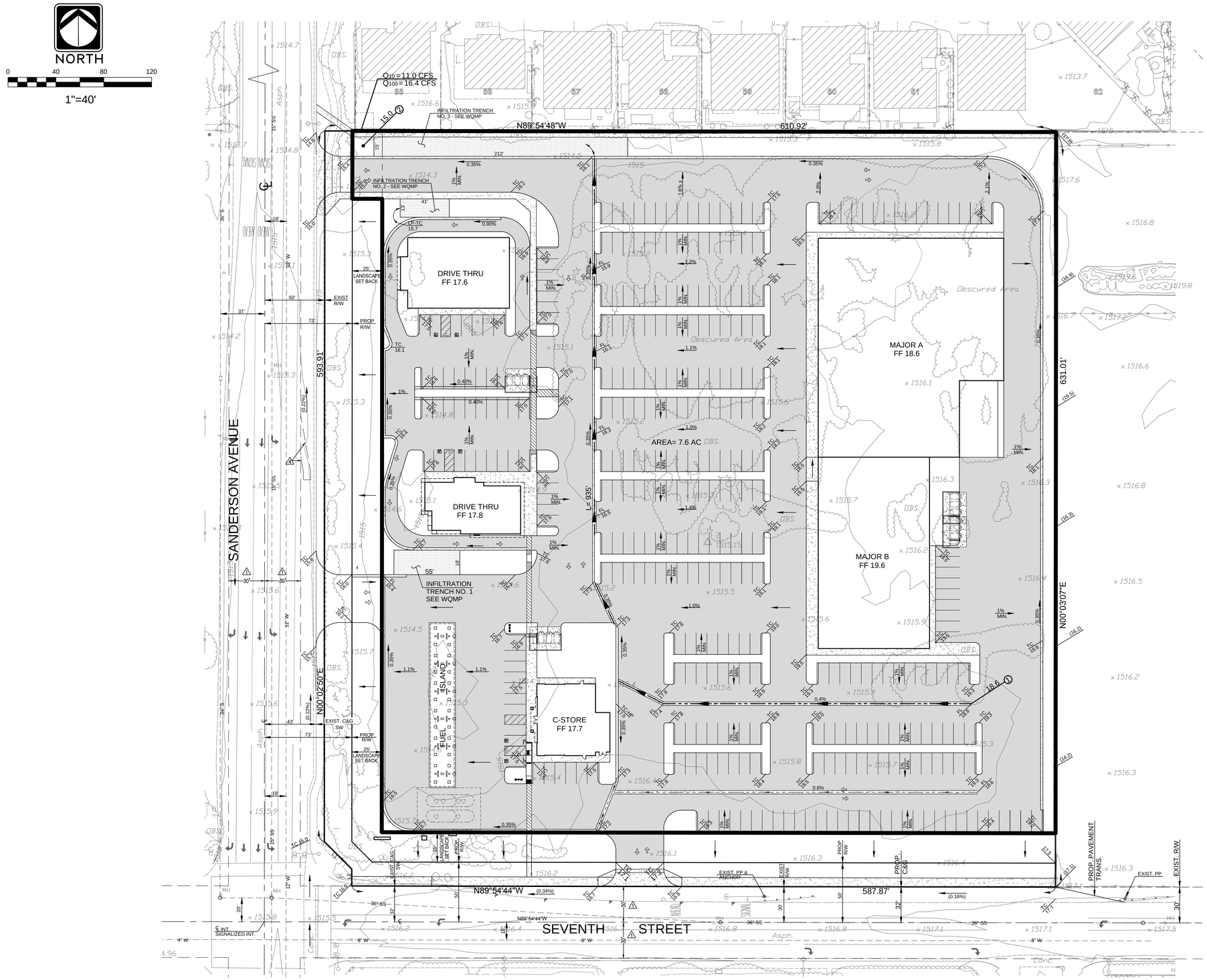
APPROVED BY: DATE
CITY ENGINEER
R.C.E. NO. EXP. DATE
PREPARED BY: DATE
R.C.E. NO. EXP. DATE

BLAINE A. WOMER
CIVIL ENGINEERING
•PLANNING •SURVEYING •CIVIL ENGINEERING •PUBLIC WORKS
Hemet, CA 92544, 43566 E Florida Ave., Suite D, Phone (951)658-1727 Fax (951)658-9347
Park City, UT 84098, 5133 Cove Canyon Dr. #302, Phone/Fax (435)615-1489

SCALE 1"= 40'
DATE MARCH, 2018
BENCHMARK:

CITY OF SAN JACINTO
TENTATIVE PARCEL MAP NO. 37231
RANCHO ESTUDILLO PLAZA
HYDROLOGY EXHIBIT - UNDEV. DEV.
FOR PANORAMA DEV. W.O.

SHEET NO. 1 OF 1 SHEETS
FILE NO.



LEGEND

- DRAINAGE BOUNDARY
- NODE NUMBER
- FLOW PATH

LINE DATA

NO.	BEARING	DISTANCE
L1	N45°01'56"W	32.48'
L2	N00°02'47"E	14.14'

DATE PREPARED: MARCH, 2018

DIG ALERT
DIAL TOLL FREE
1-800-227-2600
AT LEAST TWO DAYS BEFORE YOU DIG
UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA

DATE	BY	MARK	REVISIONS	APPR.	DATE

ENGINEER — CITY

DESIGNED BY: DRAWN BY: CHECKED BY:

SEAL: REGISTERED PROFESSIONAL ENGINEER — CIVIL — No. 46354 — STATE OF CALIFORNIA

APPROVED BY: DATE
CITY ENGINEER
R.C.E. NO. EXP. DATE

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Hemet, CA. 92544, 41555 E Florida Ave., Suite G, Phone (951)658-1727 Fax (951)658-9347
Park City, UT 84098, 5133 Cove Canyon Dr. #302, Phone/Fax (435)615-1489

SCALE 1"= 40'
DATE MARCH, 2018
BENCHMARK:

CITY OF SAN JACINTO
TENTATIVE PARCEL MAP NO. 37231
RANCHO ESTUDILLO PLAZA
HYDROLOGY EXHIBIT - DEV. COND.
FOR PANORAMA DEV. W.O.

