PRELIMINARY HYDROLOGY STUDY

for

MA 20004

PREPARED FOR:

SPACE CENTER MIRA LOMA, INC.
3401 ETIWANDA AVENUE
CITY OF JURUPA VALLEY, CA

Prepared by:

KCT CONSULTANTS, INC.

Prepared under the direction of:

____

Teresito N. Tabiolo, RCE 38826
Exp. Date: 03-31-2021

Prepared:

February 26, 2021

TABLE OF CONTENTS

GENERAL DISCUSSION

This Hydrology Study is prepared in conjunction with the proposed development known as Space Center Redwood Project-City of Jurupa Valley. The project site is located west of Space Center Court between 7th Street and 10th Street in Jurupa Valley California. Manitou Court and "C" Street extend north and south within the eastern portion of the project. The property is approximately 105 acres more or less. The site is industrial property developed with ten large warehouse buildings, associated pavements, drive areas and roads. In addition, industrial rail spurs exist on the site. The existing site elevation range from 818 feet with a gentle downward slope from north to south. This site is located in the Santa Ana River Basin Watershed. The Santa Ana Region consists of connected inland basin and open coastal basins drained by surface streams flowing southwestward toward Prado Dam. Day Creek Channel is an existing concrete trapezoidal channel which carries the ultimate developed flows of 100 year storm event.

HYDROLOGIC METHODOLOGY

For this study we used CIVILCADD/CIVILDESIGN Engineering Software which complies with the criteria set forth by Riverside County Flood Control and Water Conservation District. Runoff coefficients are determined using Soil Group A as shown for the Guasti area on the Group Soil Map. The rainfall intensity is based on the Riverside County Standard intensity-duration curves data, provided by the software.

Hydrology calculations were done for the 10 year and the 100 year ultimate (proposed) storm flows for the project site. However, the existing conditions were not performed because the project storm flows directly into an improved conveyance channel (Day Creek Channel) which has the capacity to handle the 100 year storm event.

EXISTING STORM DRAIN:

Day Creek MDP-Line "N" Storm Drain. This storm drain is located on Space Center Court and was constructed per Plot Plan 15520.

Day Creek MDP-Line "O" Storm Drain. This storm drain is located on "C" Street and was constructed per Plot Plan 15520.

Line "A" Storm Drain. This storm drain in located on site and was constructed per Plot Plan 16588.

Lateral "A-4" Storm Drain. This storm drain is located on site and it also an extension of Line "A" Storm Drain.

Line "B" Storm Drain. This storm drain is located on site and was constructed per Plot Plan 16588.

SEE REFERENCE PLANS FOR LOCATION OF THE STORM DRAIN SYSTEM LISTED ABOVE.

PROPOSED SITE IMPROVEMENTS

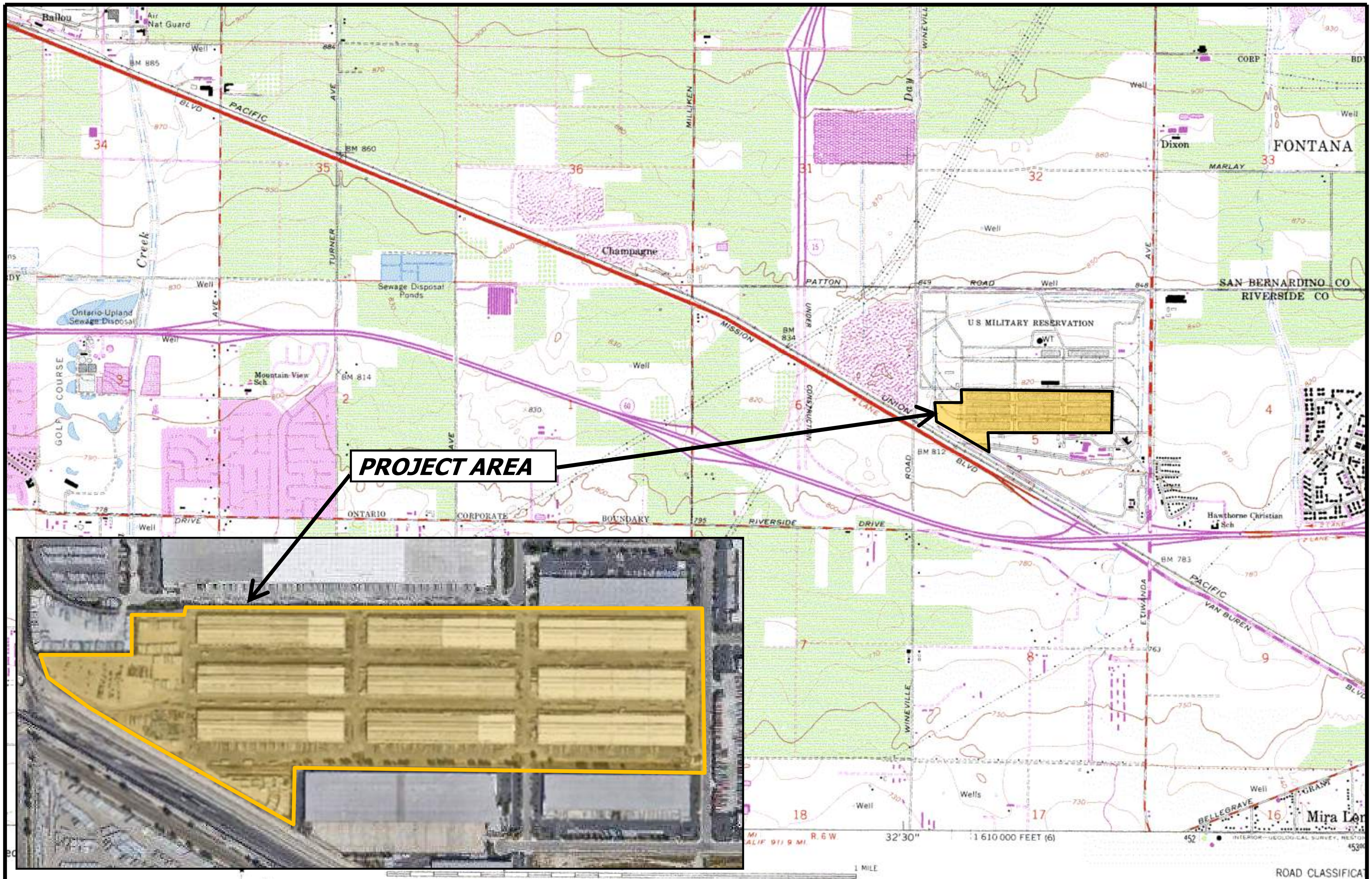
Space Center Mira Loma, Inc. is proposing to develop a 105.59 Acres property located in the Space Center Mira Loma, Inc. complex in the City of Jurupa Valley, CA. The existing property contains nine (9) redwood buildings and one (1) concrete tilt up building. The existing nine (9) redwood buildings will be demolished and will be replaced with two commercial building. All existing redwood lumber will be removed, cleaned, and resurfaced for building material use. The existing concrete tilt-up building will remain in place. The proposed buildings are as follows: Parcel 1 will contain one (1) commercial building with approximately 1,379,480 square feet of floor space and its subsequent site improvements. Parcel 2 will contain one (1) commercial building with approximately 560,330 square feet of floor space and its subsequent site improvements. Parcel 3 will contain the existing concrete tilt up building and its existing site improvement. This existing building contains 172,800 square feet of floor space. All proposed commercial buildings will be a concrete tilt-up.

All on-site storm flows will be collected by storm drain or surface drainage into an underground Detention/Retention basin to satisfy the WQMP criteria for treating the on-site storm water. The 100 year storm flows will exit the underground chamber and it will be connected to the existing storm drain listed under the heading Existing Storm Drain. The outlet flow coming out of the underground chambers will be less than or equal to the tabulated flows entering said storm drain system. Therefore, no further actions are required. If the outlet flow is greater than the tabulated flow entering the existing storm drain, a hydraulic grade line will be calculated to show that the existing storm drain has the capacity to handle the increase run off.

All existing and proposed storm drain system outlets into Day Creek Channel.

Maps and Figures

Site Location Map
Receiving Waters Map
Hydrologic Soils Group Map for Guasti`
Intensity Duration Curves for Mira Loma Area.



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SPACE CENTER DISTRIBUTION CENTER

N W E S

VICINITY MAP

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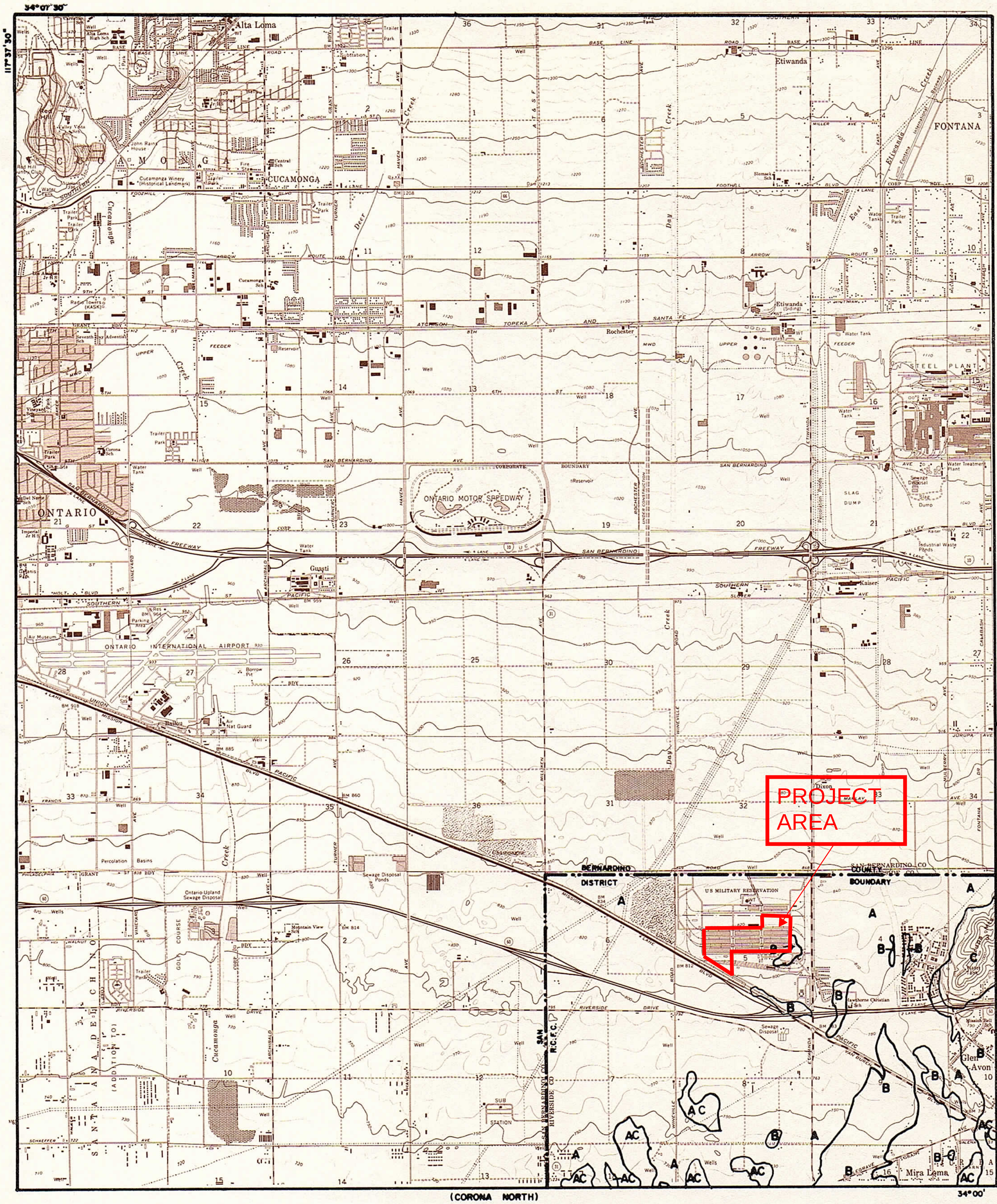
FLOW MAP



LEGEND

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

RCFC & WCD

HYDROLOGY MANUAL

0 FEET 5000

HYDROLOGIC SOILS GROUP MAP FOR GUASTI

PLATE C-1.02

RAINFALL INTENSITY—INCHES PER HOUR

MIRA LOMA			MURRIETA - TEMECULA & RANCHO CALIFORNIA			NORCO			PALM SPRINGS			PERRIS VALLEY		
DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY	
	10 YEAR	100 YEAR		10 YEAR	100 YEAR		10 YEAR	100 YEAR		10 YEAR	100 YEAR		10 YEAR	100 YEAR
5	2.84	4.48	5	3.45	5.10	5	2.77	4.16	5	4.23	6.76	5	2.64	3.78
6	2.58	4.07	6	3.12	4.61	6	2.53	3.79	6	3.80	6.08	6	2.41	3.46
7	2.37	3.75	7	2.87	4.24	7	2.34	3.51	7	3.48	5.56	7	2.24	3.21
8	2.21	3.49	8	2.67	3.94	8	2.19	3.29	8	3.22	5.15	8	2.09	3.01
9	2.08	3.28	9	2.50	3.69	9	2.07	3.10	9	3.01	4.81	9	1.98	2.84
10	1.96	3.10	10	2.36	3.48	10	1.96	2.94	10	2.83	4.52	10	1.88	2.69
11	1.87	2.95	11	2.24	3.30	11	1.87	2.80	11	2.67	4.28	11	1.79	2.57
12	1.78	2.82	12	2.13	3.15	12	1.79	2.68	12	2.54	4.07	12	1.72	2.46
13	1.71	2.70	13	2.04	3.01	13	1.72	2.58	13	2.43	3.88	13	1.65	2.37
14	1.64	2.60	14	1.96	2.89	14	1.66	2.48	14	2.33	3.72	14	1.59	2.29
15	1.58	2.50	15	1.89	2.79	15	1.60	2.40	15	2.23	3.58	15	1.54	2.21
16	1.53	2.42	16	1.82	2.69	16	1.55	2.32	16	2.15	3.44	16	1.49	2.14
17	1.48	2.34	17	1.76	2.60	17	1.50	2.25	17	2.08	3.32	17	1.45	2.08
18	1.44	2.27	18	1.71	2.52	18	1.46	2.19	18	2.01	3.22	18	1.41	2.02
19	1.40	2.21	19	1.66	2.45	19	1.42	2.13	19	1.95	3.12	19	1.37	1.97
20	1.36	2.15	20	1.61	2.38	20	1.39	2.08	20	1.89	3.03	20	1.34	1.92
22	1.29	2.04	22	1.53	2.26	22	1.32	1.98	22	1.79	2.86	22	1.28	1.83
24	1.24	1.95	24	1.46	2.15	24	1.26	1.90	24	1.70	2.72	24	1.22	1.75
26	1.18	1.87	26	1.39	2.06	26	1.22	1.82	26	1.62	2.60	26	1.18	1.69
28	1.14	1.80	28	1.34	1.98	28	1.17	1.76	28	1.56	2.49	28	1.13	1.63
30	1.10	1.73	30	1.29	1.90	30	1.13	1.70	30	1.49	2.39	30	1.10	1.57
32	1.06	1.67	32	1.24	1.84	32	1.10	1.64	32	1.44	2.30	32	1.06	1.52
34	1.03	1.62	34	1.20	1.78	34	1.06	1.59	34	1.39	2.22	34	1.03	1.48
36	1.00	1.57	36	1.17	1.72	36	1.03	1.55	36	1.34	2.15	36	1.00	1.44
38	.97	1.53	38	1.13	1.67	38	1.01	1.51	38	1.30	2.09	38	.98	1.40
40	.94	1.49	40	1.10	1.62	40	.98	1.47	40	1.27	2.02	40	.95	1.37
45	.89	1.40	45	1.03	1.52	45	.92	1.39	45	1.18	1.89	45	.90	1.29
50	.84	1.32	50	.97	1.44	50	.88	1.31	50	1.11	1.78	50	.85	1.22
55	.80	1.26	55	.92	1.36	55	.84	1.25	55	1.05	1.68	55	.81	1.17
60	.76	1.20	60	.88	1.30	60	.80	1.20	60	1.00	1.60	60	.78	1.12
65	.73	1.15	65	.84	1.24	65	.77	1.15	65	.95	1.53	65	.75	1.08
70	.70	1.11	70	.81	1.19	70	.74	1.11	70	.91	1.46	70	.72	1.04
75	.68	1.07	75	.78	1.15	75	.72	1.07	75	.88	1.41	75	.70	1.00
80	.65	1.03	80	.75	1.11	80	.69	1.04	80	.85	1.35	80	.68	.97
85	.63	1.00	85	.73	1.07	85	.67	1.01	85	.82	1.31	85	.66	.94
SLOPE = .530			SLOPE = .550			SLOPE = .500			SLOPE = .580			SLOPE = .490		

