

LEGEND:

- TYPE B SOIL
- TYPE C SOIL

PROJECT BOUNDARY

PROJECT BOUNDARY

WINGFIELD HILL COURT

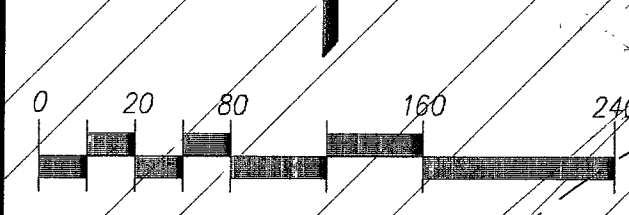
WELINGTON HILL DRIVE

JACKSON RIDGE FIRE ACCESS ROAD

WELINGTON HILL DRIVE A

WELINGTON HILL DRIVE B

JACKSON HILL DRIVE



SCALE: 1"=80'

JOB #: 2862.02

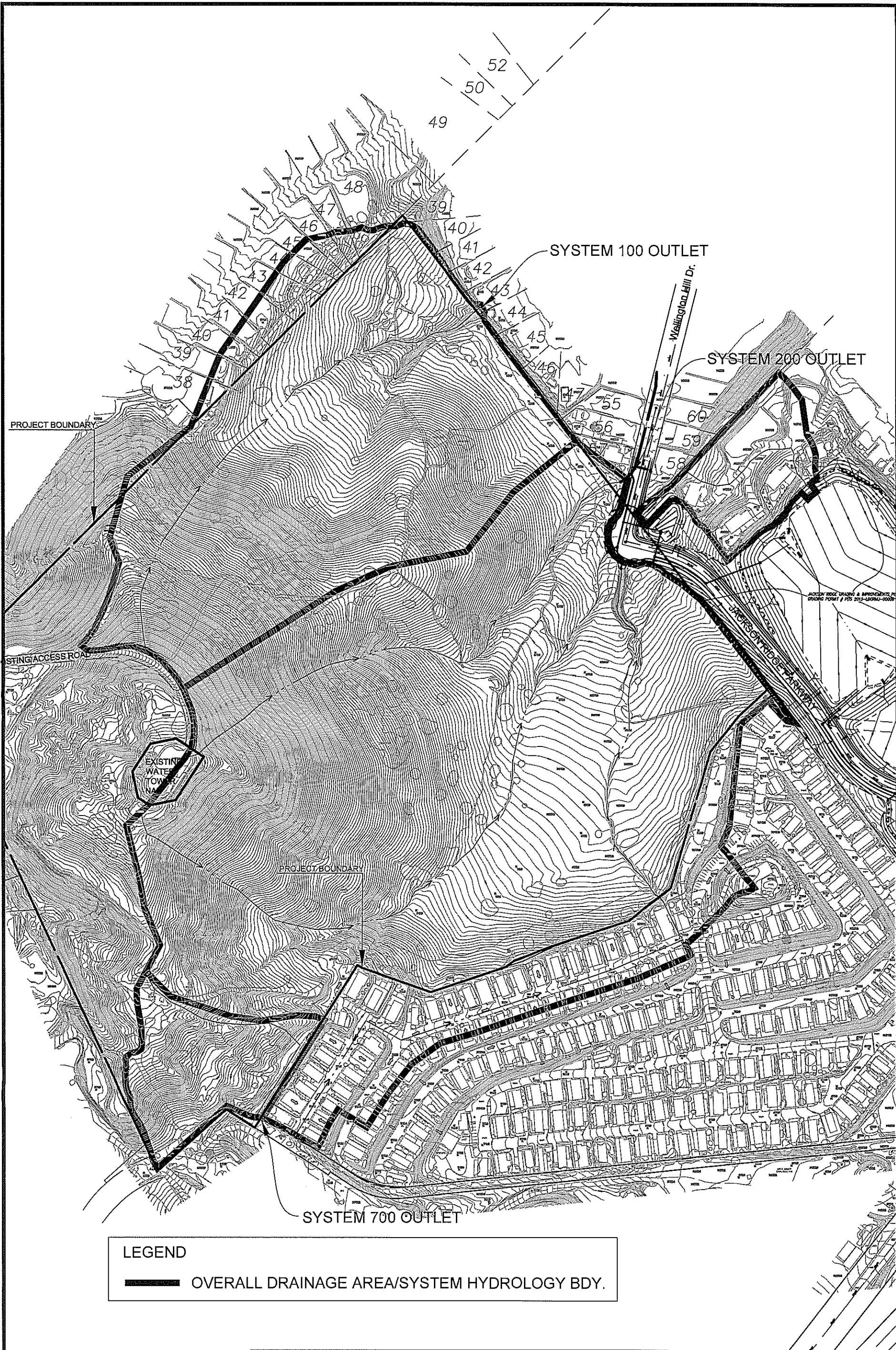
CREATED: 7/09/14

PREPARED BY:

PROJECT DESIGN CONSULTANTS
Planning | Landscape Architecture | Environmental | Engineering | Survey
701 B Street, Suite 800 San Diego, CA 92101
619.235.6471 Tel 619.234.0349 Fax

COUNTY OF SAN DIEGO
BRIGHTWATER RANCH

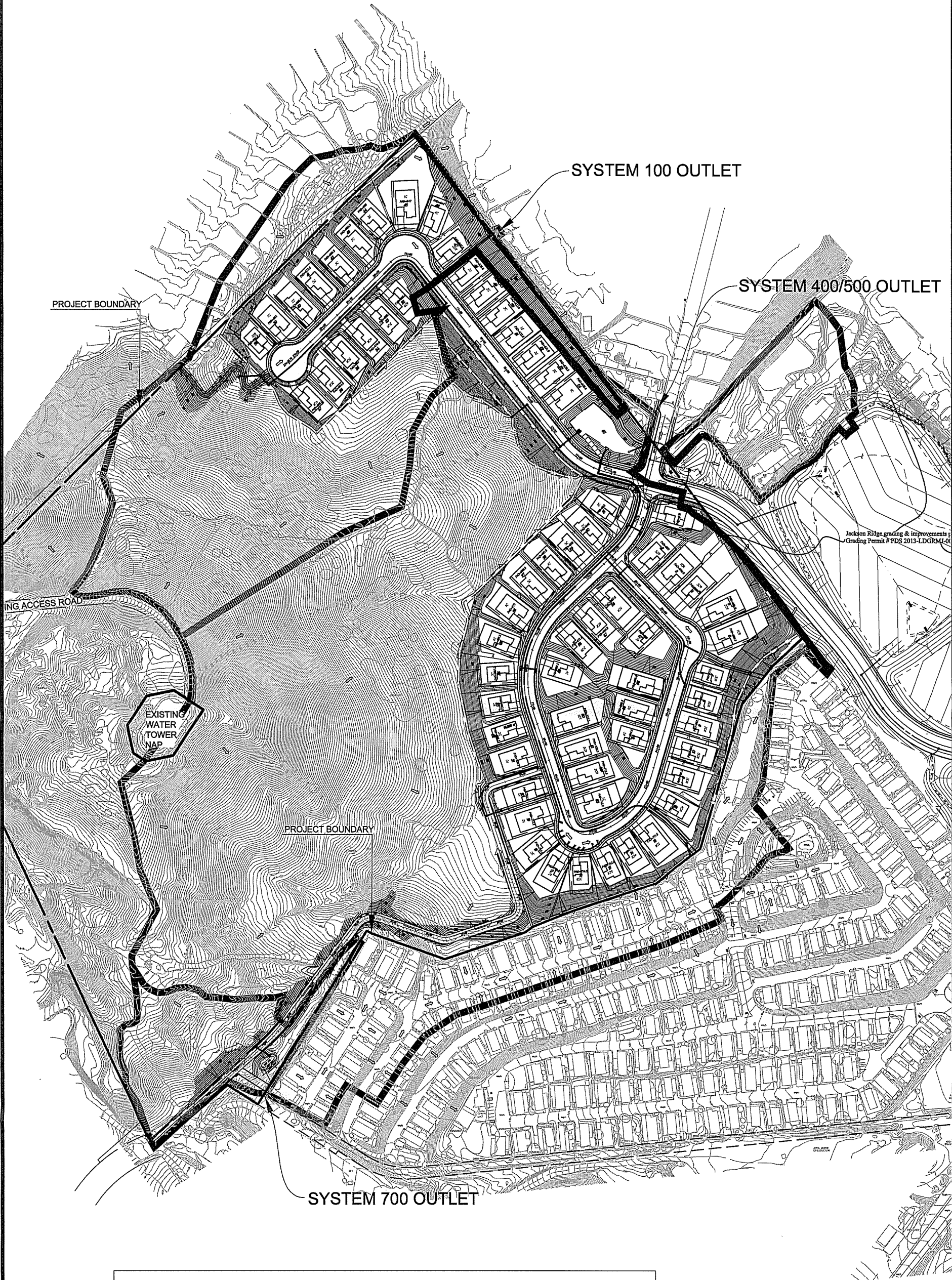
SOILS MAP
EXHIBIT C



LEGEND

— OVERALL DRAINAGE AREA/SYSTEM HYDROLOGY BDY.

P: \2862.02\ENGR\REPORTS\RAIN-TM\EXH\A\Ex Cond.dwg 3/23/2015 7:29:42 PM	SCALE: 1"=250' JOB #: 2862.02 CREATED: 3/23/15	PREPARED BY:  PROJECT DESIGN CONSULTANTS Planning Landscape Architecture Engineering Survey 701 B Street, Suite 800 San Diego, CA 92101 619.235.9471 Tel 619.234.2343 Fax	COUNTY OF SAN DIEGO BRIGHTWATER RANCH OVERALL DRAINAGE KEY MAP EXISTING CONDITIONS EXHIBIT D
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LEGEND

— OVERALL DRAINAGE AREA/SYSTEM HYDROLOGY BDY.

SCALE: 1"=250'

JOB #: 2862.02

CREATED: 3/23/15

PREPARED BY:



PROJECT DESIGN CONSULTANTS
Planning | Landscape Architecture | Engineering | Survey

701 B Street, Suite 800
San Diego, CA 92101
619.235.8471 Tel
619.234.0349 Fax

COUNTY OF SAN DIEGO
BRIGHTWATER RANCH

OVERALL DRAINAGE KEY MAP
PROPOSED CONDITIONS
EXHIBIT E

APPENDIX 3

Preliminary Detention Calculations

RATIONAL METHOD HYDROGRAPH PROGRAM
COPYRIGHT 1992, 2001 RICK ENGINEERING COMPANY

RUN DATE 3/24/2015

HYDROGRAPH FILE NAME S200P100.TXT

TIME OF CONCENTRATION 9 MIN.