SHEET NO. 1 OF 1 SHEETS
FILE NO.

REQUIRED ONSITE STORMWATER STORAGE:

10-YEAR, 24 HOUR STORM

DEV. COND V = 71,046 CF

UNDEV. COND V = 14,266 CF

ΔV = 56,780 CF

STORAGE VOLUME PROVIDED IN W.Q. MITIGATION TRENCHES:

TRENCH 1 V = 3.20' * 992 SF = 3174 CF

TRENCH 2 V = 3.20' * 533 SF = 1705 CF

TRENCH 3 V = 3.20' * 3186 SF = 10,195 CF

∴ REQUIRED ONSITE STORAGE = 56,780 - 3174 - 1705 - 10,195 = 41,706 CF

DUE TO SITE LAYOUT, STORMWATER STORAGE WILL BE SUB-SURFACE

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

      Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
            Study date  04/10/18 File: PM3723110YR24HRUNDEV2410.out

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
----------------------------------------------------------------------

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


Program License Serial Number 4061

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

 English Units used in output format



--------------------------------------------------------------------
PARCEL MAP 37231
UNIT HYDROGRAPH STUDY
UNDEVELOPED CONDITION
10 YEAR, 24 HOUR STORM
--------------------------------------------------------------------
Drainage Area =       8.20(Ac.)  =      0.013 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =       8.20(Ac.)  =      0.013 Sq. Mi.
Length along longest watercourse =     900.00(Ft.)
Length along longest watercourse measured to centroid =     455.00(Ft.)
Length along longest watercourse =      0.170 Mi.
Length along longest watercourse measured to centroid =      0.086 Mi.
Difference in elevation =       2.00(Ft.)
Slope along watercourse =     11.7333 Ft./Mi.
Average Manning's 'N' = 0.025
Lag time =    0.076 Hr.
Lag time =     4.53 Min.
25% of lag time =     1.13 Min.
40% of lag time =     1.81 Min.
Unit time =    15.00 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]
        8.20                1.80                  14.76

100 YEAR Area rainfall data:


Area(Ac.)[1]        Rainfall(In)[2]      Weighting[1*2]
        8.20                4.50                  36.90