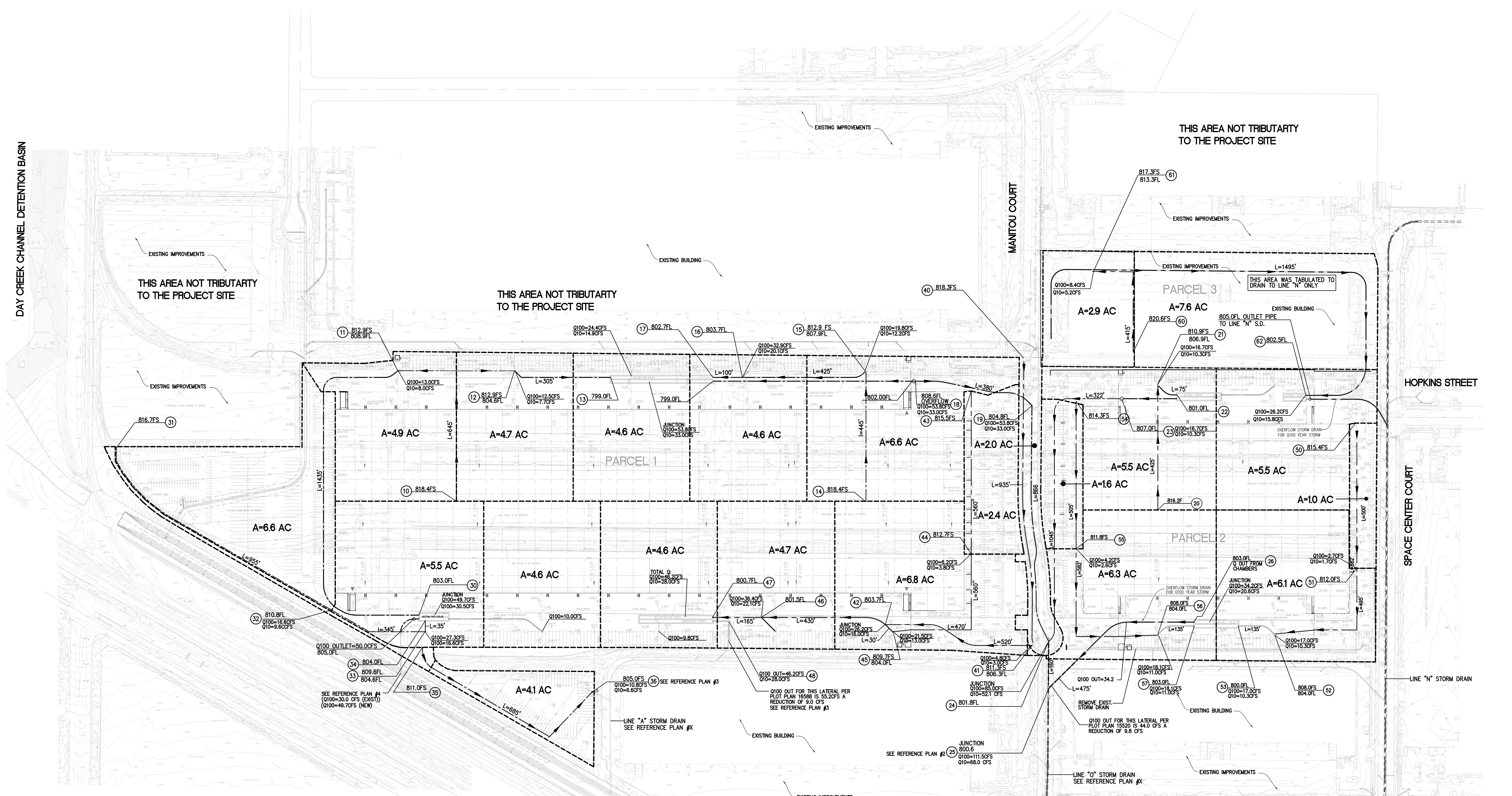
RCFC & WCD

HYDROLOGY MANUAL

STANDARD
INTENSITY—DURATION
CURVES DATA

Rational Method Hydrology

Hydrology Map
10 Year Rational Method Calculations
100 Year Rational Method Calculations



FLOW SUMMARY TABLE

NODE #	Q10 (CFS)	Q100 (CFS)	
10			
			Initial Subarea
11	8.0	13.0	
			Pipeflow Travel Time
30	14.0	23.1	Subarea Flow Addition and Confluence of Main Stream 1 of 2
31			
			Initial Subarea
32	9.6	15.6	
			Surface Flow Travel
33	16.7	27.3	Subarea Flow Addition
			Pipeflow Travel Time
34	30.4	49.7	Confluence Result with Nodes 30 and 32
35			
			Initial Subarea
36	6.6	10.8	
40			
			Initial Subarea
41	3.0	4.8	
			Pipeflow Travel Time
42	3.0	4.8	Confluence of Main Stream 1 of 2
43			
			Initial Subarea
44	3.8	6.2	
			Surface Flow Travel
45	13.0	21.5	Subarea Flow Addition
			Pipeflow Travel Time
42	16.0	26.3	Confluence Result with Nodes 41 and 42
			Pipeflow Travel Time
46	6.1	36.4	Subare Flow Addition
			Pipeflow Travel Time
47	28.0	46.2	Subarea Flow Addition
50			
			Initial Subarea
51	1.7	2.4	
			Surface Flow Travel
52	10.3	17.0	Subarea Flow Addition
			Pipeflow Travel Time
53	10.3	17.0	Confluence of Main Stream 1 of 2
54			
			Initial Subarea
55	2.6	4.2	
			Surface Flow Travel
56	11.0	18.1	Subarea Flow Addition
			Pipeflow Travel Time
57	20.7	34.2	Confluence Result with Nodes 52 and 53
60			
			Initial Subarea
61	5.2	4.4	
			Pipeflow Travel Time
62	15.8	26.2	Subarea Addition

FLOW SUMMARY TABLE

NODE #	Q10 (CFS)	Q100 (CFS)	
10			
			Initial Subarea
12	7.7	12.5	
			Pipeflow Travel Time
13	14.9	24.4	Subarea Flow Addition and Confluence of Main Stream 1 of 2
14			
			Initial Subarea
15	12.2	19.8	
			Pipeflow Travel Time
16	20.1	32.9	Subarea Flow Addition
			Pipeflow Travel Time
17	33.0	53.8	Confluence Result with Nodes 13 and 14
18			
			Pipeflow Travel Time
19	33.0	53.8	
			Pipeflow Travel Time
24	33.0	53.8	Main Stream Confluence. Stream 1 of 2
			Initial Subarea
20			
			Initial Subarea
21	10.3	16.7	
			Pipeflow Travel Time
22	20.4	33.2	Subarea Flow Addition
			Initial Subarea
23	20.4	33.2	Flow Out of Underground Chamber
			Pipeflow Travel Time
24	52.1	85.0	Confluence Result with Nodes 19 and 24. Stream 2 of 2. Connect to Line "O" Storm Drain. See Reference 2.

NOTE:

SEE SHEET 2 OF 2 FOR TYPICAL UNDERGROUND BASIN AND OUTLET OVERFLOW PIPE

HYDROLOGY MAP

1"=120'

hpa, inc.
18831 bardeen avenue - ste. #100
irvine, ca
92612
tel: 949•863•1770
fax: 949•863•0851
email: hpa@hparchs.com

Owner:

SPACE CENTER
1000 quail street, suite 190
newport beach, ca
92660
tel: 949-685-5221
fax: 949-685-3478

Project:

DISTRIBUTION FACILITY

Manitou Court
jurupa valley, ca

Consultants:

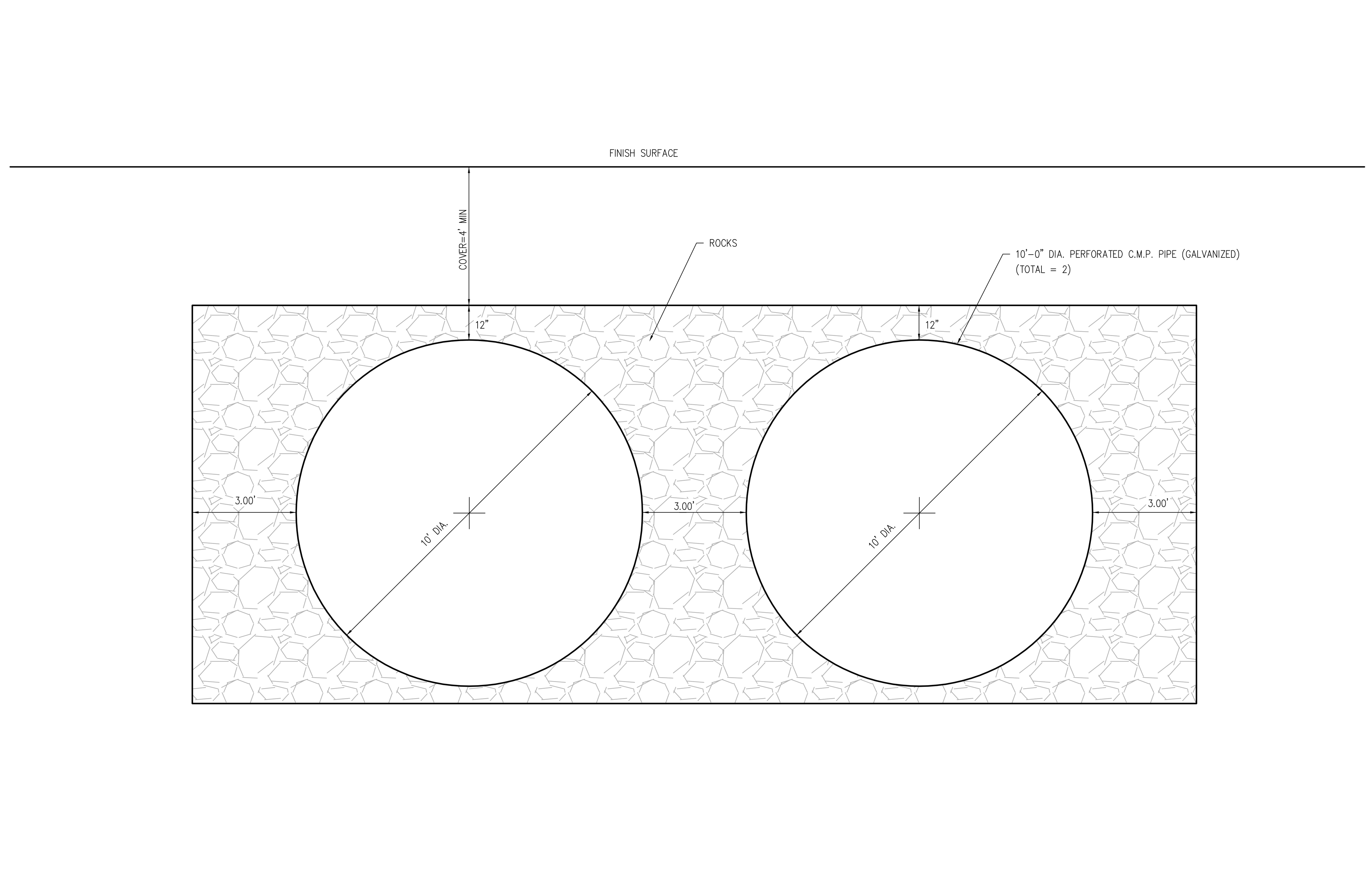
KCT CONSULTANTS, INC.
Civil Engineers - Surveyors - Planners

Title:
CONCEPTUAL GRADING PLAN

Project Number: 1009-38
Drawn by: TNT
Date: 01-07-2020
Revision:

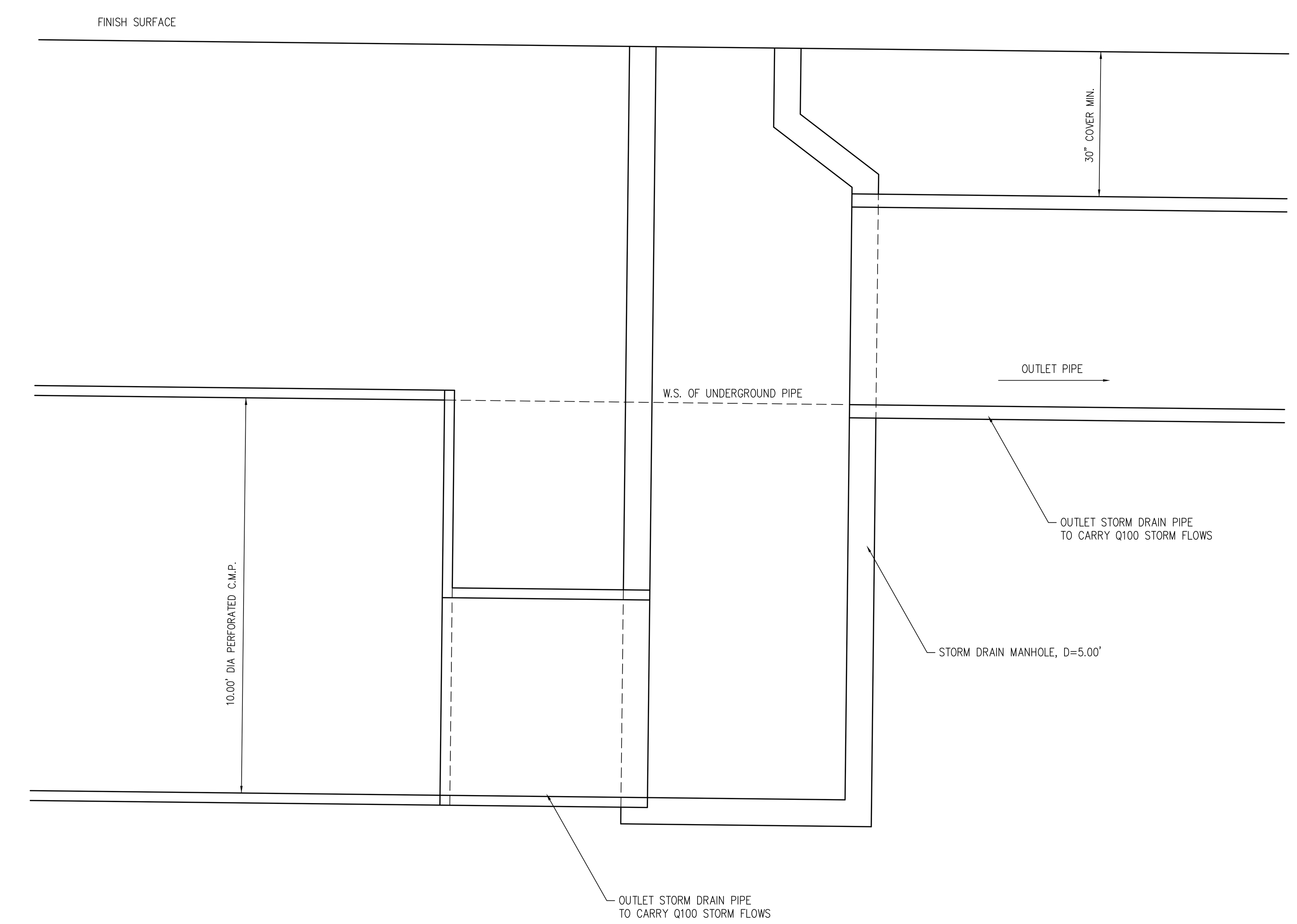
Sheet:

1 OF 2



TYPICAL UNDERGROUND BASIN

NOT TO SCALE



TYPICAL OUTLET OVERFLOW PIPE

NOT TO SCALE

hpa, inc.
18831 bardeen avenue - ste. #100
irvine, ca
92612
tel: 949•863•1770
fax: 949•863•0851
email: hpa@hparchs.com

Owner:

SPACE CENTER

1000 quail street, suite 190
newport beach, ca
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tel: 949-685-5221
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55	2.6	4.2	
			Surface Flow Travel
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			Pipeflow Travel Time
17	33.0	53.8	Confluence Result with Nodes 13 and 14
18			
			Pipeflow Travel Time
19	33.0	53.8	
			Pipeflow Travel Time
24	33.0	53.8	Main Stream Confluence. Stream 1 of 2
			Initial Subarea
20			
			Initial Subarea
21	10.3	16.7	
			Pipeflow Travel Time
22	20.4	33.2	Subarea Flow Addition
			Initial Subarea
23	20.4	33.2	Flow Out of Underground Chamber
			Pipeflow Travel Time
24	52.1	85.0	Confluence Result with Nodes 19 and 24. Stream 2 of 2. Connect to Line "O" Storm Drain. See Reference 2.