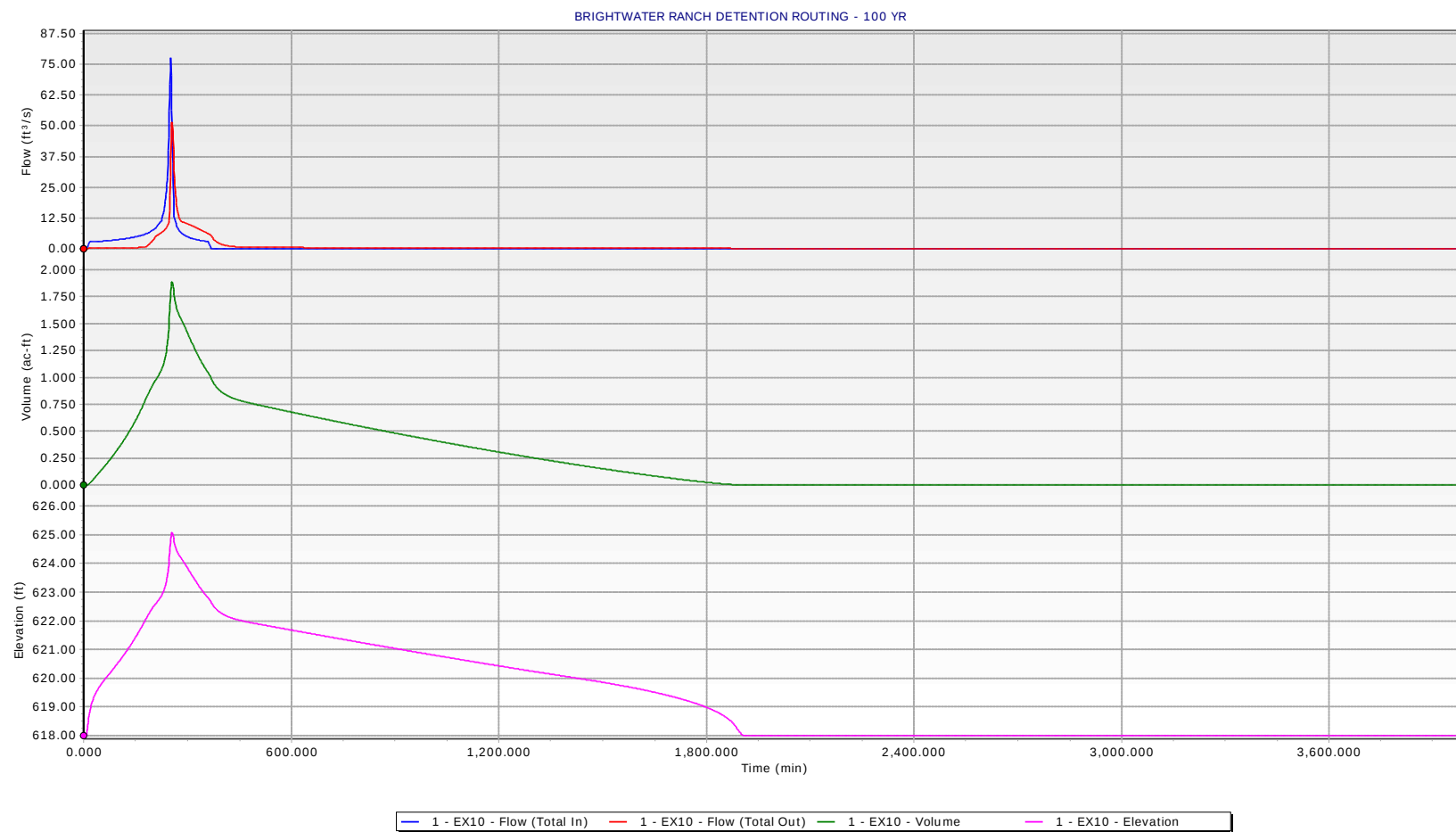
6 HOUR RAINFALL 2.7 INCHES

BASIN AREA 43 ACRES

RUNOFF COEFFICIENT 0.3991

PEAK DISCHARGE 77.75 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 9	DISCHARGE (CFS) = 0
TIME (MIN) = 18	DISCHARGE (CFS) = 2.8
TIME (MIN) = 27	DISCHARGE (CFS) = 2.9
TIME (MIN) = 36	DISCHARGE (CFS) = 3
TIME (MIN) = 45	DISCHARGE (CFS) = 3
TIME (MIN) = 54	DISCHARGE (CFS) = 3.1
TIME (MIN) = 63	DISCHARGE (CFS) = 3.2
TIME (MIN) = 72	DISCHARGE (CFS) = 3.3
TIME (MIN) = 81	DISCHARGE (CFS) = 3.4
TIME (MIN) = 90	DISCHARGE (CFS) = 3.6
TIME (MIN) = 99	DISCHARGE (CFS) = 3.7
TIME (MIN) = 108	DISCHARGE (CFS) = 3.9
TIME (MIN) = 117	DISCHARGE (CFS) = 4
TIME (MIN) = 126	DISCHARGE (CFS) = 4.2
TIME (MIN) = 135	DISCHARGE (CFS) = 4.4
TIME (MIN) = 144	DISCHARGE (CFS) = 4.7
TIME (MIN) = 153	DISCHARGE (CFS) = 4.9
TIME (MIN) = 162	DISCHARGE (CFS) = 5.3
TIME (MIN) = 171	DISCHARGE (CFS) = 5.5
TIME (MIN) = 180	DISCHARGE (CFS) = 6.1
TIME (MIN) = 189	DISCHARGE (CFS) = 6.5
TIME (MIN) = 198	DISCHARGE (CFS) = 7.5
TIME (MIN) = 207	DISCHARGE (CFS) = 8.1
TIME (MIN) = 216	DISCHARGE (CFS) = 9.9
TIME (MIN) = 225	DISCHARGE (CFS) = 11.3
TIME (MIN) = 234	DISCHARGE (CFS) = 16.5
TIME (MIN) = 243	DISCHARGE (CFS) = 29.1
TIME (MIN) = 252	DISCHARGE (CFS) = 77.75
TIME (MIN) = 261	DISCHARGE (CFS) = 13.3
TIME (MIN) = 270	DISCHARGE (CFS) = 8.9
TIME (MIN) = 279	DISCHARGE (CFS) = 6.9
TIME (MIN) = 288	DISCHARGE (CFS) = 5.8
TIME (MIN) = 297	DISCHARGE (CFS) = 5.1
TIME (MIN) = 306	DISCHARGE (CFS) = 4.5
TIME (MIN) = 315	DISCHARGE (CFS) = 4.1
TIME (MIN) = 324	DISCHARGE (CFS) = 3.8
TIME (MIN) = 333	DISCHARGE (CFS) = 3.5
TIME (MIN) = 342	DISCHARGE (CFS) = 3.3
TIME (MIN) = 351	DISCHARGE (CFS) = 3.1
TIME (MIN) = 360	DISCHARGE (CFS) = 2.9
TIME (MIN) = 369	DISCHARGE (CFS) = 0



100-yr-Routing-Basin

Project Summary

Title	Brightwater basin
Engineer	PDC
Company	PDC
Date	4/18/2015

Notes

100-yr-Routing-Basin

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (min)	Peak Flow (ft ³ /s)
CM-1	EX10	0	3.804	252.000	77.75

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (min)	Peak Flow (ft ³ /s)
O-1	EX10	0	3.804	256.000	51.59

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (min)	Peak Flow (ft ³ /s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
1 (IN)	EX10	0	3.804	252.000	77.75	(N/A)	(N/A)
1 (OUT)	EX10	0	3.804	256.000	51.59	625.07	1.887

100-yr-Routing-Basin

Subsection: Read Hydrograph

Label: CM-1

Return Event: 100 years

Storm Event:

Peak Discharge	77.75 ft ³ /s
Time to Peak	252.000 min
Hydrograph Volume	3.804 ac-ft

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 9.000 min

Time on left represents time for first value in each row.

Time (min)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
0.000	0.00	0.00	2.80	2.90	3.00
45.000	3.00	3.10	3.20	3.30	3.40
90.000	3.60	3.70	3.90	4.00	4.20
135.000	4.40	4.70	4.90	5.30	5.50
180.000	6.10	6.50	7.50	8.10	9.90
225.000	11.30	16.50	29.10	77.75	13.30
270.000	8.90	6.90	5.80	5.10	4.50
315.000	4.10	3.80	3.50	3.30	3.10
360.000	2.90	0.00	(N/A)	(N/A)	(N/A)

100-yr-Routing-Basin

Subsection: Elevation-Area Volume Curve

Return Event: 100 years

Label: 1

Storm Event:

Elevation (ft)	Planimeter (ft ²)	Area (ft ²)	A1+A2+sqr (A1*A2) (ft ²)	Volume (ac-ft)	Volume (Total) (ac-ft)
618.00	0.0	10.000	0.000	0.000	0.000
620.00	0.0	11,864.990	12,219.446	0.187	0.187
622.00	0.0	13,998.000	38,750.430	0.593	0.780
624.00	0.0	16,234.564	45,307.424	0.693	1.473
626.00	0.0	18,581.852	52,185.015	0.799	2.272

100-yr-Routing-Basin

Subsection: Volume Equations

Return Event: 100 years

Label: 1

Storm Event:

Pond Volume Equations

* Incremental volume computed by the Conic Method for Reservoir Volumes.

$$\text{Volume} = (1/3) * (\text{EL2} - \text{EL1}) * (\text{Area1} + \text{Area2} + \text{sqr}(\text{Area1} * \text{Area2}))$$

where:	EL1, EL2	Lower and upper elevations of the increment
	Area1, Area2	Areas computed for EL1, EL2, respectively
	Volume	Incremental volume between EL1 and EL2

100-yr-Routing-Basin

Subsection: Outlet Input Data

Label: Outlet#1

Return Event: 100 years

Storm Event:

Requested Pond Water Surface Elevations

Minimum (Headwater)	618.00 ft
Increment (Headwater)	0.10 ft
Maximum (Headwater)	626.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	Orifice - 1	Forward	TW	618.00	626.00
Orifice-Circular	Orifice - 2	Forward	TW	621.90	626.00
Rectangular Weir	Weir - 1	Forward	TW	624.20	626.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

100-yr-Routing-Basin

Subsection: Outlet Input Data

Label: Outlet#1

Return Event: 100 years

Storm Event:

Structure ID: Orifice - 1	
Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	618.00 ft
Orifice Diameter	3.0 in
Orifice Coefficient	0.670
Structure ID: Orifice - 2	
Structure Type: Orifice-Circular	
Number of Openings	4
Elevation	621.90 ft
Orifice Diameter	8.0 in
Orifice Coefficient	0.670
Structure ID: Weir - 1	
Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	624.20 ft
Weir Length	15.71 ft
Weir Coefficient	3.00 (ft ^{0.5})/s
Structure ID: TW	
Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall
Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft ³ /s
Flow Tolerance (Maximum)	10.000 ft ³ /s

100-yr-Routing-Basin

Subsection: Composite Rating Curve

Return Event: 100 years

Label: Outlet#1

Storm Event:

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft ³ /s)	Tailwater Elevation (ft)	Convergence Error (ft)
618.00	0.00	(N/A)	0.00
618.10	0.02	(N/A)	0.00
618.20	0.06	(N/A)	0.00
618.30	0.11	(N/A)	0.00
618.40	0.14	(N/A)	0.00
618.50	0.16	(N/A)	0.00
618.60	0.18	(N/A)	0.00
618.70	0.20	(N/A)	0.00
618.80	0.22	(N/A)	0.00
618.90	0.23	(N/A)	0.00
619.00	0.25	(N/A)	0.00
619.10	0.26	(N/A)	0.00
619.20	0.27	(N/A)	0.00
619.30	0.29	(N/A)	0.00
619.40	0.30	(N/A)	0.00
619.50	0.31	(N/A)	0.00
619.60	0.32	(N/A)	0.00
619.70	0.33	(N/A)	0.00
619.80	0.34	(N/A)	0.00
619.90	0.35	(N/A)	0.00
620.00	0.36	(N/A)	0.00
620.10	0.37	(N/A)	0.00
620.20	0.38	(N/A)	0.00
620.30	0.39	(N/A)	0.00
620.40	0.40	(N/A)	0.00
620.50	0.41	(N/A)	0.00
620.60	0.42	(N/A)	0.00
620.70	0.42	(N/A)	0.00
620.80	0.43	(N/A)	0.00
620.90	0.44	(N/A)	0.00
621.00	0.45	(N/A)	0.00
621.10	0.46	(N/A)	0.00
621.20	0.46	(N/A)	0.00
621.30	0.47	(N/A)	0.00
621.40	0.48	(N/A)	0.00
621.50	0.48	(N/A)	0.00
621.60	0.49	(N/A)	0.00
621.70	0.50	(N/A)	0.00
621.80	0.51	(N/A)	0.00
621.90	0.51	(N/A)	0.00
622.00	0.63	(N/A)	0.00
622.10	0.95	(N/A)	0.00
622.20	1.45	(N/A)	0.00

100-yr-Routing-Basin

Subsection: Composite Rating Curve
Label: Outlet#1

Return Event: 100 years
Storm Event:

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft ³ /s)	Tailwater Elevation (ft)	Convergence Error (ft)
622.30	2.10	(N/A)	0.00
622.40	2.85	(N/A)	0.00
622.50	3.70	(N/A)	0.00
622.60	5.10	(N/A)	0.00
622.70	5.69	(N/A)	0.00
622.80	6.22	(N/A)	0.00
622.90	6.70	(N/A)	0.00
623.00	7.15	(N/A)	0.00
623.10	7.57	(N/A)	0.00
623.20	7.97	(N/A)	0.00
623.30	8.35	(N/A)	0.00
623.40	8.71	(N/A)	0.00
623.50	9.06	(N/A)	0.00
623.60	9.39	(N/A)	0.00
623.70	9.71	(N/A)	0.00
623.80	10.02	(N/A)	0.00
623.90	10.32	(N/A)	0.00
624.00	10.61	(N/A)	0.00
624.10	10.90	(N/A)	0.00
624.20	11.17	(N/A)	0.00
624.30	12.93	(N/A)	0.00
624.40	15.92	(N/A)	0.00
624.50	19.71	(N/A)	0.00
624.60	24.14	(N/A)	0.00
624.70	29.13	(N/A)	0.00
624.80	34.61	(N/A)	0.00
624.90	40.54	(N/A)	0.00
625.00	46.90	(N/A)	0.00
625.10	53.64	(N/A)	0.00
625.20	60.76	(N/A)	0.00
625.30	68.22	(N/A)	0.00
625.40	76.02	(N/A)	0.00
625.50	84.14	(N/A)	0.00
625.60	92.56	(N/A)	0.00
625.70	101.28	(N/A)	0.00
625.80	110.29	(N/A)	0.00
625.90	119.57	(N/A)	0.00
626.00	129.12	(N/A)	0.00

Contributing Structures

None Contributing
Orifice - 1
Orifice - 1

100-yr-Routing-Basin

Subsection: Composite Rating Curve

Label: Outlet#1

Return Event: 100 years

Storm Event:

Composite Outflow Summary

[illegible]

100-yr-Routing-Basin

Subsection: Composite Rating Curve

Label: Outlet#1

Return Event: 100 years

Storm Event:

Composite Outflow Summary

Contributing Structures
Orifice - 1 + Orifice - 2
Orifice - 1 + Orifice - 2
Orifice - 1 + Orifice - 2
Orifice - 1 + Orifice - 2
Orifice - 1 + Orifice - 2
Orifice - 1 + Orifice - 2
Orifice - 1 + Orifice - 2
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Orifice - 1 + Orifice - 2
Orifice - 1 + Orifice - 2 + Weir - 1
Orifice - 1 + Orifice - 2 + Weir - 1
Orifice - 1 + Orifice - 2 + Weir - 1
Orifice - 1 + Orifice - 2 + Weir - 1
Orifice - 1 + Orifice - 2 + Weir - 1
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Orifice - 1 + Orifice - 2 + Weir - 1
Orifice - 1 + Orifice - 2 + Weir - 1
Orifice - 1 + Orifice - 2 + Weir - 1

100-yr-Routing-Basin

Subsection: Elevation-Volume-Flow Table (Pond)

Return Event: 100 years

Label: 1

Storm Event:

Infiltration	
Infiltration Method (Computed)	No Infiltration
Initial Conditions	
Elevation (Water Surface, Initial)	618.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft ³ /s
Flow (Initial Infiltration)	0.00 ft ³ /s
Flow (Initial, Total)	0.00 ft ³ /s
Time Increment	1.000 min

Elevation (ft)	Outflow (ft ³ /s)	Storage (ac-ft)	Area (ft ²)	Infiltration (ft ³ /s)	Flow (Total) (ft ³ /s)	2S/t + O (ft ³ /s)
618.00	0.00	0.000	10.000	0.00	0.00	0.00
618.10	0.02	0.000	71.411	0.00	0.02	0.14
618.20	0.06	0.000	188.752	0.00	0.06	0.59
618.30	0.11	0.001	362.024	0.00	0.11	1.55
618.40	0.14	0.002	591.226	0.00	0.14	3.15
618.50	0.16	0.004	876.358	0.00	0.16	5.61
618.60	0.18	0.006	1,217.421	0.00	0.18	9.10
618.70	0.20	0.009	1,614.414	0.00	0.20	13.82
618.80	0.22	0.014	2,067.337	0.00	0.22	19.96
618.90	0.23	0.019	2,576.191	0.00	0.23	27.70
619.00	0.25	0.025	3,140.975	0.00	0.25	37.23
619.10	0.26	0.033	3,761.690	0.00	0.26	48.73
619.20	0.27	0.043	4,438.335	0.00	0.27	62.39
619.30	0.29	0.054	5,170.911	0.00	0.29	78.41
619.40	0.30	0.067	5,959.417	0.00	0.30	96.95
619.50	0.31	0.081	6,803.853	0.00	0.31	118.22
619.60	0.32	0.098	7,704.220	0.00	0.32	142.40
619.70	0.33	0.117	8,660.517	0.00	0.33	169.67
619.80	0.34	0.138	9,672.744	0.00	0.34	200.22
619.90	0.35	0.161	10,740.902	0.00	0.35	234.23
620.00	0.36	0.187	11,864.990	0.00	0.36	271.90
620.10	0.37	0.214	11,967.455	0.00	0.37	311.63
620.20	0.38	0.242	12,070.361	0.00	0.38	351.71
620.30	0.39	0.270	12,173.708	0.00	0.39	392.12
620.40	0.40	0.298	12,277.495	0.00	0.40	432.88
620.50	0.41	0.326	12,381.722	0.00	0.41	473.99
620.60	0.42	0.355	12,486.390	0.00	0.42	515.45
620.70	0.42	0.383	12,591.499	0.00	0.42	557.25
620.80	0.43	0.413	12,697.048	0.00	0.43	599.41

100-yr-Routing-Basin

Subsection: Elevation-Volume-Flow Table (Pond)

Return Event: 100 years

Label: 1

Storm Event:

Elevation (ft)	Outflow (ft ³ /s)	Storage (ac-ft)	Area (ft ²)	Infiltration (ft ³ /s)	Flow (Total) (ft ³ /s)	2S/t + O (ft ³ /s)
620.90	0.44	0.442	12,803.038	0.00	0.44	641.91
621.00	0.45	0.471	12,909.468	0.00	0.45	684.78
621.10	0.46	0.501	13,016.339	0.00	0.46	727.99
621.20	0.46	0.531	13,123.650	0.00	0.46	771.57
621.30	0.47	0.561	13,231.402	0.00	0.47	815.50
621.40	0.48	0.592	13,339.594	0.00	0.48	859.79
621.50	0.48	0.623	13,448.227	0.00	0.48	904.45
621.60	0.49	0.654	13,557.300	0.00	0.49	949.46
621.70	0.50	0.685	13,666.814	0.00	0.50	994.84
621.80	0.51	0.716	13,776.769	0.00	0.51	1,040.59
621.90	0.51	0.748	13,887.164	0.00	0.51	1,086.70
622.00	0.63	0.780	13,998.000	0.00	0.63	1,133.29
622.10	0.95	0.812	14,105.893	0.00	0.95	1,180.45
622.20	1.45	0.845	14,214.200	0.00	1.45	1,228.15
622.30	2.10	0.878	14,322.922	0.00	2.10	1,276.36
622.40	2.85	0.911	14,432.058	0.00	2.85	1,325.04
622.50	3.70	0.944	14,541.608	0.00	3.70	1,374.18
622.60	5.10	0.977	14,651.572	0.00	5.10	1,424.24
622.70	5.69	1.011	14,761.950	0.00	5.69	1,473.85
622.80	6.22	1.045	14,872.743	0.00	6.22	1,523.77
622.90	6.70	1.079	14,983.950	0.00	6.70	1,574.01
623.00	7.15	1.114	15,095.571	0.00	7.15	1,624.59
623.10	7.57	1.149	15,207.606	0.00	7.57	1,675.52
623.20	7.97	1.184	15,320.056	0.00	7.97	1,726.80
623.30	8.35	1.219	15,432.920	0.00	8.35	1,778.43
623.40	8.71	1.255	15,546.198	0.00	8.71	1,830.42
623.50	9.06	1.290	15,659.890	0.00	9.06	1,882.78
623.60	9.39	1.327	15,773.996	0.00	9.39	1,935.50
623.70	9.71	1.363	15,888.517	0.00	9.71	1,988.59
623.80	10.02	1.399	16,003.452	0.00	10.02	2,042.06
623.90	10.32	1.436	16,118.801	0.00	10.32	2,095.90
624.00	10.61	1.473	16,234.564	0.00	10.61	2,150.11
624.10	10.90	1.511	16,348.165	0.00	10.90	2,204.70
624.20	11.17	1.549	16,462.163	0.00	11.17	2,259.66
624.30	12.93	1.586	16,576.557	0.00	12.93	2,316.48
624.40	15.92	1.625	16,691.347	0.00	15.92	2,374.92
624.50	19.71	1.663	16,806.533	0.00	19.71	2,434.53
624.60	24.14	1.702	16,922.115	0.00	24.14	2,495.18
624.70	29.13	1.741	17,038.093	0.00	29.13	2,556.76
624.80	34.61	1.780	17,154.467	0.00	34.61	2,619.23
624.90	40.54	1.820	17,271.237	0.00	40.54	2,682.55
625.00	46.90	1.859	17,388.404	0.00	46.90	2,746.67
625.10	53.64	1.899	17,505.966	0.00	53.64	2,811.57

100-yr-Routing-Basin

Subsection: Elevation-Volume-Flow Table (Pond)

Return Event: 100 years

Label: 1

Storm Event:

Elevation (ft)	Outflow (ft ³ /s)	Storage (ac-ft)	Area (ft ²)	Infiltration (ft ³ /s)	Flow (Total) (ft ³ /s)	2S/t + O (ft ³ /s)
625.20	60.76	1.940	17,623.925	0.00	60.76	2,877.23
625.30	68.22	1.980	17,742.279	0.00	68.22	2,943.64
625.40	76.02	2.021	17,861.030	0.00	76.02	3,010.78
625.50	84.14	2.062	17,980.177	0.00	84.14	3,078.63
625.60	92.56	2.104	18,099.720	0.00	92.56	3,147.19
625.70	101.28	2.145	18,219.658	0.00	101.28	3,216.44
625.80	110.29	2.187	18,339.993	0.00	110.29	3,286.38
625.90	119.57	2.230	18,460.725	0.00	119.57	3,357.00
626.00	129.12	2.272	18,581.852	0.00	129.12	3,428.28

100-yr-Routing-Basin

Subsection: Level Pool Pond Routing Summary

Return Event: 100 years

Label: 1 (IN)

Storm Event:

Infiltration			
Infiltration Method (Computed)		No Infiltration	
Initial Conditions			
Elevation (Water Surface, Initial)	618.00 ft		
Volume (Initial)	0.000 ac-ft		
Flow (Initial Outlet)	0.00 ft³/s		
Flow (Initial Infiltration)	0.00 ft³/s		
Flow (Initial, Total)	0.00 ft³/s		
Time Increment	1.000 min		
Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	77.75 ft³/s	Time to Peak (Flow, In)	252.000 min
Flow (Peak Outlet)	51.59 ft³/s	Time to Peak (Flow, Outlet)	256.000 min
Peak Conditions			
Elevation (Water Surface, Peak)	625.07 ft		
Volume (Peak)	1.887 ac-ft		
Mass Balance (ac-ft)			
Volume (Initial)	0.000 ac-ft		
Volume (Total Inflow)	3.804 ac-ft		
Volume (Total Infiltration)	0.000 ac-ft		
Volume (Total Outlet Outflow)	3.804 ac-ft		
Volume (Retained)	0.000 ac-ft		
Volume (Unrouted)	0.000 ac-ft		
Error (Mass Balance)	0.0 %		

100-yr-Routing-Basin

Subsection: Pond Routed Hydrograph (total out)

Return Event: 100 years

Label: 1 (OUT)

Storm Event:

Peak Discharge	51.59 ft ³ /s
Time to Peak	256.000 min
Hydrograph Volume	3.804 ac-ft

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 1.000 min

Time on left represents time for first value in each row.