STORM EVENT (YEAR) =   10.00
Area Averaged 2-Year Rainfall =    1.800(In)
```

Area Averaged 100-Year Rainfall = 4.500(In)

Point rain (area averaged) = 2.911(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.911(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
8.200	78.00	0.000

Total Area Entered = 8.20(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
78.0	78.0	0.268	0.000	0.268	1.000	0.268
					Sum (F) =	0.268

Area averaged mean soil loss (F) (In/Hr) = 0.268
Minimum soil loss rate ((In/Hr)) = 0.134
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

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

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.250	330.768	59.633	4.928
2	0.500	661.537	35.498	2.934
3	0.750	992.305	4.869	0.402
			Sum = 100.000	Sum= 8.264

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

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.25	0.20	0.023	(0.473)	0.021	0.002
2	0.50	0.30	0.035	(0.467)	0.031	0.003
3	0.75	0.30	0.035	(0.462)	0.031	0.003
4	1.00	0.40	0.047	(0.456)	0.042	0.005
5	1.25	0.30	0.035	(0.451)	0.031	0.003
6	1.50	0.30	0.035	(0.445)	0.031	0.003
7	1.75	0.30	0.035	(0.440)	0.031	0.003
8	2.00	0.40	0.047	(0.435)	0.042	0.005
9	2.25	0.40	0.047	(0.430)	0.042	0.005
10	2.50	0.40	0.047	(0.424)	0.042	0.005
11	2.75	0.50	0.058	(0.419)	0.052	0.006
12	3.00	0.50	0.058	(0.414)	0.052	0.006
13	3.25	0.50	0.058	(0.409)	0.052	0.006
14	3.50	0.50	0.058	(0.404)	0.052	0.006
15	3.75	0.50	0.058	(0.399)	0.052	0.006
16	4.00	0.60	0.070	(0.394)	0.063	0.007
17	4.25	0.60	0.070	(0.389)	0.063	0.007
18	4.50	0.70	0.082	(0.384)	0.073	0.008
19	4.75	0.70	0.082	(0.379)	0.073	0.008

20	5.00	0.80	0.093	(0.374)	0.084	0.009
21	5.25	0.60	0.070	(0.369)	0.063	0.007
22	5.50	0.70	0.082	(0.364)	0.073	0.008
23	5.75	0.80	0.093	(0.360)	0.084	0.009
24	6.00	0.80	0.093	(0.355)	0.084	0.009
25	6.25	0.90	0.105	(0.350)	0.094	0.010
26	6.50	0.90	0.105	(0.345)	0.094	0.010
27	6.75	1.00	0.116	(0.341)	0.105	0.012
28	7.00	1.00	0.116	(0.336)	0.105	0.012
29	7.25	1.00	0.116	(0.332)	0.105	0.012
30	7.50	1.10	0.128	(0.327)	0.115	0.013
31	7.75	1.20	0.140	(0.323)	0.126	0.014
32	8.00	1.30	0.151	(0.318)	0.136	0.015
33	8.25	1.50	0.175	(0.314)	0.157	0.017
34	8.50	1.50	0.175	(0.309)	0.157	0.017
35	8.75	1.60	0.186	(0.305)	0.168	0.019
36	9.00	1.70	0.198	(0.301)	0.178	0.020
37	9.25	1.90	0.221	(0.296)	0.199	0.022
38	9.50	2.00	0.233	(0.292)	0.210	0.023
39	9.75	2.10	0.245	(0.288)	0.220	0.024
40	10.00	2.20	0.256	(0.284)	0.231	0.026
41	10.25	1.50	0.175	(0.280)	0.157	0.017
42	10.50	1.50	0.175	(0.276)	0.157	0.017
43	10.75	2.00	0.233	(0.272)	0.210	0.023
44	11.00	2.00	0.233	(0.268)	0.210	0.023
45	11.25	1.90	0.221	(0.264)	0.199	0.022
46	11.50	1.90	0.221	(0.260)	0.199	0.022
47	11.75	1.70	0.198	(0.256)	0.178	0.020
48	12.00	1.80	0.210	(0.252)	0.189	0.021
49	12.25	2.50	0.291	0.249	(0.262)	0.043
50	12.50	2.60	0.303	0.245	(0.272)	0.058
51	12.75	2.80	0.326	0.241	(0.293)	0.085
52	13.00	2.90	0.338	0.238	(0.304)	0.100
53	13.25	3.40	0.396	0.234	(0.356)	0.162
54	13.50	3.40	0.396	0.230	(0.356)	0.165
55	13.75	2.30	0.268	0.227	(0.241)	0.041
56	14.00	2.30	0.268	0.223	(0.241)	0.044
57	14.25	2.70	0.314	0.220	(0.283)	0.094
58	14.50	2.60	0.303	0.217	(0.272)	0.086
59	14.75	2.60	0.303	0.213	(0.272)	0.089
60	15.00	2.50	0.291	0.210	(0.262)	0.081
61	15.25	2.40	0.279	0.207	(0.251)	0.073
62	15.50	2.30	0.268	0.204	(0.241)	0.064
63	15.75	1.90	0.221	(0.201)	0.199	0.022
64	16.00	1.90	0.221	0.198	(0.199)	0.024
65	16.25	0.40	0.047	(0.195)	0.042	0.005
66	16.50	0.40	0.047	(0.192)	0.042	0.005
67	16.75	0.30	0.035	(0.189)	0.031	0.003
68	17.00	0.30	0.035	(0.186)	0.031	0.003
69	17.25	0.50	0.058	(0.183)	0.052	0.006
70	17.50	0.50	0.058	(0.180)	0.052	0.006
71	17.75	0.50	0.058	(0.178)	0.052	0.006
72	18.00	0.40	0.047	(0.175)	0.042	0.005
73	18.25	0.40	0.047	(0.172)	0.042	0.005
74	18.50	0.40	0.047	(0.170)	0.042	0.005
75	18.75	0.30	0.035	(0.167)	0.031	0.003
76	19.00	0.20	0.023	(0.165)	0.021	0.002
77	19.25	0.30	0.035	(0.163)	0.031	0.003
78	19.50	0.40	0.047	(0.160)	0.042	0.005
79	19.75	0.30	0.035	(0.158)	0.031	0.003
80	20.00	0.20	0.023	(0.156)	0.021	0.002

81	20.25	0.30	0.035	(0.154)	0.031	0.003
82	20.50	0.30	0.035	(0.152)	0.031	0.003
83	20.75	0.30	0.035	(0.150)	0.031	0.003
84	21.00	0.20	0.023	(0.148)	0.021	0.002
85	21.25	0.30	0.035	(0.147)	0.031	0.003
86	21.50	0.20	0.023	(0.145)	0.021	0.002
87	21.75	0.30	0.035	(0.143)	0.031	0.003
88	22.00	0.20	0.023	(0.142)	0.021	0.002
89	22.25	0.30	0.035	(0.140)	0.031	0.003
90	22.50	0.20	0.023	(0.139)	0.021	0.002
91	22.75	0.20	0.023	(0.138)	0.021	0.002
92	23.00	0.20	0.023	(0.137)	0.021	0.002
93	23.25	0.20	0.023	(0.136)	0.021	0.002
94	23.50	0.20	0.023	(0.135)	0.021	0.002
95	23.75	0.20	0.023	(0.134)	0.021	0.002
96	24.00	0.20	0.023	(0.134)	0.021	0.002

(Loss Rate Not Used)

Sum = 100.0 Sum = 1.9

Flood volume = Effective rainfall 0.48(In)
times area 8.2(Ac.)/[(In)/(Ft.)] = 0.3(Ac.Ft)
Total soil loss = 2.43(In)
Total soil loss = 1.662(Ac.Ft)
Total rainfall = 2.91(In)
Flood volume = 14266.4 Cubic Feet
Total soil loss = 72375.2 Cubic Feet

Peak flow rate of this hydrograph = 1.332(CFS)

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

Hydrograph in 15 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+15	0.0002	0.01	Q				
0+30	0.0007	0.02	Q				
0+45	0.0013	0.03	Q				
1+ 0	0.0020	0.03	Q				
1+15	0.0027	0.03	Q				
1+30	0.0033	0.03	Q				
1+45	0.0039	0.03	Q				
2+ 0	0.0046	0.03	Q				
2+15	0.0054	0.04	Q				
2+30	0.0062	0.04	Q				
2+45	0.0071	0.04	Q				
3+ 0	0.0081	0.05	Q				
3+15	0.0091	0.05	QV				
3+30	0.0101	0.05	QV				
3+45	0.0111	0.05	QV				
4+ 0	0.0122	0.05	QV				
4+15	0.0134	0.06	QV				
4+30	0.0147	0.06	QV				
4+45	0.0161	0.07	QV				
5+ 0	0.0176	0.07	Q V				
5+15	0.0189	0.07	Q V				
5+30	0.0203	0.06	Q V				
5+45	0.0218	0.07	Q V				
6+ 0	0.0233	0.08	Q V				

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 6+15        0.0251       0.08  Q  V       |          |          |          |
 6+30        0.0268       0.09  Q  V       |          |          |          |
 6+45        0.0287       0.09  Q  V       |          |          |          |
 7+ 0        0.0307       0.10  Q  V       |          |          |          |
 7+15        0.0327       0.10  Q  V       |          |          |          |
 7+30        0.0348       0.10  Q   V      |          |          |          |
 7+45        0.0371       0.11  Q   V      |          |          |          |
 8+ 0        0.0396       0.12  Q   V      |          |          |          |
 8+15        0.0424       0.14  Q    V     |          |          |          |
 8+30        0.0454       0.14  Q    V     |          |          |          |