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                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
        Rational Hydrology Study        Date: 02/26/21  File:redwood10proposed1.out
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

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

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Program License Serial Number 6025

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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 [ Mira Loma ] area used.
10 year storm 10 minute intensity =  1.960(In/Hr)
10 year storm 60 minute intensity =  0.760(In/Hr)
100 year storm 10 minute intensity =  3.100(In/Hr)
100 year storm 60 minute intensity =  1.200(In/Hr)

Storm event year =  10.0
Calculated rainfall intensity data:
1 hour intensity =  0.760(In/Hr)
Slope of intensity duration curve = 0.5300


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station       11.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   645.000(Ft.)
Top (of initial area) elevation =   818.400(Ft.)
Bottom (of initial area) elevation =   812.900(Ft.)
Difference in elevation =     5.500(Ft.)
Slope =    0.00853  s(percent)=       0.85
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.346 min.
Rainfall intensity =      1.929(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.846
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      8.002(CFS)
Total initial stream area =        4.900(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station       30.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   808.900(Ft.)
Downstream point/station elevation =   803.000(Ft.)
Pipe length  =  1435.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.002(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     8.002(CFS)
Normal flow depth in pipe =   14.04(In.)
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Flow top width inside pipe =   19.77(In.)
Critical Depth =   12.58(In.)
Pipe flow velocity =      4.68(Ft/s)
Travel time through pipe =    5.11 min.
Time of concentration (TC) =    15.46 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station      30.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.842
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    15.46 min.
Rainfall intensity =      1.559(In/Hr) for a    10.0 year storm
Subarea runoff =      6.040(CFS) for      4.600(Ac.)
Total runoff =     14.042(CFS)  Total area =       9.500(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station      30.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      9.500(Ac.)
Runoff from this stream =     14.042(CFS)
Time of concentration =   15.46 min.
Rainfall intensity =     1.559(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       31.000 to Point/Station      32.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   955.000(Ft.)
Top (of initial area) elevation =   816.700(Ft.)
Bottom (of initial area) elevation =   810.800(Ft.)
Difference in elevation =     5.900(Ft.)
Slope =    0.00618  s(percent)=       0.62
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.911 min.
Rainfall intensity =      1.716(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.844
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      9.556(CFS)
Total initial stream area =        6.600(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       32.000 to Point/Station      33.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   810.800(Ft.)
End of street segment elevation =   809.600(Ft.)
Length of street segment  =   344.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
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Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     13.163(CFS)
Depth of flow =   0.492(Ft.), Average velocity =   1.897(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.281(Ft.)
Flow velocity =   1.90(Ft/s)
Travel time =    3.02 min.     TC =   15.93  min.
 Adding area flow to street
COMMERCIAL subarea type
Runoff Coefficient = 0.842
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      1.535(In/Hr) for a    10.0 year storm
Subarea runoff =      7.104(CFS) for      5.500(Ac.)
Total runoff =     16.660(CFS)  Total area =      12.100(Ac.)
Street flow at end of street =     16.660(CFS)
Half street flow at end of street =      8.330(CFS)
Depth of flow =   0.532(Ft.), Average velocity =   1.954(Ft/s)
Warning: depth of flow exceeds top of curb
Distance that curb overflow reaches into property =    1.30(Ft.)
Flow width (from curb towards crown)=  20.287(Ft.)


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Process from Point/Station       33.000 to Point/Station       34.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   804.600(Ft.)
Downstream point/station elevation =   804.000(Ft.)
Pipe length  =    35.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    16.660(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    16.660(CFS)
Normal flow depth in pipe =   14.25(In.)
Flow top width inside pipe =   19.62(In.)
Critical Depth =   18.00(In.)
Pipe flow velocity =      9.59(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =    15.99 min.


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Process from Point/Station       33.000 to Point/Station       34.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     12.100(Ac.)
Runoff from this stream =     16.660(CFS)
Time of concentration =   15.99 min.
Rainfall intensity =     1.532(In/Hr)
Summary of stream data:

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


1       14.042     15.46                 1.559
2       16.660     15.99                 1.532
Largest stream flow has longer time of concentration
```

```
Qp =      16.660 + sum of
           Qb          Ia/Ib
           14.042 *     0.982 =      13.791
Qp =      30.451

Total of 2 main streams to confluence:
Flow rates before confluence point:
      14.042      16.660
Area of streams before confluence:
        9.500       12.100


Results of confluence:
Total flow rate =      30.451(CFS)
Time of concentration =    15.993 min.
Effective stream area after confluence  =     21.600(Ac.)


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Process from Point/Station       35.000 to Point/Station       36.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =    685.000(Ft.)
Top (of initial area) elevation =   811.000(Ft.)
Bottom (of initial area) elevation =   805.000(Ft.)
Difference in elevation =     6.000(Ft.)
Slope =    0.00876  s(percent)=      0.88
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.542 min.
Rainfall intensity =      1.910(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.846
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      6.628(CFS)
Total initial stream area =        4.100(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       40.000 to Point/Station       41.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =    955.000(Ft.)
Top (of initial area) elevation =   818.300(Ft.)
Bottom (of initial area) elevation =   811.300(Ft.)
Difference in elevation =     7.000(Ft.)
Slope =    0.00733  s(percent)=      0.73
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.477 min.
Rainfall intensity =      1.747(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.844
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.950(CFS)
Total initial stream area =        2.000(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       41.000 to Point/Station       42.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   806.300(Ft.)
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Downstream point/station elevation =   803.700(Ft.)
Pipe length  =   520.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.950(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     2.950(CFS)
Normal flow depth in pipe =    8.78(In.)
Flow top width inside pipe =   14.78(In.)
Critical Depth =    8.29(In.)
Pipe flow velocity =      3.96(Ft/s)
Travel time through pipe =    2.19 min.
Time of concentration (TC) =    14.67 min.


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Process from Point/Station       41.000 to Point/Station       42.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      2.000(Ac.)
Runoff from this stream =      2.950(CFS)
Time of concentration =   14.67 min.
Rainfall intensity =     1.604(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station       43.000 to Point/Station       44.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   560.000(Ft.)
Top (of initial area) elevation =   815.500(Ft.)
Bottom (of initial area) elevation =   812.700(Ft.)
Difference in elevation =     2.800(Ft.)
Slope =    0.00500  s(percent)=       0.50
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.879 min.
Rainfall intensity =      1.879(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.846
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      3.814(CFS)
Total initial stream area =        2.400(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       44.000 to Point/Station       45.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   812.700(Ft.)
End of street segment elevation =   809.700(Ft.)
Length of street segment  =   470.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      8.482(CFS)
Depth of flow =   0.399(Ft.), Average velocity =   2.145(Ft/s)
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Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  13.603(Ft.)
Flow velocity =   2.15(Ft/s)
Travel time =    3.65 min.     TC =   14.53  min.
 Adding area flow to street
COMMERCIAL subarea type
Runoff Coefficient = 0.843
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      1.611(In/Hr) for a    10.0 year storm
Subarea runoff =      9.233(CFS) for      6.800(Ac.)
Total runoff =     13.047(CFS)  Total area =       9.200(Ac.)
Street flow at end of street =     13.047(CFS)
Half street flow at end of street =      6.524(CFS)
Depth of flow =   0.450(Ft.), Average velocity =   2.380(Ft/s)
Flow width (from curb towards crown)=  16.170(Ft.)


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Process from Point/Station       45.000 to Point/Station       42.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   804.000(Ft.)
Downstream point/station elevation =   803.700(Ft.)
Pipe length  =    30.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    13.047(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    13.047(CFS)
Normal flow depth in pipe =   14.51(In.)
Flow top width inside pipe =   19.41(In.)
Critical Depth =   16.13(In.)
Pipe flow velocity =      7.36(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =    14.60 min.


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Process from Point/Station       45.000 to Point/Station       42.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      9.200(Ac.)
Runoff from this stream =     13.047(CFS)
Time of concentration =   14.60 min.
Rainfall intensity =     1.607(In/Hr)
Summary of stream data:

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


1        2.950     14.67                 1.604
2       13.047     14.60                 1.607
Largest stream flow has longer or shorter time of concentration
Qp =     13.047 + sum of
          Qa           Tb/Ta
           2.950 *    0.995 =      2.936
Qp =     15.984

Total of 2 main streams to confluence:
Flow rates before confluence point:
       2.950      13.047
Area of streams before confluence:
        2.000        9.200


Results of confluence:
Total flow rate =     15.984(CFS)
Time of concentration =    14.599 min.
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Effective stream area after confluence  =     11.200(Ac.)


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Process from Point/Station       42.000 to Point/Station       46.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   803.700(Ft.)
Downstream point/station elevation =   801.500(Ft.)
Pipe length  =   430.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    15.984(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    15.984(CFS)
Normal flow depth in pipe =   19.41(In.)
Flow top width inside pipe =   18.88(In.)
Critical Depth =   17.31(In.)
Pipe flow velocity =      5.87(Ft/s)
Travel time through pipe =    1.22 min.
Time of concentration (TC) =    15.82 min.


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Process from Point/Station       42.000 to Point/Station       46.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.842
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    15.82 min.
Rainfall intensity =      1.541(In/Hr) for a    10.0 year storm
Subarea runoff =      6.094(CFS) for      4.700(Ac.)
Total runoff =     22.078(CFS)  Total area =      15.900(Ac.)


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Process from Point/Station       46.000 to Point/Station       47.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   801.500(Ft.)
Downstream point/station elevation =   800.700(Ft.)
Pipe length  =   165.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    22.078(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    22.078(CFS)
Normal flow depth in pipe =   22.78(In.)
Flow top width inside pipe =   19.61(In.)
Critical Depth =   19.72(In.)
Pipe flow velocity =      6.17(Ft/s)
Travel time through pipe =    0.45 min.
Time of concentration (TC) =    16.26 min.


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Process from Point/Station       46.000 to Point/Station       47.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.841
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    16.26 min.
Rainfall intensity =      1.518(In/Hr) for a    10.0 year storm
Subarea runoff =      5.875(CFS) for      4.600(Ac.)
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Total runoff =     27.953(CFS)  Total area =      20.500(Ac.)


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Process from Point/Station       50.000 to Point/Station       51.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   500.000(Ft.)
Top (of initial area) elevation =   815.400(Ft.)
Bottom (of initial area) elevation =   812.000(Ft.)
Difference in elevation =     3.400(Ft.)
Slope =    0.00680  s(percent)=       0.68
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.777 min.
Rainfall intensity =      1.988(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.847
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.684(CFS)
Total initial stream area =        1.000(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       51.000 to Point/Station       52.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   812.000(Ft.)
End of street segment elevation =   808.000(Ft.)
Length of street segment  =   495.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      6.036(CFS)
Depth of flow =   0.352(Ft.), Average velocity =   2.166(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  11.255(Ft.)
Flow velocity =   2.17(Ft/s)
Travel time =    3.81 min.     TC =   13.59  min.
 Adding area flow to street
COMMERCIAL subarea type
Runoff Coefficient = 0.843
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      1.670(In/Hr) for a    10.0 year storm
Subarea runoff =      8.591(CFS) for      6.100(Ac.)
Total runoff =     10.275(CFS)  Total area =       7.100(Ac.)
Street flow at end of street =     10.275(CFS)
Half street flow at end of street =      5.138(CFS)
Depth of flow =   0.407(Ft.), Average velocity =   2.457(Ft/s)
Flow width (from curb towards crown)=  14.016(Ft.)


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Process from Point/Station       52.000 to Point/Station       53.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   804.000(Ft.)
Downstream point/station elevation =   800.000(Ft.)
Pipe length  =   135.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    10.275(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =    10.275(CFS)
Normal flow depth in pipe =   11.39(In.)
Flow top width inside pipe =   12.82(In.)
Critical depth could not be calculated.
Pipe flow velocity =     10.29(Ft/s)
Travel time through pipe =    0.22 min.
Time of concentration (TC) =    13.80 min.


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Process from Point/Station       52.000 to Point/Station       53.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      7.100(Ac.)
Runoff from this stream =     10.275(CFS)
Time of concentration =   13.80 min.
Rainfall intensity =     1.656(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station       54.000 to Point/Station       55.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   505.000(Ft.)
Top (of initial area) elevation =   814.300(Ft.)
Bottom (of initial area) elevation =   811.800(Ft.)
Difference in elevation =     2.500(Ft.)
Slope =    0.00495  s(percent)=       0.50
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.459 min.
Rainfall intensity =      1.918(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.846
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.598(CFS)
Total initial stream area =        1.600(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       55.000 to Point/Station       56.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   811.800(Ft.)
End of street segment elevation =   808.000(Ft.)
Length of street segment  =   582.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
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 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      6.838(CFS)
Depth of flow =   0.375(Ft.), Average velocity =   2.056(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  12.395(Ft.)
Flow velocity =   2.06(Ft/s)
Travel time =    4.72 min.     TC =   15.18  min.
 Adding area flow to street
COMMERCIAL subarea type
Runoff Coefficient = 0.842
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      1.575(In/Hr) for a    10.0 year storm
Subarea runoff =      8.355(CFS) for      6.300(Ac.)
Total runoff =     10.952(CFS)  Total area =       7.900(Ac.)
Street flow at end of street =     10.952(CFS)
Half street flow at end of street =      5.476(CFS)
Depth of flow =   0.427(Ft.), Average velocity =   2.301(Ft/s)
Flow width (from curb towards crown)=  15.012(Ft.)


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Process from Point/Station       56.000 to Point/Station       57.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   804.000(Ft.)
Downstream point/station elevation =   800.000(Ft.)
Pipe length  =   135.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    10.952(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =    10.952(CFS)
Normal flow depth in pipe =   12.09(In.)
Flow top width inside pipe =   11.86(In.)
Critical depth could not be calculated.
Pipe flow velocity =     10.33(Ft/s)
Travel time through pipe =    0.22 min.
Time of concentration (TC) =    15.40 min.


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Process from Point/Station       56.000 to Point/Station       57.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      7.900(Ac.)
Runoff from this stream =     10.952(CFS)
Time of concentration =   15.40 min.
Rainfall intensity =     1.563(In/Hr)
Summary of stream data:

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


1       10.275     13.80                 1.656
2       10.952     15.40                 1.563
Largest stream flow has longer time of concentration
Qp =     10.952 + sum of
          Qb         Ia/Ib
          10.275 *    0.944 =      9.698
Qp =     20.650

Total of 2 main streams to confluence:
Flow rates before confluence point:
     10.275      10.952
Area of streams before confluence:
        7.100       7.900
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Results of confluence:
Total flow rate =     20.650(CFS)
Time of concentration =    15.396 min.
Effective stream area after confluence  =     15.000(Ac.)