Time (min)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
9.000	0.00	0.03	0.09	0.13	0.15
14.000	0.17	0.19	0.20	0.21	0.22
19.000	0.23	0.24	0.25	0.25	0.26
24.000	0.27	0.27	0.28	0.28	0.28
29.000	0.29	0.29	0.29	0.30	0.30
34.000	0.30	0.31	0.31	0.31	0.31
39.000	0.32	0.32	0.32	0.32	0.33
44.000	0.33	0.33	0.33	0.33	0.34
49.000	0.34	0.34	0.34	0.34	0.34
54.000	0.35	0.35	0.35	0.35	0.35
59.000	0.35	0.36	0.36	0.36	0.36
64.000	0.36	0.36	0.36	0.37	0.37
69.000	0.37	0.37	0.37	0.37	0.37
74.000	0.37	0.38	0.38	0.38	0.38
79.000	0.38	0.38	0.38	0.39	0.39
84.000	0.39	0.39	0.39	0.39	0.39
89.000	0.40	0.40	0.40	0.40	0.40
94.000	0.40	0.40	0.40	0.41	0.41
99.000	0.41	0.41	0.41	0.41	0.41
104.000	0.42	0.42	0.42	0.42	0.42
109.000	0.42	0.42	0.43	0.43	0.43
114.000	0.43	0.43	0.43	0.43	0.43
119.000	0.44	0.44	0.44	0.44	0.44
124.000	0.44	0.44	0.45	0.45	0.45
129.000	0.45	0.45	0.45	0.45	0.46
134.000	0.46	0.46	0.46	0.46	0.46
139.000	0.46	0.46	0.47	0.47	0.47
144.000	0.47	0.47	0.47	0.47	0.48
149.000	0.48	0.48	0.48	0.48	0.48
154.000	0.48	0.49	0.49	0.49	0.49
159.000	0.49	0.49	0.49	0.50	0.50
164.000	0.50	0.50	0.50	0.50	0.51
169.000	0.51	0.51	0.51	0.51	0.51
174.000	0.54	0.57	0.59	0.62	0.67
179.000	0.74	0.82	0.89	0.96	1.07
184.000	1.18	1.29	1.39	1.51	1.65
189.000	1.78	1.91	2.03	2.17	2.32

100-yr-Routing-Basin

Subsection: Pond Routed Hydrograph (total out)

Return Event: 100 years

Label: 1 (OUT)

Storm Event:

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 1.000 min

Time on left represents time for first value in each row.

Time (min)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
194.000	2.46	2.60	2.75	2.89	3.05
199.000	3.21	3.36	3.51	3.66	3.86
204.000	4.08	4.30	4.51	4.71	4.90
209.000	5.10	5.18	5.27	5.36	5.45
214.000	5.54	5.64	5.73	5.82	5.91
219.000	6.01	6.10	6.20	6.29	6.38
224.000	6.47	6.56	6.65	6.76	6.86
229.000	6.98	7.10	7.23	7.36	7.49
234.000	7.63	7.78	7.95	8.13	8.32
239.000	8.52	8.74	8.96	9.20	9.44
244.000	9.71	10.03	10.39	10.79	11.45
249.000	15.32	21.65	29.15	37.38	44.49
254.000	49.06	51.30	51.59	50.33	47.84
259.000	44.50	40.45	36.03	31.91	28.56
264.000	25.89	23.63	21.80	20.16	18.83
269.000	17.66	16.58	15.65	14.93	14.26
274.000	13.63	13.04	12.67	12.34	12.03
279.000	11.72	11.42	11.17	11.12	11.07
284.000	11.03	10.98	10.93	10.88	10.83
289.000	10.77	10.72	10.67	10.61	10.56
294.000	10.50	10.45	10.39	10.33	10.27
299.000	10.22	10.16	10.10	10.04	9.98
304.000	9.92	9.85	9.79	9.73	9.67
309.000	9.60	9.54	9.48	9.41	9.35
314.000	9.28	9.22	9.15	9.09	9.02
319.000	8.96	8.89	8.83	8.76	8.69
324.000	8.63	8.56	8.49	8.43	8.36
329.000	8.29	8.22	8.16	8.09	8.02
334.000	7.95	7.88	7.82	7.75	7.68
339.000	7.61	7.55	7.48	7.41	7.34
344.000	7.27	7.20	7.14	7.07	7.00
349.000	6.93	6.86	6.80	6.73	6.66
354.000	6.59	6.52	6.46	6.39	6.32
359.000	6.26	6.19	6.12	6.04	5.95
364.000	5.87	5.77	5.67	5.56	5.44
369.000	5.31	5.18	5.01	4.73	4.46
374.000	4.21	3.98	3.75	3.60	3.48
379.000	3.36	3.24	3.13	3.02	2.91
384.000	2.82	2.73	2.65	2.56	2.49
389.000	2.41	2.33	2.26	2.19	2.12
394.000	2.06	2.01	1.95	1.90	1.85
399.000	1.80	1.75	1.70	1.66	1.61

100-yr-Routing-Basin

Subsection: Pond Routed Hydrograph (total out)

Return Event: 100 years

Label: 1 (OUT)

Storm Event:

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 1.000 min

Time on left represents time for first value in each row.

Time (min)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
404.000	1.57	1.53	1.49	1.45	1.42
409.000	1.39	1.36	1.33	1.30	1.27
414.000	1.25	1.22	1.20	1.17	1.15
419.000	1.12	1.10	1.08	1.05	1.03
424.000	1.01	0.99	0.97	0.95	0.94
429.000	0.92	0.91	0.90	0.89	0.87
434.000	0.86	0.85	0.84	0.83	0.82
439.000	0.81	0.79	0.78	0.77	0.76
444.000	0.75	0.74	0.73	0.72	0.71
449.000	0.70	0.69	0.68	0.67	0.67
454.000	0.66	0.65	0.64	0.63	0.63
459.000	0.62	0.62	0.62	0.61	0.61
464.000	0.61	0.60	0.60	0.60	0.60
469.000	0.59	0.59	0.59	0.58	0.58
474.000	0.58	0.58	0.57	0.57	0.57
479.000	0.56	0.56	0.56	0.56	0.55
484.000	0.55	0.55	0.54	0.54	0.54
489.000	0.54	0.53	0.53	0.53	0.53
494.000	0.52	0.52	0.52	0.51	0.51
499.000	0.51	0.51	0.51	0.51	0.51
504.000	0.51	0.51	0.51	0.51	0.51
509.000	0.51	0.51	0.51	0.51	0.51
514.000	0.51	0.51	0.51	0.51	0.51
519.000	0.51	0.51	0.51	0.51	0.51
524.000	0.51	0.51	0.51	0.51	0.51
529.000	0.51	0.51	0.51	0.51	0.51
534.000	0.51	0.51	0.51	0.51	0.51
539.000	0.51	0.51	0.51	0.51	0.51
544.000	0.51	0.51	0.51	0.51	0.51
549.000	0.50	0.50	0.50	0.50	0.50
554.000	0.50	0.50	0.50	0.50	0.50
559.000	0.50	0.50	0.50	0.50	0.50
564.000	0.50	0.50	0.50	0.50	0.50
569.000	0.50	0.50	0.50	0.50	0.50
574.000	0.50	0.50	0.50	0.50	0.50
579.000	0.50	0.50	0.50	0.50	0.50
584.000	0.50	0.50	0.50	0.50	0.50
589.000	0.50	0.50	0.50	0.50	0.50
594.000	0.50	0.50	0.50	0.50	0.50
599.000	0.50	0.50	0.50	0.50	0.50
604.000	0.50	0.50	0.50	0.50	0.50
609.000	0.50	0.50	0.50	0.50	0.50

100-yr-Routing-Basin

Subsection: Pond Routed Hydrograph (total out)

Return Event: 100 years

Label: 1 (OUT)

Storm Event:

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 1.000 min

Time on left represents time for first value in each row.

Time (min)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
614.000	0.49	0.49	0.49	0.49	0.49
619.000	0.49	0.49	0.49	0.49	0.49
624.000	0.49	0.49	0.49	0.49	0.49
629.000	0.49	0.49	0.49	0.49	0.49
634.000	0.49	0.49	0.49	0.49	0.49
639.000	0.49	0.49	0.49	0.49	0.49
644.000	0.49	0.49	0.49	0.49	0.49
649.000	0.49	0.49	0.49	0.49	0.49
654.000	0.49	0.49	0.49	0.49	0.49
659.000	0.49	0.49	0.49	0.49	0.49
664.000	0.49	0.49	0.49	0.49	0.49
669.000	0.49	0.49	0.49	0.49	0.49
674.000	0.49	0.49	0.49	0.49	0.49
679.000	0.48	0.48	0.48	0.48	0.48
684.000	0.48	0.48	0.48	0.48	0.48
689.000	0.48	0.48	0.48	0.48	0.48
694.000	0.48	0.48	0.48	0.48	0.48
699.000	0.48	0.48	0.48	0.48	0.48
704.000	0.48	0.48	0.48	0.48	0.48
709.000	0.48	0.48	0.48	0.48	0.48
714.000	0.48	0.48	0.48	0.48	0.48
719.000	0.48	0.48	0.48	0.48	0.48
724.000	0.48	0.48	0.48	0.48	0.48
729.000	0.48	0.48	0.48	0.48	0.48
734.000	0.48	0.48	0.48	0.48	0.48
739.000	0.48	0.48	0.48	0.48	0.47
744.000	0.47	0.47	0.47	0.47	0.47
749.000	0.47	0.47	0.47	0.47	0.47
754.000	0.47	0.47	0.47	0.47	0.47
759.000	0.47	0.47	0.47	0.47	0.47
764.000	0.47	0.47	0.47	0.47	0.47
769.000	0.47	0.47	0.47	0.47	0.47
774.000	0.47	0.47	0.47	0.47	0.47
779.000	0.47	0.47	0.47	0.47	0.47
784.000	0.47	0.47	0.47	0.47	0.47
789.000	0.47	0.47	0.47	0.47	0.47
794.000	0.47	0.47	0.47	0.47	0.47
799.000	0.47	0.47	0.47	0.47	0.47
804.000	0.47	0.47	0.46	0.46	0.46
809.000	0.46	0.46	0.46	0.46	0.46
814.000	0.46	0.46	0.46	0.46	0.46
819.000	0.46	0.46	0.46	0.46	0.46

100-yr-Routing-Basin

Subsection: Pond Routed Hydrograph (total out)

Return Event: 100 years

Label: 1 (OUT)

Storm Event:

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 1.000 min

Time on left represents time for first value in each row.

Time (min)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
824.000	0.46	0.46	0.46	0.46	0.46
829.000	0.46	0.46	0.46	0.46	0.46
834.000	0.46	0.46	0.46	0.46	0.46
839.000	0.46	0.46	0.46	0.46	0.46
844.000	0.46	0.46	0.46	0.46	0.46
849.000	0.46	0.46	0.46	0.46	0.46
854.000	0.46	0.46	0.46	0.46	0.46
859.000	0.46	0.46	0.46	0.46	0.46
864.000	0.46	0.46	0.46	0.46	0.46
869.000	0.45	0.45	0.45	0.45	0.45
874.000	0.45	0.45	0.45	0.45	0.45
879.000	0.45	0.45	0.45	0.45	0.45
884.000	0.45	0.45	0.45	0.45	0.45
889.000	0.45	0.45	0.45	0.45	0.45
894.000	0.45	0.45	0.45	0.45	0.45
899.000	0.45	0.45	0.45	0.45	0.45
904.000	0.45	0.45	0.45	0.45	0.45
909.000	0.45	0.45	0.45	0.45	0.45
914.000	0.45	0.45	0.45	0.45	0.45
919.000	0.45	0.45	0.45	0.45	0.45
924.000	0.45	0.45	0.45	0.45	0.45
929.000	0.45	0.45	0.44	0.44	0.44
934.000	0.44	0.44	0.44	0.44	0.44
939.000	0.44	0.44	0.44	0.44	0.44
944.000	0.44	0.44	0.44	0.44	0.44
949.000	0.44	0.44	0.44	0.44	0.44
954.000	0.44	0.44	0.44	0.44	0.44
959.000	0.44	0.44	0.44	0.44	0.44
964.000	0.44	0.44	0.44	0.44	0.44
969.000	0.44	0.44	0.44	0.44	0.44
974.000	0.44	0.44	0.44	0.44	0.44
979.000	0.44	0.44	0.44	0.44	0.44
984.000	0.44	0.44	0.44	0.44	0.44
989.000	0.44	0.44	0.44	0.43	0.43
994.000	0.43	0.43	0.43	0.43	0.43
999.000	0.43	0.43	0.43	0.43	0.43
1,004.000	0.43	0.43	0.43	0.43	0.43
1,009.000	0.43	0.43	0.43	0.43	0.43
1,014.000	0.43	0.43	0.43	0.43	0.43
1,019.000	0.43	0.43	0.43	0.43	0.43
1,024.000	0.43	0.43	0.43	0.43	0.43
1,029.000	0.43	0.43	0.43	0.43	0.43

100-yr-Routing-Basin

Subsection: Pond Routed Hydrograph (total out)

Return Event: 100 years

Label: 1 (OUT)

Storm Event:

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 1.000 min

Time on left represents time for first value in each row.