 8+45        0.0485       0.15  Q    V     |          |          |          |
 9+ 0        0.0518       0.16  Q     V    |          |          |          |
 9+15        0.0554       0.17  Q     V    |          |          |          |
 9+30        0.0593       0.19  Q      V   |          |          |          |
 9+45        0.0634       0.20  Q      V   |          |          |          |
10+ 0        0.0676       0.21  Q       V  |          |          |          |
10+15        0.0712       0.17  Q       V  |          |          |          |
10+30        0.0742       0.15  Q        V|          |          |          |
10+45        0.0778       0.17  Q        V|          |          |          |
11+ 0        0.0817       0.19  Q        V|          |          |          |
11+15        0.0856       0.19  Q         V          |          |          |
11+30        0.0894       0.18  Q         V          |          |          |
11+45        0.0929       0.17  Q         |V         |          |          |
12+ 0        0.0964       0.17  Q         |V         |          |          |
12+15        0.1022       0.28  |Q        | V        |          |          |
12+30        0.1109       0.42  |Q        |  V       |          |          |
12+45        0.1234       0.61  | Q       |    V     |          |          |
13+ 0        0.1392       0.77  |  Q      |      V   |          |          |
13+15        0.1625       1.13  |   Q     |        V|          |          |
13+30        0.1900       1.33  |    Q    |          |     V    |          |
13+45        0.2055       0.75  |  Q      |          |       V  |          |
14+ 0        0.2139       0.41  |Q        |          |        V |          |
14+15        0.2266       0.61  | Q       |          |         V|          |
14+30        0.2414       0.72  | Q       |          |          |V         |
14+45        0.2565       0.73  | Q       |          |          | V        |
15+ 0        0.2709       0.70  | Q       |          |          |  V       |
15+15        0.2840       0.63  | Q       |          |          |   V      |
15+30        0.2956       0.56  | Q       |          |          |    V     |
15+45        0.3023       0.33  |Q        |          |          |    V     |
16+ 0        0.3066       0.21  Q         |          |          |     V    |
16+15        0.3087       0.10  Q         |          |          |     V    |
16+30        0.3096       0.05  Q         |          |          |     V    |
16+45        0.3103       0.03  Q         |          |          |     V    |
17+ 0        0.3109       0.03  Q         |          |          |     V    |
17+15        0.3118       0.04  Q         |          |          |      V   |
17+30        0.3127       0.05  Q         |          |          |      V   |
17+45        0.3137       0.05  Q         |          |          |      V   |
18+ 0        0.3146       0.04  Q         |          |          |      V   |
18+15        0.3154       0.04  Q         |          |          |      V   |
18+30        0.3162       0.04  Q         |          |          |      V   |
18+45        0.3169       0.03  Q         |          |          |      V   |
19+ 0        0.3174       0.02  Q         |          |          |      V   |
19+15        0.3179       0.03  Q         |          |          |      V   |
19+30        0.3186       0.03  Q         |          |          |      V   |
19+45        0.3193       0.03  Q         |          |          |      V   |
20+ 0        0.3198       0.02  Q         |          |          |       V|
20+15        0.3203       0.03  Q         |          |          |       V|
20+30        0.3209       0.03  Q         |          |          |       V|
20+45        0.3215       0.03  Q         |          |          |       V|
21+ 0        0.3220       0.02  Q         |          |          |       V|
21+15        0.3225       0.03  Q         |          |          |       V|
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  21+30       0.3229      0.02  Q          |          |          |         V|
  21+45       0.3235      0.03  Q          |          |          |         V|
  22+ 0       0.3239      0.02  Q          |          |          |         V|
  22+15       0.3245      0.03  Q          |          |          |         V|
  22+30       0.3249      0.02  Q          |          |          |         V|
  22+45       0.3253      0.02  Q          |          |          |         V|
  23+ 0       0.3257      0.02  Q          |          |          |         V|
  23+15       0.3261      0.02  Q          |          |          |         V|
  23+30       0.3265      0.02  Q          |          |          |         V|
  23+45       0.3269      0.02  Q          |          |          |         V|
  24+ 0       0.3273      0.02  Q          |          |          |         V|
  24+15       0.3275      0.01  Q          |          |          |         V|
  24+30       0.3275      0.00  Q          |          |          |         V|
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      U n i t   H y d r o g r a p h   A n a l y s i s

      Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
            Study date  04/10/18 File: PM3723110YR24HRDEV2410.out

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


Program License Serial Number 4061

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

 English Units used in output format



--------------------------------------------------------------------
PARCEL MAP 37231
UNIT HYDROGRAPH STUDY
DEVELOPED CONDITION
10 YEAR, 24 HOUR STORM
--------------------------------------------------------------------
Drainage Area =       8.20(Ac.)  =      0.013 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =       8.20(Ac.)  =      0.013 Sq. Mi.
Length along longest watercourse =     935.00(Ft.)
Length along longest watercourse measured to centroid =     295.00(Ft.)
Length along longest watercourse =      0.177 Mi.
Length along longest watercourse measured to centroid =      0.056 Mi.
Difference in elevation =       3.00(Ft.)
Slope along watercourse =     16.9412 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.036 Hr.
Lag time =     2.18 Min.
25% of lag time =     0.55 Min.
40% of lag time =     0.87 Min.
Unit time =    15.00 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]
        8.20                1.80                  14.76

100 YEAR Area rainfall data:


Area(Ac.)[1]        Rainfall(In)[2]      Weighting[1*2]
        8.20                4.50                  36.90

STORM EVENT (YEAR) =   10.00
Area Averaged 2-Year Rainfall =    1.800(In)
```