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Process from Point/Station       60.000 to Point/Station       61.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   415.000(Ft.)
Top (of initial area) elevation =   820.600(Ft.)
Bottom (of initial area) elevation =   817.300(Ft.)
Difference in elevation =     3.300(Ft.)
Slope =    0.00795  s(percent)=       0.80
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.795 min.
Rainfall intensity =      2.103(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.848
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      5.173(CFS)
Total initial stream area =        2.900(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       61.000 to Point/Station       62.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   813.300(Ft.)
Downstream point/station elevation =   802.500(Ft.)
Pipe length  =  1495.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.173(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     5.173(CFS)
Normal flow depth in pipe =   11.58(In.)
Flow top width inside pipe =   12.59(In.)
Critical Depth =   11.06(In.)
Pipe flow velocity =      5.09(Ft/s)
Travel time through pipe =    4.90 min.
Time of concentration (TC) =    13.69 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       61.000 to Point/Station       62.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.843
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    13.69 min.
Rainfall intensity =      1.663(In/Hr) for a    10.0 year storm
Subarea runoff =     10.658(CFS) for      7.600(Ac.)
Total runoff =     15.831(CFS)  Total area =      10.500(Ac.)
End of computations, total study area =           71.70 (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 =  32.0
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                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
        Rational Hydrology Study        Date: 02/28/21  File:REDWOOD10PROP.out
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

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

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Program License Serial Number 6025

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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 [ Mira Loma ] area used.
10 year storm 10 minute intensity =  1.960(In/Hr)
10 year storm 60 minute intensity =  0.760(In/Hr)
100 year storm 10 minute intensity =  3.100(In/Hr)
100 year storm 60 minute intensity =  1.200(In/Hr)

Storm event year =  10.0
Calculated rainfall intensity data:
1 hour intensity =  0.760(In/Hr)
Slope of intensity duration curve = 0.5300




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Process from Point/Station       10.000 to Point/Station       12.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   645.000(Ft.)
Top (of initial area) elevation =   818.400(Ft.)
Bottom (of initial area) elevation =   812.900(Ft.)
Difference in elevation =     5.500(Ft.)
Slope =    0.00853  s(percent)=       0.85
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.346 min.
Rainfall intensity =      1.929(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.846
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      7.675(CFS)
Total initial stream area =        4.700(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       12.000 to Point/Station       13.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   804.600(Ft.)
Downstream point/station elevation =   799.000(Ft.)
Pipe length  =   305.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.675(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     7.675(CFS)
Normal flow depth in pipe =   10.89(In.)
Flow top width inside pipe =   13.38(In.)
Critical Depth =   13.18(In.)
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Pipe flow velocity =      8.04(Ft/s)
Travel time through pipe =    0.63 min.
Time of concentration (TC) =    10.98 min.


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Process from Point/Station       12.000 to Point/Station      13.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.846
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    10.98 min.
Rainfall intensity =      1.870(In/Hr) for a    10.0 year storm
Subarea runoff =      7.274(CFS) for      4.600(Ac.)
Total runoff =     14.949(CFS)  Total area =       9.300(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station      13.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      9.300(Ac.)
Runoff from this stream =     14.949(CFS)
Time of concentration =   10.98 min.
Rainfall intensity =     1.870(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station      15.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   445.000(Ft.)
Top (of initial area) elevation =   818.400(Ft.)
Bottom (of initial area) elevation =   812.900(Ft.)
Difference in elevation =     5.500(Ft.)
Slope =    0.01236  s(percent)=       1.24
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.281 min.
Rainfall intensity =      2.171(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.849
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =     12.166(CFS)
Total initial stream area =        6.600(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       15.000 to Point/Station      16.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   807.900(Ft.)
Downstream point/station elevation =   803.700(Ft.)
Pipe length  =   425.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.166(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    12.166(CFS)
Normal flow depth in pipe =   13.85(In.)
Flow top width inside pipe =   19.90(In.)
Critical Depth =   15.60(In.)
Pipe flow velocity =      7.23(Ft/s)
Travel time through pipe =    0.98 min.
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Time of concentration (TC) =     9.26 min.


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Process from Point/Station       15.000 to Point/Station      16.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.848
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =     9.26 min.
Rainfall intensity =      2.046(In/Hr) for a    10.0 year storm
Subarea runoff =      7.979(CFS) for      4.600(Ac.)
Total runoff =     20.144(CFS)  Total area =      11.200(Ac.)


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Process from Point/Station       16.000 to Point/Station      17.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   803.700(Ft.)
Downstream point/station elevation =   802.700(Ft.)
Pipe length  =   100.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    20.144(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    20.144(CFS)
Normal flow depth in pipe =   17.65(In.)
Flow top width inside pipe =   21.17(In.)
Critical Depth =   19.33(In.)
Pipe flow velocity =      8.14(Ft/s)
Travel time through pipe =    0.20 min.
Time of concentration (TC) =     9.47 min.


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Process from Point/Station       16.000 to Point/Station      17.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     11.200(Ac.)
Runoff from this stream =     20.144(CFS)
Time of concentration =    9.47 min.
Rainfall intensity =     2.022(In/Hr)
Summary of stream data:

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


1       14.949     10.98                 1.870
2       20.144      9.47                 2.022
Largest stream flow has longer or shorter time of concentration
Qp =     20.144 + sum of
          Qa          Tb/Ta
          14.949 *    0.862 =     12.889
Qp =     33.034

Total of 2 main streams to confluence:
Flow rates before confluence point:
      14.949      20.144
Area of streams before confluence:
        9.300       11.200


Results of confluence:
Total flow rate =     33.034(CFS)
Time of concentration =     9.465 min.
Effective stream area after confluence  =     20.500(Ac.)
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Process from Point/Station       18.000 to Point/Station       19.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   808.600(Ft.)
Downstream point/station elevation =   804.800(Ft.)
Pipe length  =   380.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    33.034(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    33.034(CFS)
Normal flow depth in pipe =   24.30(In.)
Flow top width inside pipe =   16.20(In.)
Critical Depth =   23.65(In.)
Pipe flow velocity =      8.76(Ft/s)
Travel time through pipe =    0.72 min.
Time of concentration (TC) =    10.19 min.


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Process from Point/Station       19.000 to Point/Station       24.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   804.800(Ft.)
Downstream point/station elevation =   801.800(Ft.)
Pipe length  =   866.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    33.034(CFS)
Given pipe size =     42.00(In.)
Calculated individual pipe flow  =    33.034(CFS)
Normal flow depth in pipe =   22.43(In.)
Flow top width inside pipe =   41.90(In.)
Critical Depth =   21.36(In.)
Pipe flow velocity =      6.32(Ft/s)
Travel time through pipe =    2.28 min.
Time of concentration (TC) =    12.47 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       19.000 to Point/Station       24.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     20.500(Ac.)
Runoff from this stream =     33.034(CFS)
Time of concentration =   12.47 min.
Rainfall intensity =     1.747(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       20.000 to Point/Station       21.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   425.000(Ft.)
Top (of initial area) elevation =   816.200(Ft.)
Bottom (of initial area) elevation =   810.900(Ft.)
Difference in elevation =     5.300(Ft.)
Slope =    0.01247  s(percent)=      1.25
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.115 min.
Rainfall intensity =      2.194(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.849
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =     10.250(CFS)
Total initial stream area =        5.500(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       21.000 to Point/Station       22.000
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**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   806.900(Ft.)
Downstream point/station elevation =   801.000(Ft.)
Pipe length  =    75.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    10.250(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =    10.250(CFS)
Normal flow depth in pipe =    8.07(In.)
Flow top width inside pipe =   14.96(In.)
Critical depth could not be calculated.
Pipe flow velocity =     15.22(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =     8.20 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       21.000 to Point/Station       22.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.849
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =     8.20 min.
Rainfall intensity =      2.183(In/Hr) for a    10.0 year storm
Subarea runoff =     10.194(CFS) for      5.500(Ac.)
Total runoff =     20.444(CFS)  Total area =      11.000(Ac.)


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Process from Point/Station       23.000 to Point/Station       24.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   807.000(Ft.)
Downstream point/station elevation =   801.800(Ft.)
Pipe length  =  1045.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    20.444(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    20.444(CFS)
Normal flow depth in pipe =   20.72(In.)
Flow top width inside pipe =   22.82(In.)
Critical Depth =   18.98(In.)
Pipe flow velocity =      6.24(Ft/s)
Travel time through pipe =    2.79 min.
Time of concentration (TC) =    10.99 min.


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Process from Point/Station       23.000 to Point/Station       24.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     11.000(Ac.)
Runoff from this stream =     20.444(CFS)
Time of concentration =   10.99 min.
Rainfall intensity =     1.869(In/Hr)
Summary of stream data:

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


1       33.034     12.47                 1.747
2       20.444     10.99                 1.869
Largest stream flow has longer time of concentration
Qp =     33.034 + sum of
          Qb         Ia/Ib
          20.444 *    0.935 =     19.115
Qp =     52.149
```

```
Total of 2 main streams to confluence:
Flow rates before confluence point:
      33.034      20.444
Area of streams before confluence:
       20.500       11.000


Results of confluence:
Total flow rate =     52.149(CFS)
Time of concentration =    12.471 min.
Effective stream area after confluence  =     31.500(Ac.)


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Process from Point/Station       24.000 to Point/Station       25.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   801.800(Ft.)
Downstream point/station elevation =   800.600(Ft.)
Pipe length  =   160.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    52.149(CFS)
Given pipe size =     42.00(In.)
Calculated individual pipe flow  =    52.149(CFS)
Normal flow depth in pipe =   23.41(In.)
Flow top width inside pipe =   41.72(In.)
Critical Depth =   27.10(In.)
Pipe flow velocity =      9.46(Ft/s)
Travel time through pipe =    0.28 min.
Time of concentration (TC) =    12.75 min.


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Process from Point/Station       24.000 to Point/Station       25.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     31.500(Ac.)
Runoff from this stream =     52.149(CFS)
Time of concentration =   12.75 min.
Rainfall intensity =     1.727(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station       56.000 to Point/Station       57.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Rainfall intensity =      1.563(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.842
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
User specified values are as follows:
TC =  15.40 min.  Rain intensity =       1.56(In/Hr)
Total area =        15.00(Ac.)  Total runoff =     20.70(CFS)