Time (min)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
1,034.000	0.43	0.43	0.43	0.43	0.43
1,039.000	0.43	0.43	0.43	0.43	0.43
1,044.000	0.43	0.43	0.43	0.43	0.43
1,049.000	0.43	0.43	0.43	0.43	0.42
1,054.000	0.42	0.42	0.42	0.42	0.42
1,059.000	0.42	0.42	0.42	0.42	0.42
1,064.000	0.42	0.42	0.42	0.42	0.42
1,069.000	0.42	0.42	0.42	0.42	0.42
1,074.000	0.42	0.42	0.42	0.42	0.42
1,079.000	0.42	0.42	0.42	0.42	0.42
1,084.000	0.42	0.42	0.42	0.42	0.42
1,089.000	0.42	0.42	0.42	0.42	0.42
1,094.000	0.42	0.42	0.42	0.42	0.42
1,099.000	0.42	0.42	0.42	0.42	0.42
1,104.000	0.42	0.42	0.42	0.42	0.42
1,109.000	0.42	0.42	0.42	0.42	0.41
1,114.000	0.41	0.41	0.41	0.41	0.41
1,119.000	0.41	0.41	0.41	0.41	0.41
1,124.000	0.41	0.41	0.41	0.41	0.41
1,129.000	0.41	0.41	0.41	0.41	0.41
1,134.000	0.41	0.41	0.41	0.41	0.41
1,139.000	0.41	0.41	0.41	0.41	0.41
1,144.000	0.41	0.41	0.41	0.41	0.41
1,149.000	0.41	0.41	0.41	0.41	0.41
1,154.000	0.41	0.41	0.41	0.41	0.41
1,159.000	0.41	0.41	0.41	0.41	0.41
1,164.000	0.41	0.41	0.41	0.41	0.41
1,169.000	0.41	0.41	0.41	0.41	0.40
1,174.000	0.40	0.40	0.40	0.40	0.40
1,179.000	0.40	0.40	0.40	0.40	0.40
1,184.000	0.40	0.40	0.40	0.40	0.40
1,189.000	0.40	0.40	0.40	0.40	0.40
1,194.000	0.40	0.40	0.40	0.40	0.40
1,199.000	0.40	0.40	0.40	0.40	0.40
1,204.000	0.40	0.40	0.40	0.40	0.40
1,209.000	0.40	0.40	0.40	0.40	0.40
1,214.000	0.40	0.40	0.40	0.40	0.40
1,219.000	0.40	0.40	0.40	0.40	0.40
1,224.000	0.40	0.40	0.40	0.40	0.40
1,229.000	0.40	0.40	0.40	0.39	0.39
1,234.000	0.39	0.39	0.39	0.39	0.39
1,239.000	0.39	0.39	0.39	0.39	0.39

100-yr-Routing-Basin

Subsection: Pond Routed Hydrograph (total out)

Return Event: 100 years

Label: 1 (OUT)

Storm Event:

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 1.000 min

Time on left represents time for first value in each row.

Time (min)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
1,244.000	0.39	0.39	0.39	0.39	0.39
1,249.000	0.39	0.39	0.39	0.39	0.39
1,254.000	0.39	0.39	0.39	0.39	0.39
1,259.000	0.39	0.39	0.39	0.39	0.39
1,264.000	0.39	0.39	0.39	0.39	0.39
1,269.000	0.39	0.39	0.39	0.39	0.39
1,274.000	0.39	0.39	0.39	0.39	0.39
1,279.000	0.39	0.39	0.39	0.39	0.39
1,284.000	0.39	0.39	0.39	0.39	0.39
1,289.000	0.39	0.38	0.38	0.38	0.38
1,294.000	0.38	0.38	0.38	0.38	0.38
1,299.000	0.38	0.38	0.38	0.38	0.38
1,304.000	0.38	0.38	0.38	0.38	0.38
1,309.000	0.38	0.38	0.38	0.38	0.38
1,314.000	0.38	0.38	0.38	0.38	0.38
1,319.000	0.38	0.38	0.38	0.38	0.38
1,324.000	0.38	0.38	0.38	0.38	0.38
1,329.000	0.38	0.38	0.38	0.38	0.38
1,334.000	0.38	0.38	0.38	0.38	0.38
1,339.000	0.38	0.38	0.38	0.38	0.38
1,344.000	0.38	0.38	0.38	0.38	0.37
1,349.000	0.37	0.37	0.37	0.37	0.37
1,354.000	0.37	0.37	0.37	0.37	0.37
1,359.000	0.37	0.37	0.37	0.37	0.37
1,364.000	0.37	0.37	0.37	0.37	0.37
1,369.000	0.37	0.37	0.37	0.37	0.37
1,374.000	0.37	0.37	0.37	0.37	0.37
1,379.000	0.37	0.37	0.37	0.37	0.37
1,384.000	0.37	0.37	0.37	0.37	0.37
1,389.000	0.37	0.37	0.37	0.37	0.37
1,394.000	0.37	0.37	0.37	0.37	0.37
1,399.000	0.37	0.37	0.37	0.37	0.37
1,404.000	0.37	0.36	0.36	0.36	0.36
1,409.000	0.36	0.36	0.36	0.36	0.36
1,414.000	0.36	0.36	0.36	0.36	0.36
1,419.000	0.36	0.36	0.36	0.36	0.36
1,424.000	0.36	0.36	0.36	0.36	0.36
1,429.000	0.36	0.36	0.36	0.36	0.36
1,434.000	0.36	0.36	0.36	0.36	0.36
1,439.000	0.36	0.36	0.36	0.36	0.36
1,444.000	0.36	0.36	0.36	0.36	0.36
1,449.000	0.36	0.36	0.36	0.36	0.36

100-yr-Routing-Basin

Subsection: Pond Routed Hydrograph (total out)

Return Event: 100 years

Label: 1 (OUT)

Storm Event:

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 1.000 min

Time on left represents time for first value in each row.

Time (min)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
1,454.000	0.36	0.36	0.36	0.36	0.36
1,459.000	0.36	0.35	0.35	0.35	0.35
1,464.000	0.35	0.35	0.35	0.35	0.35
1,469.000	0.35	0.35	0.35	0.35	0.35
1,474.000	0.35	0.35	0.35	0.35	0.35
1,479.000	0.35	0.35	0.35	0.35	0.35
1,484.000	0.35	0.35	0.35	0.35	0.35
1,489.000	0.35	0.35	0.35	0.35	0.35
1,494.000	0.35	0.35	0.35	0.35	0.35
1,499.000	0.35	0.35	0.35	0.35	0.35
1,504.000	0.35	0.35	0.35	0.35	0.35
1,509.000	0.35	0.35	0.34	0.34	0.34
1,514.000	0.34	0.34	0.34	0.34	0.34
1,519.000	0.34	0.34	0.34	0.34	0.34
1,524.000	0.34	0.34	0.34	0.34	0.34
1,529.000	0.34	0.34	0.34	0.34	0.34
1,534.000	0.34	0.34	0.34	0.34	0.34
1,539.000	0.34	0.34	0.34	0.34	0.34
1,544.000	0.34	0.34	0.34	0.34	0.34
1,549.000	0.34	0.34	0.34	0.34	0.34
1,554.000	0.34	0.34	0.34	0.33	0.33
1,559.000	0.33	0.33	0.33	0.33	0.33
1,564.000	0.33	0.33	0.33	0.33	0.33
1,569.000	0.33	0.33	0.33	0.33	0.33
1,574.000	0.33	0.33	0.33	0.33	0.33
1,579.000	0.33	0.33	0.33	0.33	0.33
1,584.000	0.33	0.33	0.33	0.33	0.33
1,589.000	0.33	0.33	0.33	0.33	0.33
1,594.000	0.33	0.33	0.33	0.33	0.32
1,599.000	0.32	0.32	0.32	0.32	0.32
1,604.000	0.32	0.32	0.32	0.32	0.32
1,609.000	0.32	0.32	0.32	0.32	0.32
1,614.000	0.32	0.32	0.32	0.32	0.32
1,619.000	0.32	0.32	0.32	0.32	0.32
1,624.000	0.32	0.32	0.32	0.32	0.32
1,629.000	0.32	0.32	0.32	0.32	0.32
1,634.000	0.31	0.31	0.31	0.31	0.31
1,639.000	0.31	0.31	0.31	0.31	0.31
1,644.000	0.31	0.31	0.31	0.31	0.31
1,649.000	0.31	0.31	0.31	0.31	0.31
1,654.000	0.31	0.31	0.31	0.31	0.31
1,659.000	0.31	0.31	0.31	0.31	0.31

100-yr-Routing-Basin

Subsection: Pond Routed Hydrograph (total out)

Return Event: 100 years

Label: 1 (OUT)

Storm Event:

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 1.000 min

Time on left represents time for first value in each row.

Time (min)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
1,664.000	0.31	0.31	0.31	0.30	0.30
1,669.000	0.30	0.30	0.30	0.30	0.30
1,674.000	0.30	0.30	0.30	0.30	0.30
1,679.000	0.30	0.30	0.30	0.30	0.30
1,684.000	0.30	0.30	0.30	0.30	0.30
1,689.000	0.30	0.30	0.30	0.30	0.30
1,694.000	0.30	0.30	0.30	0.29	0.29
1,699.000	0.29	0.29	0.29	0.29	0.29
1,704.000	0.29	0.29	0.29	0.29	0.29
1,709.000	0.29	0.29	0.29	0.29	0.29
1,714.000	0.29	0.29	0.29	0.29	0.29
1,719.000	0.29	0.29	0.29	0.29	0.28
1,724.000	0.28	0.28	0.28	0.28	0.28
1,729.000	0.28	0.28	0.28	0.28	0.28
1,734.000	0.28	0.28	0.28	0.28	0.28
1,739.000	0.28	0.28	0.28	0.28	0.28
1,744.000	0.28	0.28	0.27	0.27	0.27
1,749.000	0.27	0.27	0.27	0.27	0.27
1,754.000	0.27	0.27	0.27	0.27	0.27
1,759.000	0.27	0.27	0.27	0.27	0.27
1,764.000	0.27	0.27	0.26	0.26	0.26
1,769.000	0.26	0.26	0.26	0.26	0.26
1,774.000	0.26	0.26	0.26	0.26	0.26
1,779.000	0.26	0.26	0.26	0.26	0.26
1,784.000	0.25	0.25	0.25	0.25	0.25
1,789.000	0.25	0.25	0.25	0.25	0.25
1,794.000	0.25	0.25	0.25	0.25	0.25
1,799.000	0.25	0.24	0.24	0.24	0.24
1,804.000	0.24	0.24	0.24	0.24	0.24
1,809.000	0.24	0.24	0.24	0.24	0.24
1,814.000	0.23	0.23	0.23	0.23	0.23
1,819.000	0.23	0.23	0.23	0.23	0.23
1,824.000	0.23	0.22	0.22	0.22	0.22
1,829.000	0.22	0.22	0.22	0.22	0.22
1,834.000	0.22	0.22	0.21	0.21	0.21
1,839.000	0.21	0.21	0.21	0.21	0.21
1,844.000	0.21	0.20	0.20	0.20	0.20
1,849.000	0.20	0.20	0.20	0.20	0.19
1,854.000	0.19	0.19	0.19	0.19	0.19
1,859.000	0.18	0.18	0.18	0.18	0.18
1,864.000	0.18	0.17	0.17	0.17	0.17
1,869.000	0.17	0.16	0.16	0.16	0.16

100-yr-Routing-Basin

Subsection: Pond Routed Hydrograph (total out)

Return Event: 100 years

Label: 1 (OUT)

Storm Event:

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 1.000 min

Time on left represents time for first value in each row.