Area Averaged 100-Year Rainfall = 4.500(In)

Point rain (area averaged) = 2.911(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.911(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
8.200	56.00	0.900

Total Area Entered = 8.20(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
56.0	56.0	0.511	0.900	0.097	1.000	0.097
					Sum (F) =	0.097

Area averaged mean soil loss (F) (In/Hr) = 0.097
Minimum soil loss rate ((In/Hr)) = 0.049
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.180

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

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.250	686.907	78.171	6.460
2	0.500	1373.814	21.829	1.804
			Sum = 100.000 Sum=	8.264

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

Unit Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.25	0.20	0.023	(0.171)	0.004	0.019
2	0.50	0.30	0.035	(0.169)	0.006	0.029
3	0.75	0.30	0.035	(0.167)	0.006	0.029
4	1.00	0.40	0.047	(0.165)	0.008	0.038
5	1.25	0.30	0.035	(0.163)	0.006	0.029
6	1.50	0.30	0.035	(0.162)	0.006	0.029
7	1.75	0.30	0.035	(0.160)	0.006	0.029
8	2.00	0.40	0.047	(0.158)	0.008	0.038
9	2.25	0.40	0.047	(0.156)	0.008	0.038
10	2.50	0.40	0.047	(0.154)	0.008	0.038
11	2.75	0.50	0.058	(0.152)	0.010	0.048
12	3.00	0.50	0.058	(0.150)	0.010	0.048
13	3.25	0.50	0.058	(0.148)	0.010	0.048
14	3.50	0.50	0.058	(0.146)	0.010	0.048
15	3.75	0.50	0.058	(0.145)	0.010	0.048
16	4.00	0.60	0.070	(0.143)	0.013	0.057
17	4.25	0.60	0.070	(0.141)	0.013	0.057
18	4.50	0.70	0.082	(0.139)	0.015	0.067
19	4.75	0.70	0.082	(0.137)	0.015	0.067
20	5.00	0.80	0.093	(0.136)	0.017	0.076

21	5.25	0.60	0.070	(0.134)	0.013	0.057
22	5.50	0.70	0.082	(0.132)	0.015	0.067
23	5.75	0.80	0.093	(0.130)	0.017	0.076
24	6.00	0.80	0.093	(0.129)	0.017	0.076
25	6.25	0.90	0.105	(0.127)	0.019	0.086
26	6.50	0.90	0.105	(0.125)	0.019	0.086
27	6.75	1.00	0.116	(0.124)	0.021	0.095
28	7.00	1.00	0.116	(0.122)	0.021	0.095
29	7.25	1.00	0.116	(0.120)	0.021	0.095
30	7.50	1.10	0.128	(0.119)	0.023	0.105
31	7.75	1.20	0.140	(0.117)	0.025	0.115
32	8.00	1.30	0.151	(0.115)	0.027	0.124
33	8.25	1.50	0.175	(0.114)	0.031	0.143
34	8.50	1.50	0.175	(0.112)	0.031	0.143
35	8.75	1.60	0.186	(0.111)	0.034	0.153
36	9.00	1.70	0.198	(0.109)	0.036	0.162
37	9.25	1.90	0.221	(0.108)	0.040	0.181
38	9.50	2.00	0.233	(0.106)	0.042	0.191
39	9.75	2.10	0.245	(0.104)	0.044	0.200
40	10.00	2.20	0.256	(0.103)	0.046	0.210
41	10.25	1.50	0.175	(0.101)	0.031	0.143
42	10.50	1.50	0.175	(0.100)	0.031	0.143
43	10.75	2.00	0.233	(0.099)	0.042	0.191
44	11.00	2.00	0.233	(0.097)	0.042	0.191
45	11.25	1.90	0.221	(0.096)	0.040	0.181
46	11.50	1.90	0.221	(0.094)	0.040	0.181
47	11.75	1.70	0.198	(0.093)	0.036	0.162
48	12.00	1.80	0.210	(0.092)	0.038	0.172
49	12.25	2.50	0.291	(0.090)	0.052	0.239
50	12.50	2.60	0.303	(0.089)	0.054	0.248
51	12.75	2.80	0.326	(0.087)	0.059	0.267
52	13.00	2.90	0.338	(0.086)	0.061	0.277
53	13.25	3.40	0.396	(0.085)	0.071	0.325
54	13.50	3.40	0.396	(0.084)	0.071	0.325
55	13.75	2.30	0.268	(0.082)	0.048	0.220
56	14.00	2.30	0.268	(0.081)	0.048	0.220
57	14.25	2.70	0.314	(0.080)	0.057	0.258
58	14.50	2.60	0.303	(0.079)	0.054	0.248
59	14.75	2.60	0.303	(0.077)	0.054	0.248
60	15.00	2.50	0.291	(0.076)	0.052	0.239
61	15.25	2.40	0.279	(0.075)	0.050	0.229
62	15.50	2.30	0.268	(0.074)	0.048	0.220
63	15.75	1.90	0.221	(0.073)	0.040	0.181
64	16.00	1.90	0.221	(0.072)	0.040	0.181
65	16.25	0.40	0.047	(0.071)	0.008	0.038
66	16.50	0.40	0.047	(0.069)	0.008	0.038
67	16.75	0.30	0.035	(0.068)	0.006	0.029
68	17.00	0.30	0.035	(0.067)	0.006	0.029
69	17.25	0.50	0.058	(0.066)	0.010	0.048
70	17.50	0.50	0.058	(0.065)	0.010	0.048
71	17.75	0.50	0.058	(0.064)	0.010	0.048
72	18.00	0.40	0.047	(0.063)	0.008	0.038
73	18.25	0.40	0.047	(0.063)	0.008	0.038
74	18.50	0.40	0.047	(0.062)	0.008	0.038
75	18.75	0.30	0.035	(0.061)	0.006	0.029
76	19.00	0.20	0.023	(0.060)	0.004	0.019
77	19.25	0.30	0.035	(0.059)	0.006	0.029
78	19.50	0.40	0.047	(0.058)	0.008	0.038
79	19.75	0.30	0.035	(0.057)	0.006	0.029
80	20.00	0.20	0.023	(0.057)	0.004	0.019
81	20.25	0.30	0.035	(0.056)	0.006	0.029