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Process from Point/Station       26.000 to Point/Station       25.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   803.000(Ft.)
Downstream point/station elevation =   800.600(Ft.)
Pipe length  =   475.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    20.700(CFS)
Given pipe size =     42.00(In.)
Calculated individual pipe flow  =    20.700(CFS)
Normal flow depth in pipe =   15.47(In.)
Flow top width inside pipe =   40.52(In.)
Critical Depth =   16.70(In.)
Pipe flow velocity =      6.43(Ft/s)
```

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Travel time through pipe =    1.23 min.
Time of concentration (TC) =    16.63 min.


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Process from Point/Station       26.000 to Point/Station       25.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     15.000(Ac.)
Runoff from this stream =     20.700(CFS)
Time of concentration =   16.63 min.
Rainfall intensity =     1.500(In/Hr)
Summary of stream data:

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


1       52.149     12.75                 1.727
2       20.700     16.63                 1.500
Largest stream flow has longer or shorter time of concentration
Qp =     52.149 + sum of
          Qa          Tb/Ta
          20.700 *    0.767 =     15.873
Qp =     68.023

Total of 2 main streams to confluence:
Flow rates before confluence point:
      52.149      20.700
Area of streams before confluence:
       31.500       15.000


Results of confluence:
Total flow rate =     68.023(CFS)
Time of concentration =    12.753 min.
Effective stream area after confluence  =     46.500(Ac.)
End of computations, total study area =           46.50 (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 =  32.0
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                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
        Rational Hydrology Study        Date: 02/28/21  File:REDWOOD100PROPOSED1.out
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

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

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Program License Serial Number 6025

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

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

Standard intensity-duration curves data (Plate D-4.1)
For the [ Mira Loma ] area used.
10 year storm 10 minute intensity =  1.960(In/Hr)
10 year storm 60 minute intensity =  0.760(In/Hr)
100 year storm 10 minute intensity =  3.100(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 = 0.5300





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Process from Point/Station       10.000 to Point/Station       11.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   645.000(Ft.)
Top (of initial area) elevation =   818.400(Ft.)
Bottom (of initial area) elevation =   812.900(Ft.)
Difference in elevation =     5.500(Ft.)
Slope =    0.00853  s(percent)=       0.85
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.346 min.
Rainfall intensity =      3.046(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.874
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  52.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =     13.047(CFS)
Total initial stream area =        4.900(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station       30.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   808.900(Ft.)
Downstream point/station elevation =   803.000(Ft.)
Pipe length  =  1435.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    13.047(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    13.047(CFS)
Normal flow depth in pipe =   17.79(In.)
Flow top width inside pipe =   21.02(In.)
Critical Depth =   15.58(In.)
```

```
Pipe flow velocity =      5.22(Ft/s)
Travel time through pipe =    4.58 min.
Time of concentration (TC) =    14.92 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station      30.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.870
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  52.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    14.92 min.
Rainfall intensity =      2.509(In/Hr) for a   100.0 year storm
Subarea runoff =     10.044(CFS) for      4.600(Ac.)
Total runoff =     23.091(CFS)  Total area =       9.500(Ac.)


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Process from Point/Station       11.000 to Point/Station      30.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      9.500(Ac.)
Runoff from this stream =     23.091(CFS)
Time of concentration =   14.92 min.
Rainfall intensity =     2.509(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       31.000 to Point/Station      32.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   955.000(Ft.)
Top (of initial area) elevation =   816.700(Ft.)
Bottom (of initial area) elevation =   810.800(Ft.)
Difference in elevation =     5.900(Ft.)
Slope =    0.00618  s(percent)=       0.62
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.911 min.
Rainfall intensity =      2.709(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.872
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  52.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =     15.588(CFS)
Total initial stream area =        6.600(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       32.000 to Point/Station      33.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   810.800(Ft.)
End of street segment elevation =   809.600(Ft.)
Length of street segment  =   344.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
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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 =     21.510(CFS)
Depth of flow =   0.575(Ft.), Average velocity =   2.043(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    3.00(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  22.000(Ft.)
Flow velocity =   2.04(Ft/s)
Travel time =    2.81 min.     TC =   15.72  min.
 Adding area flow to street
COMMERCIAL subarea type
Runoff Coefficient = 0.870
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  52.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      2.441(In/Hr) for a   100.0 year storm
Subarea runoff =     11.677(CFS) for      5.500(Ac.)
Total runoff =     27.265(CFS)  Total area =      12.100(Ac.)
Street flow at end of street =     27.265(CFS)
Half street flow at end of street =     13.633(CFS)
Depth of flow =   0.612(Ft.), Average velocity =   2.197(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    4.47(Ft.)
Flow width (from curb towards crown)=  22.000(Ft.)


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Process from Point/Station       33.000 to Point/Station       34.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   804.600(Ft.)
Downstream point/station elevation =   804.000(Ft.)
Pipe length  =    35.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    27.265(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    27.265(CFS)
Normal flow depth in pipe =   18.14(In.)
Flow top width inside pipe =   20.62(In.)
Critical Depth =   21.77(In.)
Pipe flow velocity =     10.70(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =    15.77 min.


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Process from Point/Station       33.000 to Point/Station       34.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     12.100(Ac.)
Runoff from this stream =     27.265(CFS)
Time of concentration =   15.77 min.
Rainfall intensity =     2.436(In/Hr)
Summary of stream data:

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


1       23.091     14.92                 2.509
2       27.265     15.77                 2.436
Largest stream flow has longer time of concentration
Qp =     27.265 + sum of
          Qb         Ia/Ib
          23.091 *    0.971 =     22.425
Qp =     49.690
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Total of 2 main streams to confluence:
Flow rates before confluence point:
      23.091      27.265
Area of streams before confluence:
        9.500       12.100


Results of confluence:
Total flow rate =     49.690(CFS)
Time of concentration =    15.772 min.
Effective stream area after confluence  =     21.600(Ac.)


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Process from Point/Station       35.000 to Point/Station       36.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   685.000(Ft.)
Top (of initial area) elevation =   811.000(Ft.)
Bottom (of initial area) elevation =   805.000(Ft.)
Difference in elevation =     6.000(Ft.)
Slope =    0.00876  s(percent)=       0.88
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.542 min.
Rainfall intensity =      3.016(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.874
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  52.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =     10.807(CFS)
Total initial stream area =       4.100(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       40.000 to Point/Station       41.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   955.000(Ft.)
Top (of initial area) elevation =   818.300(Ft.)
Bottom (of initial area) elevation =   811.300(Ft.)
Difference in elevation =     7.000(Ft.)
Slope =    0.00733  s(percent)=       0.73
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.477 min.
Rainfall intensity =      2.758(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.872
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  52.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      4.812(CFS)
Total initial stream area =       2.000(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       41.000 to Point/Station       42.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   806.300(Ft.)
Downstream point/station elevation =   803.700(Ft.)
Pipe length  =   520.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.812(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     4.812(CFS)
Normal flow depth in pipe =   10.55(In.)
Flow top width inside pipe =   17.73(In.)
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Critical Depth =   10.11(In.)
Pipe flow velocity =      4.47(Ft/s)
Travel time through pipe =    1.94 min.
Time of concentration (TC) =    14.42 min.


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Process from Point/Station       41.000 to Point/Station       42.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      2.000(Ac.)
Runoff from this stream =      4.812(CFS)
Time of concentration =   14.42 min.
Rainfall intensity =     2.555(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station       43.000 to Point/Station       44.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   560.000(Ft.)
Top (of initial area) elevation =   815.500(Ft.)
Bottom (of initial area) elevation =   812.700(Ft.)
Difference in elevation =     2.800(Ft.)
Slope =    0.00500  s(percent)=       0.50
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.879 min.
Rainfall intensity =      2.966(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.874
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  52.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      6.219(CFS)
Total initial stream area =        2.400(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       44.000 to Point/Station       45.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   812.700(Ft.)
End of street segment elevation =   809.700(Ft.)
Length of street segment  =   470.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     13.946(CFS)
Depth of flow =   0.459(Ft.), Average velocity =   2.418(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  16.603(Ft.)
Flow velocity =   2.42(Ft/s)
Travel time =    3.24 min.     TC =   14.12  min.
 Adding area flow to street
COMMERCIAL subarea type
Runoff Coefficient = 0.871
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
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Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  52.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      2.584(In/Hr) for a   100.0 year storm
Subarea runoff =     15.301(CFS) for      6.800(Ac.)
Total runoff =     21.520(CFS)  Total area =       9.200(Ac.)
Street flow at end of street =     21.520(CFS)
Half street flow at end of street =     10.760(CFS)
Depth of flow =   0.524(Ft.), Average velocity =   2.630(Ft/s)
Warning: depth of flow exceeds top of curb
Distance that curb overflow reaches into property =    0.97(Ft.)
Flow width (from curb towards crown)=  19.883(Ft.)


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Process from Point/Station       45.000 to Point/Station      42.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   804.000(Ft.)
Downstream point/station elevation =   803.700(Ft.)
Pipe length  =    30.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    21.520(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    21.520(CFS)
Normal flow depth in pipe =   18.70(In.)
Flow top width inside pipe =   19.91(In.)
Critical Depth =   19.91(In.)
Pipe flow velocity =      8.20(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =    14.18 min.


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Process from Point/Station       45.000 to Point/Station      42.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      9.200(Ac.)
Runoff from this stream =     21.520(CFS)
Time of concentration =   14.18 min.
Rainfall intensity =     2.578(In/Hr)
Summary of stream data:

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


1        4.812     14.42                 2.555
2       21.520     14.18                 2.578
Largest stream flow has longer or shorter time of concentration
Qp =     21.520 + sum of
          Qa           Tb/Ta
           4.812 *    0.984 =      4.733
Qp =     26.254

Total of 2 main streams to confluence:
Flow rates before confluence point:
       4.812      21.520
Area of streams before confluence:
        2.000        9.200


Results of confluence:
Total flow rate =     26.254(CFS)
Time of concentration =    14.179 min.
Effective stream area after confluence  =     11.200(Ac.)


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Process from Point/Station       42.000 to Point/Station      46.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   803.700(Ft.)
Downstream point/station elevation =   801.500(Ft.)
Pipe length  =   430.00(Ft.)   Manning's N = 0.013
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No. of pipes = 1  Required pipe flow  =    26.254(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    26.254(CFS)
Normal flow depth in pipe =   22.13(In.)
Flow top width inside pipe =   26.40(In.)
Critical Depth =   20.95(In.)
Pipe flow velocity =      6.76(Ft/s)
Travel time through pipe =    1.06 min.
Time of concentration (TC) =    15.24 min.


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Process from Point/Station       42.000 to Point/Station       46.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.870
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  52.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    15.24 min.
Rainfall intensity =      2.481(In/Hr) for a   100.0 year storm
Subarea runoff =     10.146(CFS) for      4.700(Ac.)
Total runoff =     36.400(CFS)  Total area =      15.900(Ac.)


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Process from Point/Station       46.000 to Point/Station       47.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   801.500(Ft.)
Downstream point/station elevation =   800.700(Ft.)
Pipe length  =   165.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    36.400(CFS)
Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =    36.400(CFS)
Normal flow depth in pipe =   26.72(In.)
Flow top width inside pipe =   25.91(In.)
Critical Depth =   24.11(In.)
Pipe flow velocity =      7.07(Ft/s)
Travel time through pipe =    0.39 min.
Time of concentration (TC) =    15.63 min.


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Process from Point/Station       46.000 to Point/Station       47.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.870
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  52.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    15.63 min.
Rainfall intensity =      2.448(In/Hr) for a   100.0 year storm
Subarea runoff =      9.796(CFS) for      4.600(Ac.)
Total runoff =     46.196(CFS)  Total area =      20.500(Ac.)


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Process from Point/Station       50.000 to Point/Station       51.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   500.000(Ft.)
Top (of initial area) elevation =   815.400(Ft.)
Bottom (of initial area) elevation =   812.000(Ft.)
Difference in elevation =     3.400(Ft.)
Slope =    0.00680  s(percent)=       0.68
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.777 min.
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Rainfall intensity =      3.139(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.875
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  52.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.746(CFS)
Total initial stream area =       1.000(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       51.000 to Point/Station       52.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   812.000(Ft.)
End of street segment elevation =   808.000(Ft.)
Length of street segment  =   495.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      9.958(CFS)
Depth of flow =   0.403(Ft.), Average velocity =   2.438(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  13.839(Ft.)
Flow velocity =   2.44(Ft/s)
Travel time =    3.38 min.     TC =   13.16  min.
 Adding area flow to street
COMMERCIAL subarea type
Runoff Coefficient = 0.872
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  52.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      2.682(In/Hr) for a   100.0 year storm
Subarea runoff =     14.259(CFS) for      6.100(Ac.)
Total runoff =     17.004(CFS)  Total area =       7.100(Ac.)
Street flow at end of street =     17.004(CFS)
Half street flow at end of street =      8.502(CFS)
Depth of flow =   0.469(Ft.), Average velocity =   2.775(Ft/s)
Flow width (from curb towards crown)=  17.139(Ft.)


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Process from Point/Station       52.000 to Point/Station       53.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   804.000(Ft.)
Downstream point/station elevation =   800.000(Ft.)
Pipe length  =   135.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    17.004(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    17.004(CFS)
Normal flow depth in pipe =   13.88(In.)
Flow top width inside pipe =   15.13(In.)
Critical depth could not be calculated.
Pipe flow velocity =     11.63(Ft/s)
Travel time through pipe =    0.19 min.
Time of concentration (TC) =    13.35 min.
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Process from Point/Station       52.000 to Point/Station       53.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      7.100(Ac.)
Runoff from this stream =     17.004(CFS)
Time of concentration =   13.35 min.
Rainfall intensity =     2.661(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station       54.000 to Point/Station       55.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   505.000(Ft.)
Top (of initial area) elevation =   814.300(Ft.)
Bottom (of initial area) elevation =   811.800(Ft.)
Difference in elevation =     2.500(Ft.)
Slope =    0.00495  s(percent)=       0.50
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.459 min.
Rainfall intensity =      3.029(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.874
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  52.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      4.235(CFS)
Total initial stream area =        1.600(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       55.000 to Point/Station       56.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   811.800(Ft.)
End of street segment elevation =   808.000(Ft.)
Length of street segment  =   582.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     11.277(CFS)
Depth of flow =   0.430(Ft.), Average velocity =   2.317(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  15.188(Ft.)
Flow velocity =   2.32(Ft/s)
Travel time =    4.19 min.     TC =   14.65  min.
 Adding area flow to street
COMMERCIAL subarea type
Runoff Coefficient = 0.871
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  52.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      2.534(In/Hr) for a   100.0 year storm
Subarea runoff =     13.897(CFS) for      6.300(Ac.)
Total runoff =     18.132(CFS)  Total area =       7.900(Ac.)
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Street flow at end of street =     18.132(CFS)
Half street flow at end of street =      9.066(CFS)
Depth of flow =   0.493(Ft.), Average velocity =   2.600(Ft/s)
Flow width (from curb towards crown)=  18.330(Ft.)


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Process from Point/Station       56.000 to Point/Station       57.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   804.000(Ft.)
Downstream point/station elevation =   800.000(Ft.)
Pipe length  =   135.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    18.132(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    18.132(CFS)
Normal flow depth in pipe =   14.81(In.)
Flow top width inside pipe =   13.74(In.)
Critical depth could not be calculated.
Pipe flow velocity =     11.66(Ft/s)
Travel time through pipe =    0.19 min.
Time of concentration (TC) =    14.84 min.


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Process from Point/Station       56.000 to Point/Station       57.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      7.900(Ac.)
Runoff from this stream =     18.132(CFS)
Time of concentration =   14.84 min.
Rainfall intensity =     2.516(In/Hr)
Summary of stream data:

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


1       17.004     13.35                2.661
2       18.132     14.84                2.516
Largest stream flow has longer time of concentration
Qp =     18.132 + sum of
          Qb         Ia/Ib
          17.004 *    0.946 =     16.080
Qp =     34.212

Total of 2 main streams to confluence:
Flow rates before confluence point:
      17.004      18.132
Area of streams before confluence:
        7.100        7.900


Results of confluence:
Total flow rate =     34.212(CFS)
Time of concentration =    14.839 min.
Effective stream area after confluence  =     15.000(Ac.)


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Process from Point/Station       60.000 to Point/Station       61.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   415.000(Ft.)
Top (of initial area) elevation =   820.600(Ft.)
Bottom (of initial area) elevation =   817.300(Ft.)
Difference in elevation =     3.300(Ft.)
Slope =    0.00795  s(percent)=       0.80
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.795 min.
Rainfall intensity =      3.320(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.876
Decimal fraction soil group A = 1.000
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```
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  52.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      8.431(CFS)
Total initial stream area =        2.900(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       61.000 to Point/Station       62.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   813.300(Ft.)
Downstream point/station elevation =   802.500(Ft.)
Pipe length  =  1495.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.431(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     8.431(CFS)
Normal flow depth in pipe =   13.92(In.)
Flow top width inside pipe =   15.07(In.)
Critical Depth =   13.49(In.)
Pipe flow velocity =      5.75(Ft/s)
Travel time through pipe =    4.34 min.
Time of concentration (TC) =    13.13 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       61.000 to Point/Station       62.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.872
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  52.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    13.13 min.
Rainfall intensity =      2.685(In/Hr) for a   100.0 year storm
Subarea runoff =     17.786(CFS) for      7.600(Ac.)
Total runoff =     26.217(CFS)  Total area =      10.500(Ac.)
End of computations, total study area =           71.70 (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 =  32.0
```

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                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
        Rational Hydrology Study        Date: 02/28/21  File:REDWOOD100PROP.out
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

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

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


Program License Serial Number 6025

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

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

Standard intensity-duration curves data (Plate D-4.1)
For the [ Mira Loma ] area used.
10 year storm 10 minute intensity =  1.960(In/Hr)
10 year storm 60 minute intensity =  0.760(In/Hr)
100 year storm 10 minute intensity =  3.100(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 = 0.5300




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Process from Point/Station       10.000 to Point/Station       12.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   645.000(Ft.)
Top (of initial area) elevation =   818.400(Ft.)
Bottom (of initial area) elevation =   812.900(Ft.)
Difference in elevation =     5.500(Ft.)
Slope =    0.00853  s(percent)=       0.85
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.346 min.
Rainfall intensity =      3.046(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.874
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  52.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =     12.515(CFS)
Total initial stream area =        4.700(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station       13.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   804.600(Ft.)
Downstream point/station elevation =   799.000(Ft.)
Pipe length  =   305.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.515(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    12.515(CFS)
Normal flow depth in pipe =   13.10(In.)
Flow top width inside pipe =   16.02(In.)
Critical Depth =   16.02(In.)
```

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Pipe flow velocity =      9.09(Ft/s)
Travel time through pipe =    0.56 min.
Time of concentration (TC) =    10.91 min.


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Process from Point/Station       12.000 to Point/Station      13.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.874
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  52.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    10.91 min.
Rainfall intensity =      2.962(In/Hr) for a   100.0 year storm
Subarea runoff =     11.904(CFS) for      4.600(Ac.)
Total runoff =     24.419(CFS)  Total area =       9.300(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station      13.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      9.300(Ac.)
Runoff from this stream =     24.419(CFS)
Time of concentration =   10.91 min.
Rainfall intensity =     2.962(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station      15.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   445.000(Ft.)
Top (of initial area) elevation =   818.400(Ft.)
Bottom (of initial area) elevation =   812.900(Ft.)
Difference in elevation =     5.500(Ft.)
Slope =    0.01236  s(percent)=      1.24
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.281 min.
Rainfall intensity =      3.428(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.876
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  52.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =     19.824(CFS)
Total initial stream area =        6.600(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       15.000 to Point/Station      16.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   807.900(Ft.)
Downstream point/station elevation =   803.700(Ft.)
Pipe length  =   425.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    19.824(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    19.824(CFS)
Normal flow depth in pipe =   17.48(In.)
Flow top width inside pipe =   21.35(In.)
Critical Depth =   19.18(In.)
Pipe flow velocity =      8.08(Ft/s)
Travel time through pipe =    0.88 min.
```

Time of concentration (TC) =   9.16 min.

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Process from Point/Station   15.000 to Point/Station   16.000
**** SUBAREA FLOW ADDITION ****

COMMERCIAL subarea type
Runoff Coefficient = 0.875
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3) = 52.00
Pervious area fraction = 0.100; Impervious fraction = 0.900
Time of concentration =   9.16 min.
Rainfall intensity =   3.250(In/Hr) for a   100.0 year storm
Subarea runoff =   13.085(CFS) for   4.600(Ac.)
Total runoff =   32.908(CFS) Total area =   11.200(Ac.)

++
Process from Point/Station   16.000 to Point/Station   17.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =   803.700(Ft.)
Downstream point/station elevation =   802.700(Ft.)
Pipe length =   100.00(Ft.)   Manning's N = 0.013
No. of pipes = 1 Required pipe flow =   32.908(CFS)
Nearest computed pipe diameter =   30.00(In.)
Calculated individual pipe flow =   32.908(CFS)
Normal flow depth in pipe =   20.34(In.)
Flow top width inside pipe =   28.03(In.)
Critical Depth =   23.41(In.)
Pipe flow velocity =   9.29(Ft/s)
Travel time through pipe =   0.18 min.
Time of concentration (TC) =   9.34 min.