Time (min)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)	Flow (ft ³ /s)
1,874.000	0.15	0.15	0.15	0.15	0.14
1,879.000	0.14	0.14	0.13	0.13	0.12
1,884.000	0.12	0.11	0.11	0.10	0.08
1,889.000	0.08	0.07	0.06	0.05	0.04
1,894.000	0.03	0.03	0.02	0.02	0.02
1,899.000	0.01	0.01	0.01	0.01	0.00
1,904.000	0.00	0.00	0.00	0.00	0.00
1,909.000	0.00	(N/A)	(N/A)	(N/A)	(N/A)

100-yr-Routing-Basin

Subsection: Pond Inflow Summary

Label: 1 (IN)

Return Event: 100 years

Storm Event:

Summary for Hydrograph Addition at '1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	CM-1

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (min)	Flow (Peak) (ft ³ /s)
Flow (From)	CM-1	3.804	252.000	77.75
Flow (In)	1	3.804	252.000	77.75

APPENDIX 4

Existing Conditions, Weighted Runoff Coefficient Calculations for Subareas with Multiple Land uses and/or Soil Types

Summary Calculations to Determine Existing Condition Composite Runoff Coefficients

Node 100-175 Total acreage= 8.20												
Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A*C	Soil B A*C	Soil C A*C	Soil D A*C
	0	8.20	0	0	0.2	0.25	0.3	0.35	0	2.05	0	0
Composite Runoff Coef.												0.25
Node 150-175 Total acreage= 6.90												
Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A*C	Soil B A*C	Soil C A*C	Soil D A*C
	0	6.79	0.11	0	0.2	0.25	0.3	0.35	0	1.6975	0.033	0
Composite Runoff Coef.												0.25
Node 175-185 Total acreage= 6.91												
Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A*C	Soil B A*C	Soil C A*C	Soil D A*C
	0	4.44	2.47	0	0.2	0.25	0.3	0.35	0	1.11	0.741	0
Composite Runoff Coef.												0.27
Node 320-356 Total acreage= 1.06												
Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A*C	Soil B A*C	Soil C A*C	Soil D A*C
	0	1.03	0.035	0	0.2	0.25	0.3	0.35	0	0.2563	0.0105	0
Composite Runoff Coef.												0.25
Node 321-323 Total acreage= 4.78												
Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A*C	Soil B A*C	Soil C A*C	Soil D A*C
	0	4.68	0.1	0	0.66	0.67	0.69	0.71	0	3.1356	0.069	0
Composite Runoff Coef.												0.67
Node 324-323 Total acreage= 0.59												
Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A*C	Soil B A*C	Soil C A*C	Soil D A*C
	0	0.17	0.42	0	0.66	0.67	0.69	0.71	0	0.1139	0.2898	0
Composite Runoff Coef.												0.68
Node 325-356 Total acreage= 12.73												
Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A*C	Soil B A*C	Soil C A*C	Soil D A*C
	0	9.09	3.72	0	0.2	0.25	0.3	0.35	0	2.2725	1.116	0
Composite Runoff Coef.												0.27

Node 330-340 Total acreage= 2.33														
Land Use / Land Cover		Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A*C	Soil B A*C	Soil C A*C	Soil D A*C	Composite Runoff Coef.
Open Brush		0	2.33	0	0	0.2	0.25	0.3	0.35	0	0.5825	0	0	
														0.25

Node 340-357 Total acreage= 15.08													
Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A*C	Soil B A*C	Soil C A*C	Soil D A*C	Composite Runoff Coef.
	0	11.35	3.73	0	0.2	0.25	0.3	0.35	0	2.8375	1.119	0	
Open Brush													0.26

Node 400-410 Total acreage= 6.32														
Land Use / Land Cover		Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A*C	Soil B A*C	Soil C A*C	Soil D A*C	Composite Runoff Coef.
Open Brush		0	6.32	0	0	0.2	0.25	0.3	0.35	0	1.58	0	0	0.25

Node 410-520 Total acreage= 4.62														
Land Use / Land Cover		Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A*C	Soil B A*C	Soil C A*C	Soil D A*C	Composite Runoff Coef.
Open Brush		0	2.26	2.37	0	0.2	0.25	0.3	0.35	0	0.565	0.711	0	0.28

Node 420-430 Total acreage= 2.76													
Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A*C	Soil B A*C	Soil C A*C	Soil D A*C	Composite Runoff Coef.
LDR 2.9 du/ac or less	0	2.72	0.04	0	0.38	0.41	0.45	0.49	0	1.1152	0.018	0	0.41

Node 700-710 Total acreage= 2.46														
Land Use / Land Cover		Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A*C	Soil B A*C	Soil C A*C	Soil D A*C	Composite Runoff Coef.
Open Brush		0	2.46	0	0	0.2	0.25	0.3	0.35	0	0.615	0	0	0.25

Total Drainage Acreage= 74.74

APPENDIX 5

Proposed Conditions, Weighted Runoff Coefficient Calculations for Subareas with Multiple Land uses and/or Soil Types

Summary Calculations to Determine Proposed Condition Composite Runoff Coefficients

Node 100-110 Total acreage= 4.04												
Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A°C	Soil B A°C	Soil C A°C	Soil D A°C
	0	4.04	0	0	0.2	0.25	0.3	0.35	0	1.01	0	0
Open Brush												
Composite Runoff Coef.												
0.25												
Node 111-113 Total acreage= 1.81												
Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A°C	Soil B A°C	Soil C A°C	Soil D A°C
	0	1.77	0.04	0	0.41	0.45	0.48	0.52	0	0.80	0.02	0
Residential, 4.3 du/ac or less												
Composite Runoff Coef.												
0.45												
Node 114-176 Total acreage= 3.45												
Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A°C	Soil B A°C	Soil C A°C	Soil D A°C
	0	3.35	0.10	0	0.41	0.45	0.48	0.52	0	1.51	0.05	0
Residential, 4.3 du/ac or less												
Composite Runoff Coef.												
0.45												
Node 120-185 Total acreage= 2.11												
Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A°C	Soil B A°C	Soil C A°C	Soil D A°C
	0	2.09	0.02	0	0.2	0.25	0.3	0.35	0	0.52	0.01	0
Landscaped slope												
Composite Runoff Coef.												
0.25												
Node 150-170 Total acreage= 6.08												
Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A°C	Soil B A°C	Soil C A°C	Soil D A°C
	0	6.07	0.01	0	0.2	0.25	0.3	0.35	0	1.52	0.003	0
Open Brush												
Composite Runoff Coef.												
0.25												
Node 130-185 Total acreage= 0.59												
Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A°C	Soil B A°C	Soil C A°C	Soil D A°C
	0	0	0.59	0	0.2	0.25	0.3	0.35	0	0	0.18	0
Landscaped slope												
Composite Runoff Coef.												
0.30												
Node 200-225 Total acreage= 1.99												
Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A°C	Soil B A°C	Soil C A°C	Soil D A°C
	0	0.97	1.02	0	0.41	0.45	0.48	0.52	0	0.44	0.49	0
Residential, 4.3 du/ac or less												
Composite Runoff Coef.												
0.47												

Node 205-207 Total acreage= 1.78													
Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A°C	Soil B A°C	Soil C A°C	Soil D A°C	Composite Runoff Coef.
	0	0	1.78	0	0.41	0.45	0.48	0.52	0	0	0.85	0	
	Residential, 4.3 du/ac or less												0.48
Node 230-235 Total acreage= 0.64													
Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A°C	Soil B A°C	Soil C A°C	Soil D A°C	Composite Runoff Coef.
	0	0	0.64	0	0.2	0.25	0.3	0.35	0	0	0.19	0	
	Detention Basin												0.30
Node 210-220 Total acreage= 1.62													
Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A°C	Soil B A°C	Soil C A°C	Soil D A°C	Composite Runoff Coef.
	0	1.62	0	0	0.2	0.25	0.3	0.35	0	0.41	0	0	
	Open Brush												0.25
Node 300-325 Total acreage= 0.54													
Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A°C	Soil B A°C	Soil C A°C	Soil D A°C	Composite Runoff Coef.
	0	0.54	0	0	0.27	0.32	0.36	0.41	0	0.17	0	0	
	Residential, 1.0 du/ac or less												0.32
Node 303-355 Total acreage= 5.26													
Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A°C	Soil B A°C	Soil C A°C	Soil D A°C	Composite Runoff Coef.
	0	4.86	0.40	0	0.41	0.45	0.48	0.52	0	2.19	0.19	0	
	Residential, 4.3 du/ac or less												0.45
Node 306-350 Total acreage= 1.87													
Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A°C	Soil B A°C	Soil C A°C	Soil D A°C	Composite Runoff Coef.
	0	0.41	1.46	0	0.41	0.45	0.48	0.52	0	0.18	0.70	0	
	Residential, 4.3 du/ac or less												0.47
Node 310-320 Total acreage= 1.26													
Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A°C	Soil B A°C	Soil C A°C	Soil D A°C	Composite Runoff Coef.
	0	1.25	0.01	0	0.27	0.32	0.36	0.41	0	0.40	0.0036	0	
	Residential, 1.0 du/ac or less												0.32

Node 400-410 Total acreage= 7.36												
Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A*C	Soil B A*C	Soil C A*C	Soil D A*C
	0	7.36	0	0	0.2	0.25	0.3	0.35	0	1.84	0	0
Open Brush												Composite Runoff Coef.
												0.25

Node 410-412 Total acreage= 1.99												
Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A*C	Soil B A*C	Soil C A*C	Soil D A*C
	0	1.61	0.38	0	0.2	0.25	0.3	0.35	0	0.40	0.11	0
Open Brush												Composite Runoff Coef.
												0.26

Node 420-430 Total acreage= 2.76												
Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A*C	Soil B A*C	Soil C A*C	Soil D A*C
	0	2.72	0.04	0	0.38	0.41	0.45	0.49	0	1.12	0.02	0
Residential, 2.9 du/ac or less												Composite Runoff Coef.
												0.41

Node 520-525 Total acreage= 0.25												
Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A*C	Soil B A*C	Soil C A*C	Soil D A*C
	0	0	0.25	0	0.2	0.25	0.3	0.35	0	0	0.08	0
Open Brush												Composite Runoff Coef.
												0.30

Node 700-710 Total acreage= 2.46												
Land Use / Land Cover	Soil A (acres)	Soil B (acres)	Soil C (acres)	Soil D (acres)	Soil A C	Soil B C	Soil C C	Soil D C	Soil A A*C	Soil B A*C	Soil C A*C	Soil D A*C
	0	2.46	0	0	0.2	0.25	0.3	0.35	0	0.62	0	0
Open Brush												Composite Runoff Coef.
												0.25

Total Drainage Acreage= 75.85

APPENDIX 6

100-year Existing Conditions Rational Method Computer Output

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE

Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT

2003,1985,1981 HYDROLOGY MANUAL

(c) Copyright 1982-2012 Advanced Engineering Software (aes)

Ver. 19.0 Release Date: 06/01/2012 License ID 1509

Analysis prepared by:

Project Design Consultants

701 B Street

Suite 800

619-235-6471

***** DESCRIPTION OF STUDY *****

* PDC JOB 2862.02 BRIGHTWATER RANCH *

* 100 YEAR EXISTING CONDITIONS *

* SYSTEM 100 - AREA DRAINING TO FOXBOROUGH LN STORM DRAIN *

FILE NAME: S100E100.DAT

TIME/DATE OF STUDY: 09:31 05/19/2014

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 100.00

6-HOUR DURATION PRECIPITATION (INCHES) = 2.700

SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00

SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95

SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD

NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT- / PARK- SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH (FT)	LIP (FT)	HIKE (FT)	MANNING FACTOR (n)
1	18.0	13.0	0.020/0.020/0.020	0.50	1.50	0.0313	0.125	0.0170

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 1.00 FEET

as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)