82	20.50	0.30	0.035	(0.055)	0.006	0.029
83	20.75	0.30	0.035	(0.054)	0.006	0.029
84	21.00	0.20	0.023	(0.054)	0.004	0.019
85	21.25	0.30	0.035	(0.053)	0.006	0.029
86	21.50	0.20	0.023	(0.053)	0.004	0.019
87	21.75	0.30	0.035	(0.052)	0.006	0.029
88	22.00	0.20	0.023	(0.051)	0.004	0.019
89	22.25	0.30	0.035	(0.051)	0.006	0.029
90	22.50	0.20	0.023	(0.050)	0.004	0.019
91	22.75	0.20	0.023	(0.050)	0.004	0.019
92	23.00	0.20	0.023	(0.050)	0.004	0.019
93	23.25	0.20	0.023	(0.049)	0.004	0.019
94	23.50	0.20	0.023	(0.049)	0.004	0.019
95	23.75	0.20	0.023	(0.049)	0.004	0.019
96	24.00	0.20	0.023	(0.049)	0.004	0.019

(Loss Rate Not Used)

Sum = 100.0 Sum = 9.5

Flood volume = Effective rainfall 2.39(In)
times area 8.2(Ac.)/[(In)/(Ft.)] = 1.6(Ac.Ft)
Total soil loss = 0.52(In)
Total soil loss = 0.358(Ac.Ft)
Total rainfall = 2.91(In)
Flood volume = 71046.1 Cubic Feet
Total soil loss = 15595.5 Cubic Feet

Peak flow rate of this hydrograph = 2.684(CFS)

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

Hydrograph in 15 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0 2.5 5.0 7.5 10.0
0+15	0.0025	0.12	Q
0+30	0.0071	0.22	Q
0+45	0.0120	0.24	Q
1+ 0	0.0181	0.30	VQ
1+15	0.0234	0.25	VQ
1+30	0.0283	0.24	Q
1+45	0.0332	0.24	Q
2+ 0	0.0394	0.30	VQ
2+15	0.0459	0.32	|Q
2+30	0.0524	0.32	|Q
2+45	0.0602	0.38	|Q
3+ 0	0.0684	0.39	|Q
3+15	0.0765	0.39	|Q
3+30	0.0847	0.39	|QV
3+45	0.0928	0.39	|QV
4+ 0	0.1022	0.46	|QV
4+15	0.1120	0.47	|QV
4+30	0.1231	0.54	| QV
4+45	0.1345	0.55	| QV
5+ 0	0.1472	0.61	| QV
5+15	0.1577	0.51	| QV
5+30	0.1688	0.54	| Q V
5+45	0.1815	0.61	| Q V
6+ 0	0.1945	0.63	| Q V
6+15	0.2088	0.69	| Q V