++
Process from Point/Station   16.000 to Point/Station   17.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =   11.200(Ac.)
Runoff from this stream =   32.908(CFS)
Time of concentration =   9.34 min.
Rainfall intensity =   3.217(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	24.419	10.91	2.962
2	32.908	9.34	3.217

Largest stream flow has longer or shorter time of concentration
Qp =   32.908 + sum of
          Qa   Tb/Ta
          24.419 *   0.856 =   20.907
Qp =   53.815

Total of 2 main streams to confluence:
Flow rates before confluence point:
      24.419   32.908
Area of streams before confluence:
        9.300   11.200

Results of confluence:
Total flow rate =   53.815(CFS)
Time of concentration =   9.337 min.
Effective stream area after confluence =   20.500(Ac.)

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Process from Point/Station       18.000 to Point/Station       19.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   808.600(Ft.)
Downstream point/station elevation =   804.800(Ft.)
Pipe length  =   380.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    53.815(CFS)
Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =    53.815(CFS)
Normal flow depth in pipe =   27.61(In.)
Flow top width inside pipe =   24.40(In.)
Critical Depth =   28.75(In.)
Pipe flow velocity =     10.14(Ft/s)
Travel time through pipe =    0.62 min.
Time of concentration (TC) =     9.96 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       19.000 to Point/Station       24.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   804.800(Ft.)
Downstream point/station elevation =   801.800(Ft.)
Pipe length  =   866.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    53.815(CFS)
Given pipe size =     42.00(In.)
Calculated individual pipe flow  =    53.815(CFS)
Normal flow depth in pipe =   31.41(In.)
Flow top width inside pipe =   36.48(In.)
Critical Depth =   27.53(In.)
Pipe flow velocity =      6.97(Ft/s)
Travel time through pipe =    2.07 min.
Time of concentration (TC) =    12.03 min.


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Process from Point/Station       19.000 to Point/Station       24.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     20.500(Ac.)
Runoff from this stream =     53.815(CFS)
Time of concentration =   12.03 min.
Rainfall intensity =     2.812(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       20.000 to Point/Station       21.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   425.000(Ft.)
Top (of initial area) elevation =   816.200(Ft.)
Bottom (of initial area) elevation =   810.900(Ft.)
Difference in elevation =     5.300(Ft.)
Slope =    0.01247  s(percent)=      1.25
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.115 min.
Rainfall intensity =      3.465(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.876
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  52.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =     16.701(CFS)
Total initial stream area =        5.500(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       21.000 to Point/Station       22.000
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**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   806.900(Ft.)
Downstream point/station elevation =   801.000(Ft.)
Pipe length  =    75.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    16.701(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =    16.701(CFS)
Normal flow depth in pipe =   11.36(In.)
Flow top width inside pipe =   12.87(In.)
Critical depth could not be calculated.
Pipe flow velocity =     16.75(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =     8.19 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       21.000 to Point/Station       22.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.876
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  52.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =     8.19 min.
Rainfall intensity =      3.448(In/Hr) for a   100.0 year storm
Subarea runoff =     16.619(CFS) for      5.500(Ac.)
Total runoff =     33.320(CFS)  Total area =      11.000(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       23.000 to Point/Station       24.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   807.000(Ft.)
Downstream point/station elevation =   801.800(Ft.)
Pipe length  =  1045.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    33.320(CFS)
Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =    33.320(CFS)
Normal flow depth in pipe =   24.33(In.)
Flow top width inside pipe =   29.05(In.)
Critical Depth =   23.05(In.)
Pipe flow velocity =      7.10(Ft/s)
Travel time through pipe =    2.45 min.
Time of concentration (TC) =    10.64 min.


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Process from Point/Station       23.000 to Point/Station       24.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     11.000(Ac.)
Runoff from this stream =     33.320(CFS)
Time of concentration =   10.64 min.
Rainfall intensity =     3.001(In/Hr)
Summary of stream data:

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


1       53.815     12.03                 2.812
2       33.320     10.64                 3.001
Largest stream flow has longer time of concentration
Qp =     53.815 + sum of
          Qb         Ia/Ib
          33.320 *    0.937 =     31.222
Qp =     85.037
```

```
Total of 2 main streams to confluence:
Flow rates before confluence point:
      53.815      33.320
Area of streams before confluence:
       20.500       11.000


Results of confluence:
Total flow rate =     85.037(CFS)
Time of concentration =    12.031 min.
Effective stream area after confluence  =     31.500(Ac.)


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Process from Point/Station       24.000 to Point/Station       25.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   801.800(Ft.)
Downstream point/station elevation =   800.600(Ft.)
Pipe length  =   160.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    85.037(CFS)
Given pipe size =     42.00(In.)
Calculated individual pipe flow  =    85.037(CFS)
Normal flow depth in pipe =   33.56(In.)
Flow top width inside pipe =   33.66(In.)
Critical Depth =   34.49(In.)
Pipe flow velocity =     10.32(Ft/s)
Travel time through pipe =    0.26 min.
Time of concentration (TC) =    12.29 min.


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Process from Point/Station       24.000 to Point/Station       25.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     31.500(Ac.)
Runoff from this stream =     85.037(CFS)
Time of concentration =   12.29 min.
Rainfall intensity =     2.781(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       56.000 to Point/Station       57.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Rainfall intensity =      2.520(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.870
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  52.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
User specified values are as follows:
TC =  14.80 min.  Rain intensity =       2.52(In/Hr)
Total area =        15.00(Ac.)  Total runoff =     34.20(CFS)


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Process from Point/Station       26.000 to Point/Station       25.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   803.000(Ft.)
Downstream point/station elevation =   800.600(Ft.)
Pipe length  =   475.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    34.200(CFS)
Given pipe size =     42.00(In.)
Calculated individual pipe flow  =    34.200(CFS)
Normal flow depth in pipe =   20.46(In.)
Flow top width inside pipe =   41.99(In.)
Critical Depth =   21.75(In.)
Pipe flow velocity =      7.35(Ft/s)
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Travel time through pipe =    1.08 min.
Time of concentration (TC) =    15.88 min.


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Process from Point/Station       26.000 to Point/Station       25.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     15.000(Ac.)
Runoff from this stream =     34.200(CFS)
Time of concentration =   15.88 min.
Rainfall intensity =     2.428(In/Hr)
Summary of stream data:

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


1       85.037     12.29                 2.781
2       34.200     15.88                 2.428
Largest stream flow has longer or shorter time of concentration
Qp =     85.037 + sum of
          Qa          Tb/Ta
          34.200 *    0.774 =     26.472
Qp =    111.510

Total of 2 main streams to confluence:
Flow rates before confluence point:
      85.037      34.200
Area of streams before confluence:
       31.500       15.000


Results of confluence:
Total flow rate =    111.510(CFS)
Time of concentration =    12.290 min.
Effective stream area after confluence  =     46.500(Ac.)
End of computations, total study area =           46.50 (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 =  32.0
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Reference Plans

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

GENERAL NOTES:

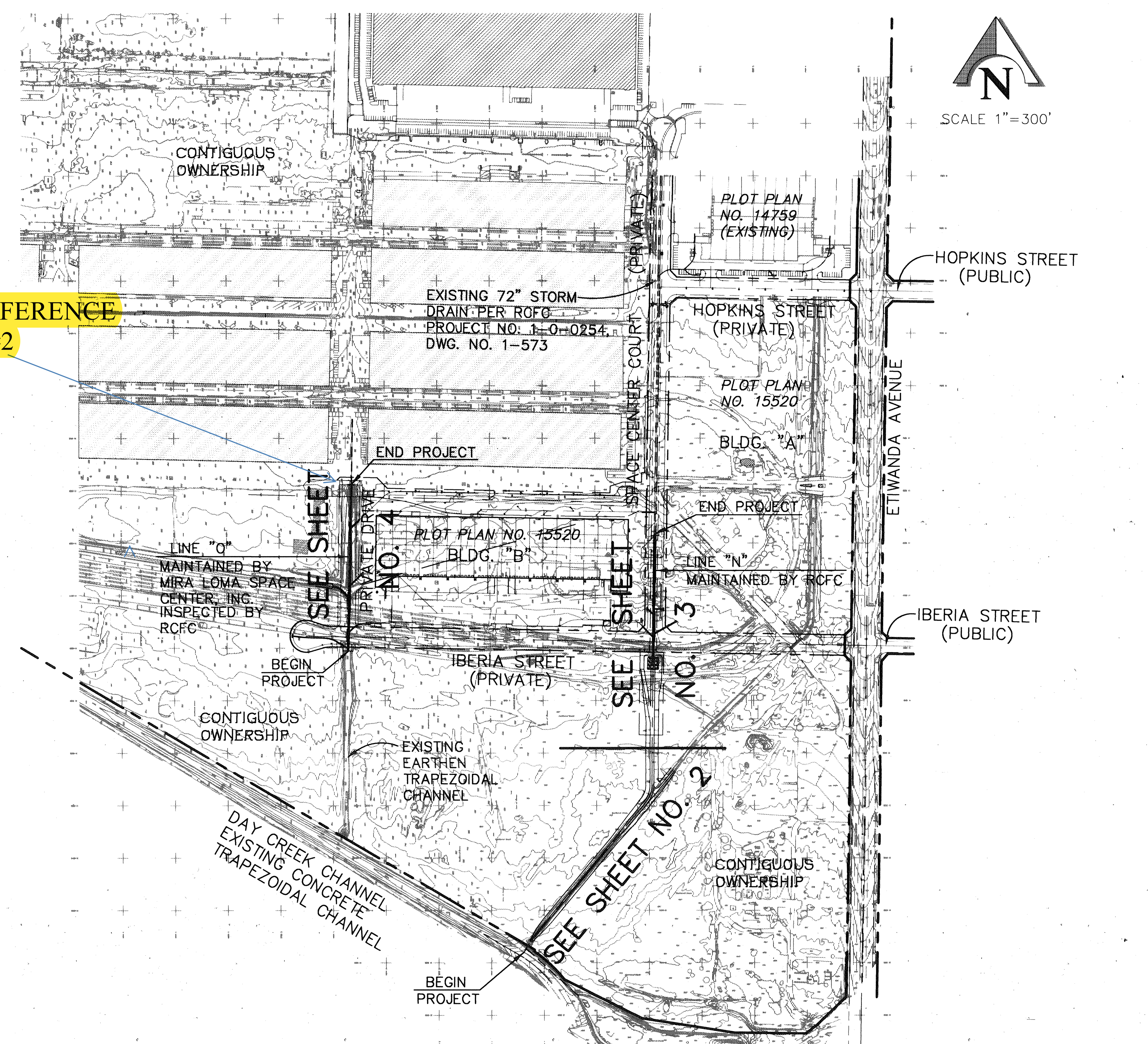
1. ALL STATIONING REFERS TO CENTERLINE OF CONSTRUCTION.
2. ALL CHANNEL/STORM DRAIN REFERENCES AND CROSS SECTIONS ARE TAKEN LOOKING DOWNSTREAM.
3. ALL ELEVATIONS ARE IN FEET, BASED ON U.S.C. & G.S. DATA.
4. STANDARD DRAWINGS CALLED FOR ON THE PLAN & PROFILE SHALL CONFORM TO R.C.F.C. & W.C.D. STANDARD DRAWINGS, CALTRANS, RIVERSIDE COUNTY TRANSPORTATION DEPT. STANDARD DRAWINGS, AND AMERICAN PUBLIC WORKS ASSOCIATION STANDARDS PLANS.
5. ELEVATIONS AND LOCATIONS OF UTILITIES WERE OBTAINED FROM AVAILABLE INFORMATION AND SHOWN APPROXIMATELY ON PLANS. 48 HOURS BEFORE EXCAVATION CALL UNDERGROUND SERVICE ALERT AT (800) 227-2600. ALL UTILITIES SHALL BE PROTECTED IN PLACE EXCEPT AS NOTED ON PLANS AND SPECIFICATIONS.
6. ALL RECONSTRUCTION, RESURFACING AND PAVEMENT DELINEATION, CURBS, SIDEWALKS AND OTHER IMPROVEMENTS ARE TO BE RECONSTRUCTED IN KIND AT THE SAME LOCATIONS AND ELEVATIONS AS THE EXISTING IMPROVEMENTS, UNLESS OTHERWISE NOTED.
7. DISTURBED MONUMENTS ARE TO BE SALVAGED AND RESET BY THE OWNER.
8. THE CONTRACTOR SHALL MAINTAIN, ON A 24 HOUR BASIS ALL TRAFFIC CONTROL DEVICES NECESSARY TO ENSURE PROPER FLOW AND SAFETY OF TRAFFIC. THIS SHALL INCLUDE, BUT NOT TO BE LIMITED TO MONITORING OF TRAFFIC CONTROL DEVICES AT NIGHTTIME AND WEEKENDS.
9. CARE SHALL BE USED IN THE OPERATION OF HEAVY EQUIPMENT IN AREAS WHERE THE DEPTH OF BACKFILL OVER THE R.C.P. IS LESS THAN 3 FEET.
10. A PRELIMINARY SOILS INVESTIGATION DATED DECEMBER 2, 1998 BY NORCAL ENGINEERING PROJECT NO. 7767-98, SHALL BE INCLUDED AS PART OF THESE PLANS. ALL WORK SHALL CONFORM TO THE RECOMMENDATIONS AS OUTLINED IN SAID REPORT.
11. THE CONTRACTOR SHALL CONSTRUCT THE FLOOD CONTROL IMPROVEMENTS SHOWN ON THE DRAWING IN CONFORMANCE WITH THE REQUIREMENTS OF THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT'S SPECIFICATIONS DATED SEPTEMBER 1984, AND DESIGN MANUAL STANDARD DRAWINGS. DRAWINGS DATED MAY 1971.
12. THE CONCRETE COVER ON THE INSIDE OF ALL CONCRETE PIPE MUST BE INCREASED TO PROVIDE A MIN. OF 1.5" OVER THE REINFORCING WHEN THE DESIGN VELOCITIES EXCEED 20 FPS. THE CONCRETE DESIGN STRENGTH IN THESE REACHES SHALL BE:
    FC= 5000 PSI FOR VELOCITIES EXCEEDING 20 FPS.
    FC= 6000 PSI FOR VELOCITIES EXCEEDING 30 FPS.
13. "V" IS THE DEPTH OF CATCH BASINS MEASURED FROM THE TOP OF CURB TO INVERT OF CONNECTOR PIPE.
14. BEDDING PIPE WITH LESS THAN TWO FEET OF COVER SHALL CONFORM TO LOS ANGELES COUNTY FLOOD CONTROL DISTRICT STANDARD DRAWINGS 2-D117 FOR CONCRETE BACKFILL IN TRENCHES. ALL OTHER PIPE SHALL CONFORM TO R.C.F.C. & W.C.D. STD. DWG M815.
15. THE FOLLOWING ITEMS ARE TO BE INSPECTED AND MAINTAINED BY RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT:

    LINE "N" STORM DRAIN
    * 72" RCP FROM STA. 22+40 TO STA. 27+10 AS SHOWN ON SHEET 3.
    * OUTLET CHANNEL FROM STA. 19+50 TO STA. 22+40 AND ALL MANHOLES AND OTHER STRUCTURES REQUIRED TO COMPLETE THE CONSTRUCTION OF THE ABOVE MENTIONED MAINLINE PIPE; EXCLUDING CATCH BASINS AND CONNECTOR PIPES.
16. THE FOLLOWING ITEMS ARE TO BE INSPECTED BY RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT:

    LINE "O" STORM DRAIN
    * 72" RCP FROM STA. 10+00 TO STA. 11+99.47.
    * 60" RCP FROM STA. 12+10.05 TO STA.12+81.30.
    * OUTLET CHANNEL FROM STA. 9+80 TO STA.10+00.
    * ALL MANHOLES AND OTHER STRUCTURES REQUIRED TO COMPLETE THE CONSTRUCTION OF THE ABOVE MENTIONED MAINLINE PIPE; EXCLUDING CATCH BASIN AND CONNECTOR PIPES.