2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN

OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

FLOW PROCESS FROM NODE 100.00 TO NODE 105.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

```
=====
USER-SPECIFIED RUNOFF COEFFICIENT = .2500
S.C.S. CURVE NUMBER (AMC II) = 30
INITIAL SUBAREA FLOW-LENGTH(FEET) = 67.00
UPSTREAM ELEVATION(FEET) = 938.00
DOWNSTREAM ELEVATION(FEET) = 912.00
ELEVATION DIFFERENCE(FEET) = 26.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.813
WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.455
SUBAREA RUNOFF(CFS) = 0.16
TOTAL AREA(ACRES) = 0.10 TOTAL RUNOFF(CFS) = 0.16
=====
```

```
*****
FLOW PROCESS FROM NODE 105.00 TO NODE 175.00 IS CODE = 51
=====
```

```
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====
```

```
ELEVATION DATA: UPSTREAM(FEET) = 912.00 DOWNSTREAM(FEET) = 620.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 1209.00 CHANNEL SLOPE = 0.2415
CHANNEL BASE(FEET) = 2.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.045 MAXIMUM DEPTH(FEET) = 1.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.852
USER-SPECIFIED RUNOFF COEFFICIENT = .2500
S.C.S. CURVE NUMBER (AMC II) = 30
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 5.17
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.23
AVERAGE FLOW DEPTH(FEET) = 0.32 TRAVEL TIME(MIN.) = 3.24
Tc(MIN.) = 9.05
SUBAREA AREA(ACRES) = 8.10 SUBAREA RUNOFF(CFS) = 9.83
AREA-AVERAGE RUNOFF COEFFICIENT = 0.250
TOTAL AREA(ACRES) = 8.2 PEAK FLOW RATE(CFS) = 9.95
=====
```

```
END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.45 FLOW VELOCITY(FEET/SEC.) = 7.68
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 175.00 = 1276.00 FEET.
=====
```

```
*****
FLOW PROCESS FROM NODE 150.00 TO NODE 175.00 IS CODE = 81
=====
```

```
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
```

```
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.852
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .2500
S.C.S. CURVE NUMBER (AMC II) = 30
AREA-AVERAGE RUNOFF COEFFICIENT = 0.2500
SUBAREA AREA(ACRES) = 6.90 SUBAREA RUNOFF(CFS) = 8.37
TOTAL AREA(ACRES) = 15.1 TOTAL RUNOFF(CFS) = 18.32
TC(MIN.) = 9.05
=====
```

```
*****
```

FLOW PROCESS FROM NODE 175.00 TO NODE 185.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

```
=====
ELEVATION DATA: UPSTREAM(FEET) = 620.00 DOWNSTREAM(FEET) = 596.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 204.00 CHANNEL SLOPE = 0.1176
CHANNEL BASE(FEET) = 2.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.045 MAXIMUM DEPTH(FEET) = 2.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.700
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .2700
S.C.S. CURVE NUMBER (AMC II) = 30
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 22.70
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FT/SEC.) = 7.41
AVERAGE FLOW DEPTH(FT) = 0.83 TRAVEL TIME(MIN.) = 0.46
Tc(MIN.) = 9.51
SUBAREA AREA(ACRES) = 6.91 SUBAREA RUNOFF(CFS) = 8.77
AREA-AVERAGE RUNOFF COEFFICIENT = 0.256
TOTAL AREA(ACRES) = 22.0 PEAK FLOW RATE(CFS) = 26.51
=====
```

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FT) = 0.90 FLOW VELOCITY(FT/SEC.) = 7.78

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 185.00 = 1480.00 FEET.

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 22.0 TC(MIN.) = 9.51

PEAK FLOW RATE(CFS) = 26.51

=====

END OF RATIONAL METHOD ANALYSIS

□

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
2003,1985,1981 HYDROLOGY MANUAL
(c) Copyright 1982-2012 Advanced Engineering Software (aes)
Ver. 19.0 Release Date: 06/01/2012 License ID 1509

Analysis prepared by:

Project Design Consultants
701 B Street
Suite 800
619-235-6471

***** DESCRIPTION OF STUDY *****
* PDC JOB 2862.02 BRIGHTWATER RANCH *
* 100 YEAR EXISTING CONDITIONS *
* SYSTEM 200 - AREA DRAINING TO WELLINGTON HILL DR STORM DRAIN *

FILE NAME: S200E100.DAT
TIME/DATE OF STUDY: 17:58 06/12/2014

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 100.00
6-HOUR DURATION PRECIPITATION (INCHES) = 2.700
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH	CROWN TO CROSSFALL	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT	GUTTER-GEOMETRIES: WIDTH LIP HIKE	MANNING FACTOR
	(FT)	(FT)		(FT)	(FT) (FT) (FT)	(n)
1	18.0	13.0	0.020/0.020/0.020	0.50	1.50 0.0313 0.125	0.0170

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 1.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
 2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
- *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

FLOW PROCESS FROM NODE 321.00 TO NODE 322.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

=====

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .6700

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 97.00

UPSTREAM ELEVATION(FEET) = 810.00

DOWNSTREAM ELEVATION(FEET) = 804.00

ELEVATION DIFFERENCE(FEET) = 6.00

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 4.136

WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN

THE MAXIMUM OVERLAND FLOW LENGTH = 96.19

(Reference: Table 3-1B of Hydrology Manual)

THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN T_c CALCULATION!

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.114

NOTE: RAINFALL INTENSITY IS BASED ON T_c = 5-MINUTE.

SUBAREA RUNOFF(CFS) = 0.62

TOTAL AREA(ACRES) = 0.13 TOTAL RUNOFF(CFS) = 0.62

FLOW PROCESS FROM NODE 322.00 TO NODE 323.00 IS CODE = 62

>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>>(STREET TABLE SECTION # 1 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 804.00 DOWNSTREAM ELEVATION(FEET) = 730.00

STREET LENGTH(FEET) = 1330.00 CURB HEIGHT(INCHES) = 6.0

STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 13.00

INSIDE STREET CROSSFALL(DECIMAL) = 0.020

OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 2

STREET PARKWAY CROSSFALL(DECIMAL) = 0.020

Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0170

Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 8.33

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.31

HALFSTREET FLOOD WIDTH(FEET) = 9.04

AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.46

PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.37

STREET FLOW TRAVEL TIME(MIN.) = 4.97 T_c(MIN.) = 9.11

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.832

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .6700

S.C.S. CURVE NUMBER (AMC II) = 0

AREA-AVERAGE RUNOFF COEFFICIENT = 0.670

SUBAREA AREA(ACRES) = 4.65 SUBAREA RUNOFF(CFS) = 15.05

TOTAL AREA(ACRES) = 4.8 PEAK FLOW RATE(CFS) = 15.47

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(Feet) = 0.36 HALFSTREET FLOOD WIDTH(Feet) = 11.78
FLOW VELOCITY(Feet/Sec.) = 5.14 DEPTH*VELOCITY(FT*FT/SEC.) = 1.86
LONGEST FLOWPATH FROM NODE 321.00 TO NODE 323.00 = 1427.00 FEET.

FLOW PROCESS FROM NODE 324.00 TO NODE 323.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.832
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .6800
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6711
SUBAREA AREA(ACRES) = 0.59 SUBAREA RUNOFF(CFS) = 1.94
TOTAL AREA(ACRES) = 5.4 TOTAL RUNOFF(CFS) = 17.41
TC(MIN.) = 9.11

FLOW PROCESS FROM NODE 323.00 TO NODE 325.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<

=====

ELEVATION DATA: UPSTREAM(Feet) = 730.00 DOWNSTREAM(Feet) = 724.00
FLOW LENGTH(Feet) = 102.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 9.4 INCHES
PIPE-FLOW VELOCITY(Feet/Sec.) = 15.20
GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 17.41
PIPE TRAVEL TIME(MIN.) = 0.11 Tc(MIN.) = 9.22
LONGEST FLOWPATH FROM NODE 321.00 TO NODE 325.00 = 1529.00 FEET.

FLOW PROCESS FROM NODE 325.00 TO NODE 356.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

=====

ELEVATION DATA: UPSTREAM(Feet) = 724.00 DOWNSTREAM(Feet) = 623.00
CHANNEL LENGTH THRU SUBAREA(Feet) = 1035.00 CHANNEL SLOPE = 0.0976
CHANNEL BASE(Feet) = 2.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.045 MAXIMUM DEPTH(Feet) = 2.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.125
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .2700
S.C.S. CURVE NUMBER (AMC II) = 0
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 24.60
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) = 7.13
AVERAGE FLOW DEPTH(Feet) = 0.91 TRAVEL TIME(MIN.) = 2.42
Tc(MIN.) = 11.64
SUBAREA AREA(ACRES) = 12.73 SUBAREA RUNOFF(CFS) = 14.18
AREA-AVERAGE RUNOFF COEFFICIENT = 0.389

TOTAL AREA(ACRES) = 18.1 PEAK FLOW RATE(CFS) = 29.04

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.99 FLOW VELOCITY(FEET/SEC.) = 7.40

LONGEST FLOWPATH FROM NODE 321.00 TO NODE 356.00 = 2564.00 FEET.

FLOW PROCESS FROM NODE 320.00 TO NODE 356.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.125

USER-SPECIFIED RUNOFF COEFFICIENT = .2500

S.C.S. CURVE NUMBER (AMC II) = 76

AREA-AVERAGE RUNOFF COEFFICIENT = 0.3813

SUBAREA AREA(ACRES) = 1.06 SUBAREA RUNOFF(CFS) = 1.09

TOTAL AREA(ACRES) = 19.2 TOTAL RUNOFF(CFS) = 30.14

TC(MIN.) = 11.64

FLOW PROCESS FROM NODE 356.00 TO NODE 505.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 623.00 DOWNSTREAM(FEET) = 621.80

FLOW LENGTH(FEET) = 59.30 MANNING'S N = 0.013

DEPTH OF FLOW IN 24.0 INCH PIPE IS 18.9 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 11.36

GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 30.14

PIPE TRAVEL TIME(MIN.) = 0.09 Tc(MIN.) = 11.73

LONGEST FLOWPATH FROM NODE 321.00 TO NODE 505.00 = 2623.30 FEET.

FLOW PROCESS FROM NODE 356.00 TO NODE 505.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

TOTAL NUMBER OF STREAMS = 2

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:

TIME OF CONCENTRATION(MIN.) = 11.73

RAINFALL INTENSITY(INCH/HR) = 4.11

TOTAL STREAM AREA(ACRES) = 19.16

PEAK FLOW RATE(CFS) AT CONFLUENCE = 30.14

FLOW PROCESS FROM NODE 330.00 TO NODE 335.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

USER-SPECIFIED RUNOFF COEFFICIENT = .2500

S.C.S. CURVE NUMBER (AMC II) = 30

INITIAL SUBAREA FLOW-LENGTH (FEET) = 60.00
 UPSTREAM ELEVATION (FEET) = 991.00
 DOWNSTREAM ELEVATION (FEET) = 970.00
 ELEVATION DIFFERENCE (FEET) = 21.00
 SUBAREA OVERLAND TIME OF FLOW (MIN.) = 5.501
 WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 6.689
 SUBAREA RUNOFF (CFS) = 0.20
 TOTAL AREA (ACRES) = 0.12 TOTAL RUNOFF (CFS) = 0.20

FLOW PROCESS FROM NODE 335.00 TO NODE 340.00 IS CODE = 51

>>>> COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
 >>>> TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

=====

ELEVATION DATA: UPSTREAM (FEET) = 970.00 DOWNSTREAM (FEET) = 826.00
 CHANNEL LENGTH THRU SUBAREA (FEET) = 434.00 CHANNEL SLOPE = 0.3318
 CHANNEL BASE (FEET) = 2.00 "Z" FACTOR = 2.000
 MANNING'S FACTOR = 0.045 MAXIMUM DEPTH (FEET) = 1.00
 100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 5.753
 USER-SPECIFIED RUNOFF COEFFICIENT = .2500
 S.C.S. CURVE NUMBER (AMC II) = 30
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 1.80
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 5.00
 AVERAGE FLOW DEPTH (FEET) = 0.16 TRAVEL TIME (MIN.) = 1.45
 Tc (MIN.) = 6.95
 SUBAREA AREA (ACRES) = 2.21 SUBAREA RUNOFF (CFS) = 3.18
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.250
 TOTAL AREA (ACRES) = 2.3 PEAK FLOW RATE (CFS) = 3.35

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH (FEET) = 0.22 FLOW VELOCITY (FEET/SEC.) = 6.11
 LONGEST FLOWPATH FROM NODE 330.00 TO NODE 340.00 = 494.00 FEET.

FLOW PROCESS FROM NODE 340.00 TO NODE 357.00 IS CODE = 51

>>>> COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
 >>>> TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

=====

ELEVATION DATA: UPSTREAM (FEET) = 826.00 DOWNSTREAM (FEET) = 626.00
 CHANNEL LENGTH THRU SUBAREA (FEET) = 1596.00 CHANNEL SLOPE = 0.1253
 CHANNEL BASE (FEET) = 2.00 "Z" FACTOR = 2.000
 MANNING'S FACTOR = 0.045 MAXIMUM DEPTH (FEET) = 2.00
 100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 4.245
 *USER SPECIFIED (SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .2600
 S.C.S. CURVE NUMBER (AMC II) = 30
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 11.78
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 6.36
 AVERAGE FLOW DEPTH (FEET) = 0.58 TRAVEL TIME (MIN.) = 4.18
 Tc (MIN.) = 11.13

SUBAREA AREA(ACRES) = 15.08 SUBAREA RUNOFF(CFS) = 16.64
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.259
 TOTAL AREA(ACRES) = 17.4 PEAK FLOW RATE(CFS) = 19.12

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.75 FLOW VELOCITY(FEET/SEC.) = 7.28
 LONGEST FLOWPATH FROM NODE 330.00 TO NODE 357.00 = 2090.00 FEET.