6+30	0.2235	0.71	
6+45	0.2395	0.77	
7+ 0	0.2558	0.79	
7+15	0.2721	0.79	
7+30	0.2897	0.85	
7+45	0.3089	0.93	
8+ 0	0.3297	1.01	
8+15	0.3535	1.15	
8+30	0.3779	1.18	
8+45	0.4037	1.25	
9+ 0	0.4311	1.32	
9+15	0.4613	1.47	
9+30	0.4936	1.56	
9+45	0.5275	1.64	
10+ 0	0.5630	1.72	
10+15	0.5900	1.30	
10+30	0.6144	1.18	
10+45	0.6453	1.49	
11+ 0	0.6779	1.58	
11+15	0.7092	1.52	
11+30	0.7402	1.50	
11+45	0.7687	1.38	
12+ 0	0.7977	1.40	
12+15	0.8360	1.85	
12+30	0.8780	2.04	
12+45	0.9230	2.18	
13+ 0	0.9699	2.27	
13+15	1.0236	2.60	
13+30	1.0790	2.68	
13+45	1.1205	2.01	
14+ 0	1.1580	1.82	
14+15	1.2006	2.06	
14+30	1.2433	2.07	
14+45	1.2858	2.05	
15+ 0	1.3269	1.99	
15+15	1.3664	1.91	
15+30	1.4043	1.83	
15+45	1.4367	1.57	
16+ 0	1.4677	1.50	
16+15	1.4795	0.57	
16+30	1.4860	0.32	
16+45	1.4913	0.25	
17+ 0	1.4962	0.24	
17+15	1.5036	0.36	
17+30	1.5118	0.39	
17+45	1.5199	0.39	
18+ 0	1.5268	0.33	
18+15	1.5333	0.32	
18+30	1.5399	0.32	
18+45	1.5451	0.25	
19+ 0	1.5487	0.18	
19+15	1.5533	0.22	
19+30	1.5594	0.30	
19+45	1.5647	0.25	
20+ 0	1.5683	0.18	
20+15	1.5728	0.22	
20+30	1.5777	0.24	
20+45	1.5826	0.24	
21+ 0	1.5862	0.18	
21+15	1.5908	0.22	
21+30	1.5944	0.18	

```
   21+45       1.5989      0.22  Q          |          |          |         V|
   22+ 0       1.6026      0.18  Q          |          |          |         V|
   22+15       1.6071      0.22  Q          |          |          |         V|
   22+30       1.6107      0.18  Q          |          |          |         V|
   22+45       1.6140      0.16  Q          |          |          |         V|
   23+ 0       1.6172      0.16  Q          |          |          |         V|