    LATERAL "O-3" STORM DRAIN
    * 54" RCP FROM STA. 12+09.38 TO STA. 14+67.14.
    * 42" RCP FROM STA. 14+75.64 TO STA. 16+32.80.
    * ALL MANHOLES AND OTHER STRUCTURES REQUIRED TO COMPLETE THE CONSTRUCTION OF THE ABOVE MENTIONED MAINLINE PIPE; EXCLUDING CATCH BASIN AND CONNECTOR PIPES.

SEE REFERENCE PLAN #2



REFERENCE PLAN #1

INDEX

R.C.F.C. & W.C.D. STANDARD DRAWINGS

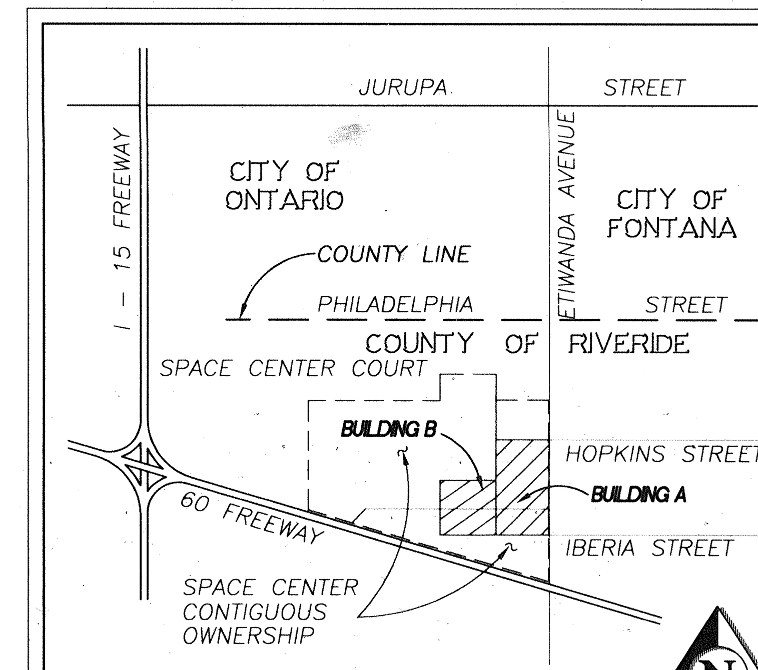
CB100	CATCH BASIN NO. 1
CB105	DETAIL OF CATCH BASIN OPENING & INSTALLATION DETAILS
CB108	INLET TYPE X
LD201	LOCAL DEPRESSION NO. 2
JS229	JUNCTION STRUCTURE NO. 4
JS231	JUNCTION STRUCTURE NO. 6
MH252	MANHOLE NO. 2
MH254	MANHOLE NO. 4
MH257	MANHOLE SHAFT FOR CAST PIPE
TS303	TRANSITION STRUCTURE NO. 3
M801	CHAIN LINK FENCE DETAILS
M803	CONCRETE COLLAR
M815	BEDDING AND PAY LINES

JURUPA COMMUNITY SERVICES DISTRICT

A-4	STANDARD GUARD POST INSTALLATION
A-6	PIPE ENCASEMENT DETAIL

CALTRANS STANDARD DRAWINGS

D90 PIPE CULVERT, HEADWALL, ENDWALLS AND WINGWALL



VICINITY MAP

THE THOMAS GUIDE, 1998 EDITION, SAN BERNARDINO/ RIVERSIDE COUNTY, PAGE 643, SECTIONS H-5 & H-6 SEC. 5, T.2S, R. 6W.

Underground Service Alert
Call: TOLL FREE 1-800 227-2600
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KCT CONSULTANTS, INC.
Civil Engineers - Surveyors - Planners

PREPARED UNDER THE SUPERVISION OF:
Teresito N. Tabiolo DATE 3-17-99
TERESITO N. TABIOLO, R.C.E. NO. 38826 EXP. DATE 3-31-01

REGISTERED PROFESSIONAL ENGINEER TERESITO N. TABIOLO RCE No. 38826 Exp. 3-31-01 CIVIL STATE OF CALIFORNIA

BENCH MARK
TOP BRASS DISC IN CAPPED MONUMENT MARKED FOR SECTION CORNER AT C.L. INTERSECTION OF ETIWANDA AVE. & SAN SEVAINE WAY.
ELEVATION= 783.69

REVISIONS

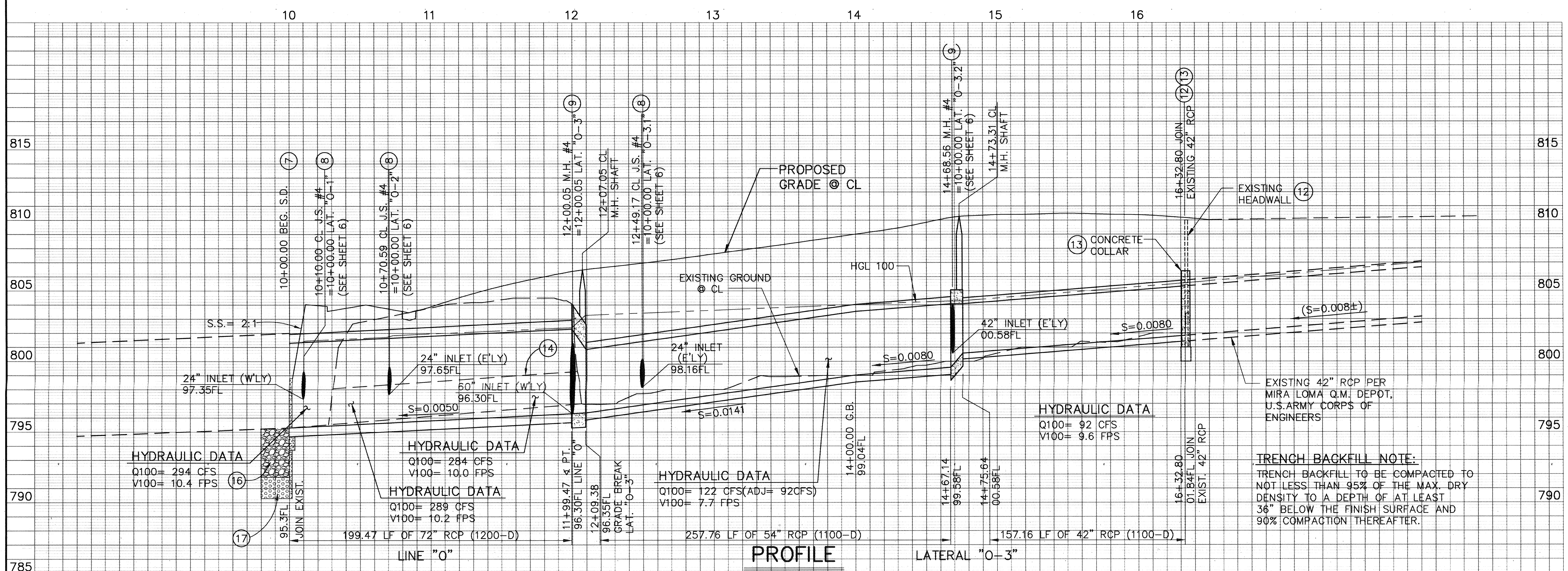
REF.	DESCRIPTION	APPR	DATE	APPR	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: PLANNING ENGINEER DATE: 3/22/99
APPROVED BY: Asst. CHIEF ENGINEER DATE: 3/23/99

~~County of Riverside~~
APPROVED BY:
FOR TRANSPORTATION DEPT. RIVERSIDE COUNTY, CALIF. DATE:

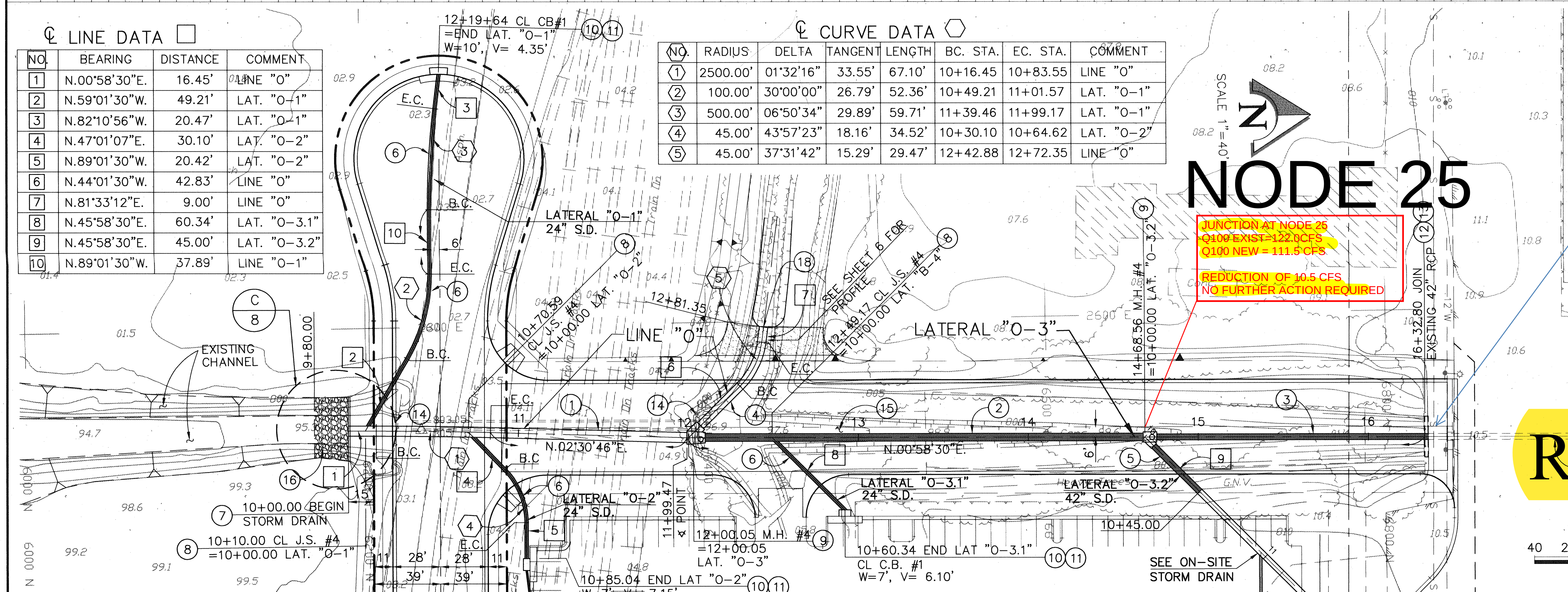
DAY CREEK M.D.P.
LINE "N". STAGE 3
LINE "O". STAGE 1
PLOT PLAN 15520
TITLE SHEET

PROJECT NO. 1-0-0257 1-0-0254
DRAWING NO. 1-586
SHEET NO. 1 OF 8



1. 72" RCP, 1200-D.
2. 54" RCP, 1100-D.
3. 42" RCP, 1100-D.
4. 60" RCP, 1000-D.
5. 42" RCP, 1000-D.
6. 24" RCP, CLASS IV
7. HEADWALL PER CALTRANS STD. D90, TYPE B. L=38.00', H=4.10', CUT-OFF WALL= 5.00'.
8. J.S. NO. 4 PER RCFC STD. DWG. NO. JS229.
9. MANHOLE NO. 4 PER RCFC STD. DWG. NO. MH254. MANHOLE VALUES AS NOTED ON PLAN.
10. CATCH BASIN NO. 1 PER RCFC STD. DWG. NO. CB100. W & V AS NOTED ON PLAN.
11. LOCAL DEPRESSION PER RCFC STD. DWG. NO. LD201, CASE C.
12. REMOVE EXISTING HEADWALL.
13. CONCRETE COLLAR PER RCFC STD.DWG NO. M803.
14. REMOVE EXISTING CULVERT AND HEADWALL (4-30" RCP).
15. REMOVE EXISTING CONCRETE CHANNEL.
16. 1/2 TON UNGROUTED RIP RAP, 3.5' THICK.
17. NO. 1 BACKING AND ROCK SLOPE PROTECTION FABRIC (WOVEN) PER CALTRANS SPECS.
18. J.S. NO. 6 PER RCFC STD. DWG. NO. JS231. D=60", L=20', C=0', ELEV. "R"= 97.05 ELEV. "S"= 97.3 (JOIN EXIST.)

1009-05



LINE DATA

NO.	BEARING	DISTANCE	COMMENT
1	N.00°58'30"E.	16.45'	LINE "O"
2	N.59°01'30"W.	49.21'	LAT. "O-1"
3	N.82°10'56"W.	20.47'	LAT. "O-1"
4	N.47°01'07"E.	30.10'	LAT. "O-2"
5	N.89°01'30"W.	20.42'	LAT. "O-2"
6	N.44°01'30"W.	42.83'	LINE "O"
7	N.81°33'12"E.	9.00'	LINE "O"
8	N.45°58'30"E.	60.34'	LAT. "O-3.1"
9	N.45°58'30"E.	45.00'	LAT. "O-3.2"
10	N.89°01'30"W.	37.89'	LINE "O-1"

CURVE DATA

NO.	RADIUS	DELTA	TANGENT	LENGTH	BC. STA.	EC. STA.	COMMENT
1	2500.00'	01°32'16"	33.55'	67.10'	10+16.45	10+83.55	LINE "O"
2	100.00'	30°00'00"	26.79'	52.36'	10+49.21	11+01.57	LAT. "O-1"
3	500.00'	06°50'34"	29.89'	59.71'	11+39.46	11+99.17	LAT. "O-1"
4	45.00'	43°57'23"	18.16'	34.52'	10+30.10	10+64.62	LAT. "O-2"
5	45.00'	37°31'42"	15.29'	29.47'	12+42.88	12+72.35	LINE "O"

NODE 24

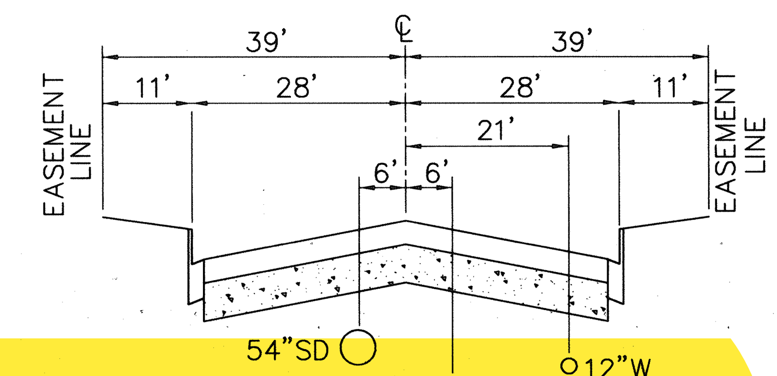
Q100=85.0 CFS (NEW)
Q100=92.0 CFS(EXIST)

REDUCTION OF 7.0 CFS
NO FURTHER ACTION REQUIRED

NODE 25

MANHOLE NO. 4 TABLE OF VALUES

STATION 12+00.05	STATION 14+68.56
A = 45°00'00"	A = 45°00'00"
B = 60"	B = 42"
C = 10.00'	C = 7.75'
D1 = 54"	D1 = 42"
D2 = 72"	D2 = 54"
ELEV. "R" = 96.42	ELEV. "R" = 00.59
ELEV. "S" = 96.35	ELEV. "S" = 00.58
L = 10.75'	L = 8.50'



SECTION @ STATION 13+00.00
SECTION LOOKING DOWNSTREAM

REFERENCE PLAN #2

PLAN

MAINTAINED BY MIRA LOMA SPACE CENTER
INSPECTION BY RCFC & WCD

Underground Service Alert
Call: TOLL FREE 1-800 227-2600
TWO WORKING DAYS BEFORE YOU DIG

KCT CONSULTANTS, INC.
Civil Engineers - Surveyors - Planners

PREPARED UNDER THE SUPERVISION OF:
TERESITO N. TABIOLO, R.C.E. NO. 38826 DATE 3-17-99 EXP. DATE 3-31-01

BENCH MARK
SEE SHEET NO. 1

REVISIONS

REF.	DESCRIPTION	APPR	DATE	APPR	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: PLANNING ENGINEER DATE: 3/22/99
APPROVED BY: CHIEF ENGINEER DATE: 3/23/99

County of Riverside
APPROVED BY:
FOR TRANSPORTATION DEPT. RIVERSIDE COUNTY, CALIF. DATE:

DAY CREEK M.D.P.
LINE "O" & LATERAL "O-3"
STAGE 1
FROM STA.10+00 TO STA.16+32.80
PLOT PLAN 15520

PROJECT NO. 1-0-257
DRAWING NO. 1-586
SHEET NO. 4 OF 8

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

GENERAL NOTES:

1. ALL STATIONING REFERS TO CENTERLINE OF CONSTRUCTION.
2. ALL STORM DRAIN REFERENCES AND CROSS SECTIONS ARE TAKEN LOOKING DOWNSTREAM.
3. ALL ELEVATIONS ARE IN FEET, BASED ON U.S.C. & G.S. DATA.
4. STANDARD DRAWINGS CALLED FOR ON THE PLAN & PROFILE SHALL CONFORM TO R.C.F.C. & W.C.D. STANDARD DRAWINGS AND AMERICAN PUBLIC WORKS ASSOCIATION STANDARDS PLANS.
5. ELEVATIONS AND LOCATIONS OF UTILITIES WERE OBTAINED FROM AVAILABLE INFORMATION AND SHOWN APPROXIMATELY ON PLANS. 48 HOURS BEFORE EXCAVATION CALL UNDERGROUND SERVICE ALERT AT (800) 227-2600. ALL UTILITIES SHALL BE PROTECTED IN PLACE EXCEPT AS NOTED ON PLANS AND SPECIFICATIONS.
6. ALL RECONSTRUCTION, RESURFACING AND PAVEMENT DELINEATION, CURBS, SIDEWALKS AND OTHER IMPROVEMENTS ARE TO BE RECONSTRUCTED IN KIND AT THE SAME LOCATIONS AND ELEVATIONS AS THE EXISTING IMPROVEMENTS, UNLESS OTHERWISE NOTED.
7. DISTURBED MONUMENTS ARE TO BE SALVAGED AND RESET BY THE OWNER.
8. THE CONTRACTOR SHALL MAINTAIN, ON A 24 HOUR BASIS ALL TRAFFIC CONTROL DEVICES NECESSARY TO ENSURE PROPER FLOW AND SAFETY OF TRAFFIC. THIS SHALL INCLUDE, BUT NOT TO BE LIMITED TO MONITORING OF TRAFFIC CONTROL DEVICES AT NIGHTTIME AND WEEKENDS.
9. CARE SHALL BE USED IN THE OPERATION OF HEAVY EQUIPMENT IN AREAS WHERE THE DEPTH OF BACKFILL OVER THE R.C.P. IS LESS THAN 3 FEET.
10. A PRELIMINARY SOILS INVESTIGATION DATED MAY 24, 2000 BY NORCAL ENGINEERING PROJECT NO. 8770-00, SHALL BE INCLUDED AS PART OF THESE PLANS. ALL WORK SHALL CONFORM TO THE RECOMMENDATIONS AS OUTLINED IN SAID REPORT.
11. THE CONTRACTOR SHALL CONSTRUCT THE FLOOD CONTROL IMPROVEMENTS SHOWN ON THE DRAWING IN CONFORMANCE WITH THE REQUIREMENTS OF THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT'S SPECIFICATIONS DATED SEPTEMBER 1984, AND DESIGN MANUAL STANDARD DRAWINGS. DRAWINGS DATED MAY 1971.
12. THE CONCRETE COVER ON THE INSIDE OF ALL CONCRETE PIPE MUST BE INCREASED TO PROVIDE A MIN. OF 1.5" OVER THE REINFORCING WHEN THE DESIGN VELOCITIES EXCEED 20 FPS. THE CONCRETE DESIGN STRENGTH IN THESE REACHES SHALL BE:
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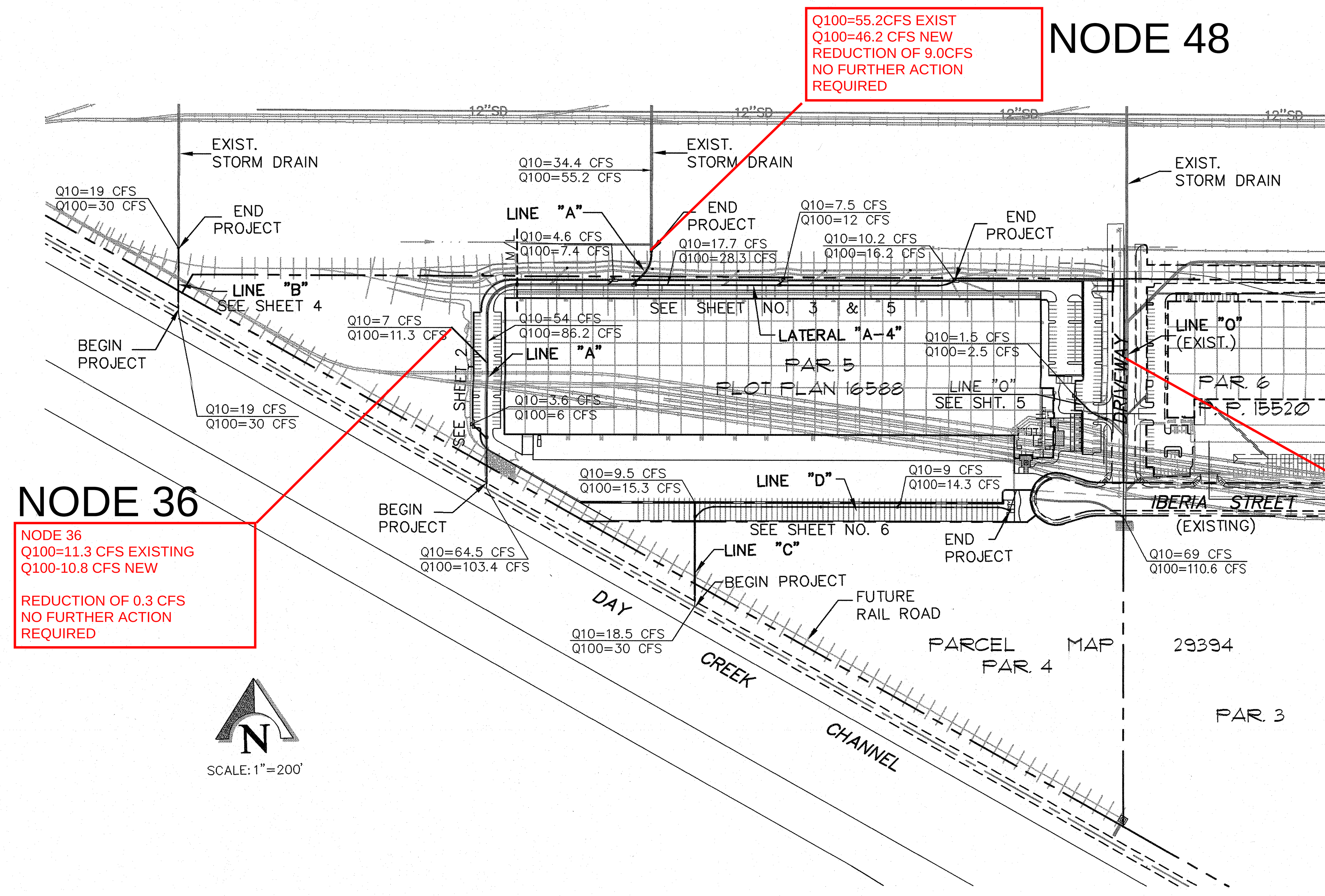
    FC= 6000 PSI FOR VELOCITIES EXCEEDING 30 FPS.
13. "V" IS THE DEPTH OF CATCH BASINS MEASURED FROM THE TOP OF CURB TO INVERT OF CONNECTOR PIPE.
14. BEDDING PIPE WITH LESS THAN TWO FEET OF COVER SHALL CONFORM TO LOS ANGELES COUNTY FLOOD CONTROL DISTRICT STANDARD DRAWINGS 2-D177 FOR CONCRETE BACKFILL IN TRENCHES. ALL OTHER PIPE SHALL CONFORM TO R.C.F.C. & W.C.D. STD. DWG. M815.



SEE REFERENCE PLANS #1 AND #2 IN THIS AREA

SHEET INDEX AND LOCATION MAP

0 100 200 400 600 800

SCALE: 1 INCH = 200 FEET

INDEX

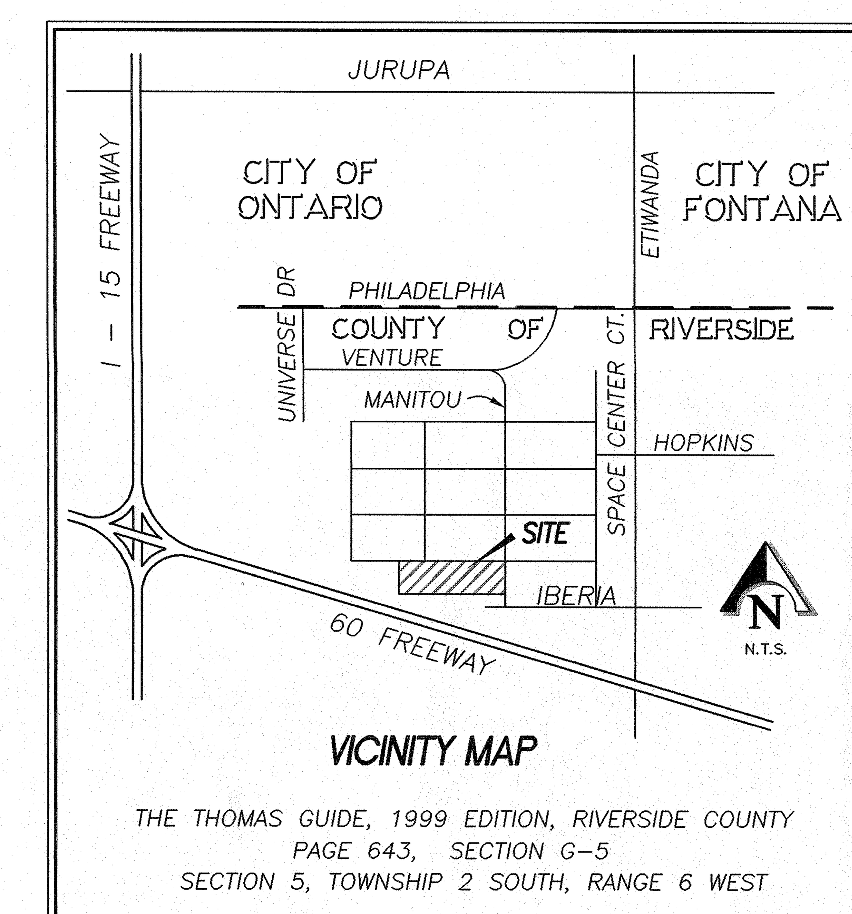
R.C.F.C. & W.C.D. STANDARD DRAWINGS

CB100	CATCH BASIN NO. 1
CB105	DETAIL OF CATCH BASIN OPENING & INSTALLATION DETAILS
CB108	INLET TYPE X WITH TRASH RACK
LD201	LOCAL DEPRESSION NO. 2
JS229	JUNCTION STRUCTURE NO. 4
JS230	JUNCTION STRUCTURE NO. 5
MH251	MANHOLE NO. 1
MH252	MANHOLE NO. 2
MH254	MANHOLE NO. 4
MH257	MANHOLE SHAFT FOR CAST PIPE
M803	CONCRETE COLLAR
M815	BEDDING AND PAY LINES

AMERICAN PUBLIC WORKS ASSOCIATION STANDARD DRAWINGS

305-1 GRATING CATCH BASIN

1009-11 1 of 8
Space Center



VICINITY MAP

THE THOMAS GUIDE, 1999 EDITION, RIVERSIDE COUNTY PAGE 643, SECTION G-5
SECTION 5, TOWNSHIP 2 SOUTH, RANGE 6 WEST

ENGINEER OF RECORDS

KCT CONSULTANTS, INC.
4344 LATHAM STREET, SUITE 200
RIVERSIDE, CA 92501
PHONE: (909) 341-8940, EXT. 226
FAX: (909) 341-8945
E-MAIL: kctinc@kctconsultants.com
ATTN: TERRY TABIOLO

ESTIMATED CONSTRUCTION SCHEDULE

BEGIN CONSTRUCTION: NOVEMBER 15, 2000
END CONSTRUCTION: MARCH 15, 2001

REFERENCE PLAN #3

STORM DRAIN SYSTEM MAINTAINED BY SPACE CENTER MIRA LOMA, INC.

Underground Service Alert
Call: TOLL FREE 1-800 227-2600
TWO WORKING DAYS BEFORE YOU DIG

KCT CONSULTANTS, INC.
Civil Engineers - Surveyors - Planners

PREPARED UNDER THE SUPERVISION OF:
DATE
TERESITO N. TABIOLO, R.C.E. NO. 38826 EXP. DATE 3-31-01

REGISTERED PROFESSIONAL ENGINEER TERESITO N. TABIOLO RCE No. 38826 Exp. 3-31-01 CIVIL STATE OF CALIFORNIA

BENCH MARK
TOP BRASS DISC IN CAPPED MONUMENT MARKED FOR SECTION CORNER AT C.L. INTERSECTION OF ETIWANDA AVE. & SAN SEVAINE WAY.
ELEV.= 783.69

REVISIONS					
REF.	DESCRIPTION	APPR	DATE	APPR	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: PLANNING ENGINEER DATE:
APPROVED BY: CHIEF ENGINEER DATE:

County of Riverside
APPROVED BY:
FOR TRANSPORTATION DEPT. RIVERSIDE COUNTY, CALIF. DATE:

PLOT PLAN 16588
STORM DRAIN PLAN
TITLE SHEET

PROJECT NO.
DRAWING NO.
SHEET NO. 1 OF 8

CONSTRUCTION NOTES:

1. J.S. NO. 5, D=33", L=25', C=19.5', ∡=60°36'44", ELEV "R"= 794.35, ELEV "S"= 792.54
2. 33" RCP, CLASS V (3000 D)
3. REMOVE EXISTING HEADWALL
4. CONCRETE COLLAR
5. MANHOLE NO. 4. STA. 17+90.00, A=45°, B= 42", D_1=36", D_2=60", C= 7.50', ELEV. "R"= 793.18, ELEV. "S"= 792.88.

REFERECE PLAN #4

STORM DRAIN SYSTEM MAINTAINED BY SPACE CENTER MIRA LOMA, INC.

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Call: TOLL FREE 1-800 227-2600
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KCT CONSULTANTS, INC.
Civil Engineers - Surveyors - Planners

PREPARED UNDER THE SUPERVISION OF:
TERESITO N. TABIOLO, R.C.E. NO. 38826 — DATE — EXP. DATE 3-31-01

BENCH MARK

REVISIONS

REF.	DESCRIPTION	APPR	DATE	APPR	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: PLANNING ENGINEER DATE:
APPROVED BY: CHIEF ENGINEER DATE:

County of Riverside
APPROVED BY: FOR TRANSPORTATION DEPT. RIVERSIDE COUNTY, CALIF. DATE:

PLOT PLAN 16588
STORM DRAIN PLAN
LINE "B"
FROM STA. 10+00 TO STA. 11+54.03
DETAILS

PROJECT NO.
DRAWING NO.
SHEET NO. 4 OF 8

1009-11 4 of 8 Space Center