   23+15       1.6205      0.16  Q          |          |          |         V|
   23+30       1.6238      0.16  Q          |          |          |         V|
   23+45       1.6270      0.16  Q          |          |          |         V|
   24+ 0       1.6303      0.16  Q          |          |          |         V|
   24+15       1.6310      0.03  Q          |          |          |         V|
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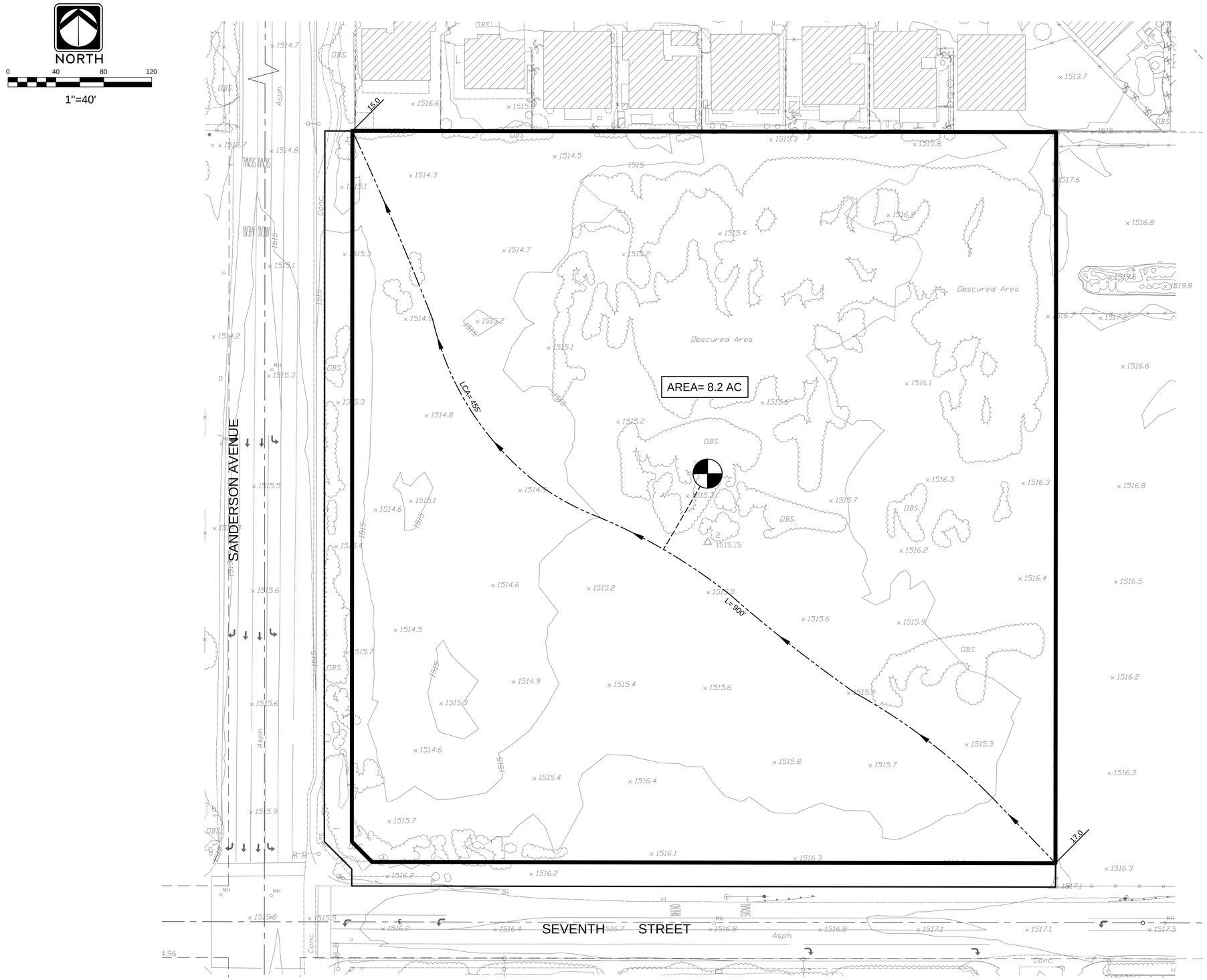


DATE PREPARED: MARCH, 2018

DIG ALERT
DIAL TOLL FREE
1-800-227-2600
AT LEAST TWO DAYS BEFORE YOU DIG
UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA

DATE	BY	MARK		APPR.	DATE

ENGINEER — REVISIONS — CITY
DESIGNED BY: DRAWN BY: CHECKED BY:

SEAL: REGISTERED PROFESSIONAL ENGINEER — TREA — No. 46354 — CIVIL — STATE OF CALIFORNIA

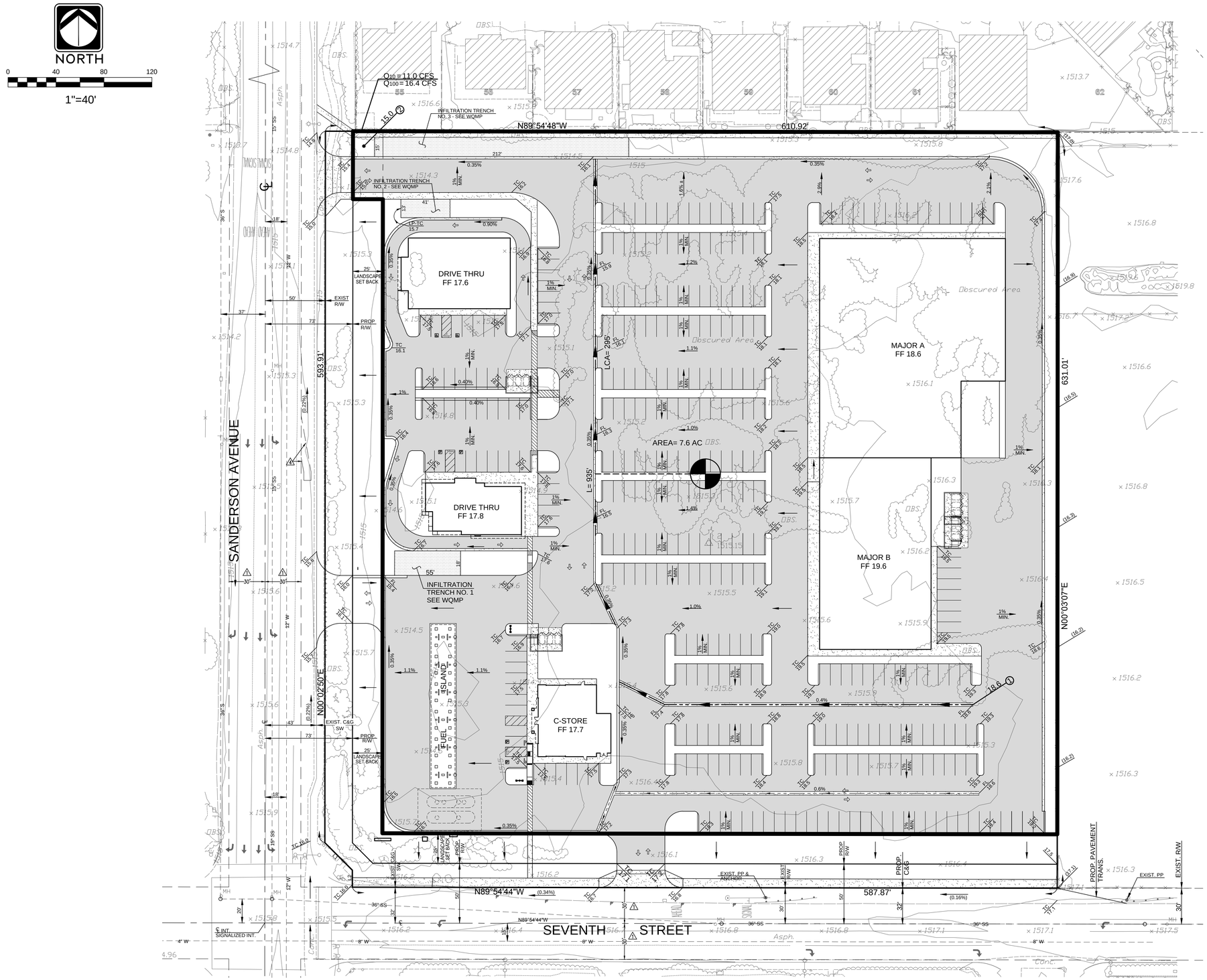
APPROVED BY: DATE
CITY ENGINEER
R.C.E. NO. EXP. DATE
PREPARED BY: DATE
R.C.E. NO. EXP. DATE

BLAINE A. WOMER
CIVIL ENGINEERING
•PLANNING •SURVEYING •CIVIL ENGINEERING •PUBLIC WORKS
Hemet, CA. 92544, 41555 E Florida Ave., Suite G, Phone (951)658-1727 Fax (951)658-6347
Park City, UT 84098, 5133 Cove Canyon Dr. #302, Phone/Fax (435)615-1489

SCALE 1"= 40'
DATE MARCH, 2018
BENCHMARK:

CITY OF SAN JACINTO
TENTATIVE PARCEL MAP NO. 37231
RANCHO ESTUDILLO PLAZA
UNIT HYDROGRAPH EXHIBIT
FOR PANORAMA DEV. W.O.

SHEET NO. 1 OF 1 SHEETS
FILE NO.



LEGEND

- DRAINAGE BOUNDARY
- NODE NUMBER
- FLOW PATH

LINE DATA

NO.	BEARING	DISTANCE
L1	N45°01'56"W	32.48'
L2	N00°02'47"E	14.14'

DATE PREPARED: MARCH, 2018

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SHEET NO. 1 OF 2 SHEETS
FILE NO.