FLOW PROCESS FROM NODE 357.00 TO NODE 505.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 626.00 DOWNSTREAM(FEET) = 621.50
 FLOW LENGTH(FEET) = 29.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 8.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 22.50
 GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 19.12
 PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 11.15
 LONGEST FLOWPATH FROM NODE 330.00 TO NODE 505.00 = 2119.00 FEET.

FLOW PROCESS FROM NODE 357.00 TO NODE 505.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 11.15
 RAINFALL INTENSITY(INCH/HR) = 4.24
 TOTAL STREAM AREA(ACRES) = 17.41
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 19.12

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	30.14	11.73	4.105	19.16
2	19.12	11.15	4.240	17.41

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	47.79	11.15	4.240
2	48.65	11.73	4.105

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 48.65 Tc(MIN.) = 11.73

TOTAL AREA(ACRES) = 36.6
LONGEST FLOWPATH FROM NODE 321.00 TO NODE 505.00 = 2623.30 FEET.

FLOW PROCESS FROM NODE 505.00 TO NODE 510.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) =	621.80	DOWNSTREAM(FEET) =	620.10
FLOW LENGTH(FEET) =	68.30	MANNING'S N =	0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS	19.8 INCHES		
PIPE-FLOW VELOCITY(FEET/SEC.) =	14.16		
GIVEN PIPE DIAMETER(INCH) =	30.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	48.65		
PIPE TRAVEL TIME(MIN.) =	0.08	Tc(MIN.) =	11.81
LONGEST FLOWPATH FROM NODE 321.00 TO NODE 510.00 =	2691.60 FEET.		

FLOW PROCESS FROM NODE 505.00 TO NODE 510.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

=====

TOTAL NUMBER OF STREAMS =	2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:	
TIME OF CONCENTRATION(MIN.) =	11.81
RAINFALL INTENSITY(INCH/HR) =	4.09
TOTAL STREAM AREA(ACRES) =	36.57
PEAK FLOW RATE(CFS) AT CONFLUENCE =	48.65

FLOW PROCESS FROM NODE 415.00 TO NODE 510.00 IS CODE = 7

>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<

=====

USER-SPECIFIED VALUES ARE AS FOLLOWS:	
TC(MIN) = 10.00	RAIN INTENSITY(INCH/HOUR) = 4.55
TOTAL AREA(ACRES) = 4.54	TOTAL RUNOFF(CFS) = 0.30

FLOW PROCESS FROM NODE 415.00 TO NODE 510.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

=====

TOTAL NUMBER OF STREAMS =	2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:	
TIME OF CONCENTRATION(MIN.) =	10.00
RAINFALL INTENSITY(INCH/HR) =	4.55
TOTAL STREAM AREA(ACRES) =	4.54
PEAK FLOW RATE(CFS) AT CONFLUENCE =	0.30

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	48.65	11.81	4.087	36.57
2	0.30	10.00	4.549	4.54

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	44.01	10.00	4.549
2	48.92	11.81	4.087

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 48.92 Tc(MIN.) = 11.81
TOTAL AREA(ACRES) = 41.1
LONGEST FLOWPATH FROM NODE 321.00 TO NODE 510.00 = 2691.60 FEET.

FLOW PROCESS FROM NODE 510.00 TO NODE 515.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 620.10 DOWNSTREAM(FEET) = 617.50
FLOW LENGTH(FEET) = 44.40 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 15.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 19.75
GIVEN PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 48.92
PIPE TRAVEL TIME(MIN.) = 0.04 Tc(MIN.) = 11.84
LONGEST FLOWPATH FROM NODE 321.00 TO NODE 515.00 = 2736.00 FEET.

FLOW PROCESS FROM NODE 510.00 TO NODE 515.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 11.84
RAINFALL INTENSITY(INCH/HR) = 4.08
TOTAL STREAM AREA(ACRES) = 41.11
PEAK FLOW RATE(CFS) AT CONFLUENCE = 48.92

FLOW PROCESS FROM NODE 420.00 TO NODE 425.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .4100

S.C.S. CURVE NUMBER (AMC II) = 30
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 74.00
 UPSTREAM ELEVATION(FEET) = 710.00
 DOWNSTREAM ELEVATION(FEET) = 682.00
 ELEVATION DIFFERENCE(FEET) = 28.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 4.959
 WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.114
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) = 0.32
 TOTAL AREA(ACRES) = 0.11 TOTAL RUNOFF(CFS) = 0.32

FLOW PROCESS FROM NODE 425.00 TO NODE 430.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 682.00 DOWNSTREAM(FEET) = 625.90
 CHANNEL LENGTH THRU SUBAREA(FEET) = 606.00 CHANNEL SLOPE = 0.0926
 CHANNEL BASE(FEET) = 2.00 "Z" FACTOR = 2.000
 MANNING'S FACTOR = 0.020 MAXIMUM DEPTH(FEET) = 2.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.081
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .4100
 S.C.S. CURVE NUMBER (AMC II) = 30
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.64
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FT/SEC.) = 7.13
 AVERAGE FLOW DEPTH(FT) = 0.21 TRAVEL TIME(MIN.) = 1.42
 Tc(MIN.) = 6.38
 SUBAREA AREA(ACRES) = 2.65 SUBAREA RUNOFF(CFS) = 6.61
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.410
 TOTAL AREA(ACRES) = 2.8 PEAK FLOW RATE(CFS) = 6.88

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FT) = 0.30 FLOW VELOCITY(FT/SEC.) = 8.74
 LONGEST FLOWPATH FROM NODE 420.00 TO NODE 430.00 = 680.00 FEET.

FLOW PROCESS FROM NODE 430.00 TO NODE 515.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 618.60 DOWNSTREAM(FEET) = 617.50
 FLOW LENGTH(FT) = 43.80 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 8.2 INCHES
 PIPE-FLOW VELOCITY(FT/SEC.) = 8.80
 GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 6.88
 PIPE TRAVEL TIME(MIN.) = 0.08 Tc(MIN.) = 6.46
 LONGEST FLOWPATH FROM NODE 420.00 TO NODE 515.00 = 723.80 FEET.

FLOW PROCESS FROM NODE 430.00 TO NODE 515.00 IS CODE = 1

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 6.46
RAINFALL INTENSITY(INCH/HR) = 6.03
TOTAL STREAM AREA(ACRES) = 2.76
PEAK FLOW RATE(CFS) AT CONFLUENCE = 6.88

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	48.92	11.84	4.079	41.11
2	6.88	6.46	6.031	2.76

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	39.97	6.46	6.031
2	53.57	11.84	4.079

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 53.57 Tc(MIN.) = 11.84
TOTAL AREA(ACRES) = 43.9
LONGEST FLOWPATH FROM NODE 321.00 TO NODE 515.00 = 2736.00 FEET.

FLOW PROCESS FROM NODE 515.00 TO NODE 525.00 IS CODE = 41

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
=====

ELEVATION DATA: UPSTREAM(FEET) = 617.50 DOWNSTREAM(FEET) = 609.60
FLOW LENGTH(FEET) = 88.60 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 14.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 23.64
GIVEN PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 53.57
PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 11.91
LONGEST FLOWPATH FROM NODE 321.00 TO NODE 525.00 = 2824.60 FEET.

FLOW PROCESS FROM NODE 515.00 TO NODE 525.00 IS CODE = 1

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 11.91
 RAINFALL INTENSITY(INCH/HR) = 4.07
 TOTAL STREAM AREA(ACRES) = 43.87
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 53.57

 FLOW PROCESS FROM NODE 400.00 TO NODE 405.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

=====

USER-SPECIFIED RUNOFF COEFFICIENT = .2500
 S.C.S. CURVE NUMBER (AMC II) = 76
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 104.00
 UPSTREAM ELEVATION(FEET) = 989.00
 DOWNSTREAM ELEVATION(FEET) = 956.00
 ELEVATION DIFFERENCE(FEET) = 33.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 7.102
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 100.00
 (Reference: Table 3-1B of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.673
 SUBAREA RUNOFF(CFS) = 0.18
 TOTAL AREA(ACRES) = 0.13 TOTAL RUNOFF(CFS) = 0.18

 FLOW PROCESS FROM NODE 405.00 TO NODE 410.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 956.00 DOWNSTREAM(FEET) = 693.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 740.00 CHANNEL SLOPE = 0.3554
 CHANNEL BASE(FEET) = 2.00 "Z" FACTOR = 2.000
 MANNING'S FACTOR = 0.045 MAXIMUM DEPTH(FEET) = 1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.884
 USER-SPECIFIED RUNOFF COEFFICIENT = .2500
 S.C.S. CURVE NUMBER (AMC II) = 30
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.98
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.65
 AVERAGE FLOW DEPTH(FEET) = 0.24 TRAVEL TIME(MIN.) = 1.85
 Tc(MIN.) = 8.96
 SUBAREA AREA(ACRES) = 6.19 SUBAREA RUNOFF(CFS) = 7.56
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.250
 TOTAL AREA(ACRES) = 6.3 PEAK FLOW RATE(CFS) = 7.72

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.35 FLOW VELOCITY(FEET/SEC.) = 8.06
 LONGEST FLOWPATH FROM NODE 400.00 TO NODE 410.00 = 844.00 FEET.

FLOW PROCESS FROM NODE 410.00 TO NODE 520.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 693.00 DOWNSTREAM(FEET) = 612.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 744.00 CHANNEL SLOPE = 0.1089
CHANNEL BASE(FEET) = 2.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.045 MAXIMUM DEPTH(FEET) = 1.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.260
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .2800
S.C.S. CURVE NUMBER (AMC II) = 30
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 10.47
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.86
AVERAGE FLOW DEPTH(FEET) = 0.57 TRAVEL TIME(MIN.) = 2.12
Tc(MIN.) = 11.07
SUBAREA AREA(ACRES) = 4.62 SUBAREA RUNOFF(CFS) = 5.51
AREA-AVERAGE RUNOFF COEFFICIENT = 0.263
TOTAL AREA(ACRES) = 10.9 PEAK FLOW RATE(CFS) = 12.24

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.62 FLOW VELOCITY(FEET/SEC.) = 6.08
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 520.00 = 1588.00 FEET.

FLOW PROCESS FROM NODE 520.00 TO NODE 525.00 IS CODE = 41

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 612.10 DOWNSTREAM(FEET) = 609.60
FLOW LENGTH(FEET) = 37.50 MANNING'S N = 0.013
DEPTH OF FLOW IN 30.0 INCH PIPE IS 7.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.12
GIVEN PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 12.24
PIPE TRAVEL TIME(MIN.) = 0.04 Tc(MIN.) = 11.12
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 525.00 = 1625.50 FEET.

FLOW PROCESS FROM NODE 520.00 TO NODE 525.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 11.12
RAINFALL INTENSITY(INCH/HR) = 4.25
TOTAL STREAM AREA(ACRES) = 10.94
PEAK FLOW RATE(CFS) AT CONFLUENCE = 12.24

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	53.57	11.91	4.065	43.87
2	12.24	11.12	4.249	10.94

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	63.50	11.12	4.249
2	65.28	11.91	4.065

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE (CFS) = 65.28 Tc (MIN.) = 11.91
 TOTAL AREA (ACRES) = 54.8
 LONGEST FLOWPATH FROM NODE 321.00 TO NODE 525.00 = 2824.60 FEET.

=====

END OF STUDY SUMMARY:

TOTAL AREA (ACRES) = 54.8 TC (MIN.) = 11.91
 PEAK FLOW RATE (CFS) = 65.28

=====

END OF RATIONAL METHOD ANALYSIS

□

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
2003,1985,1981 HYDROLOGY MANUAL
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Ver. 19.0 Release Date: 06/01/2012 License ID 1509

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* PDC JOB 2862.02 BRIGHTWATER RANCH *
* 100 YEAR EXISTING CONDITIONS *
* SYSTEM 700 *

FILE NAME: S700E100.DAT
TIME/DATE OF STUDY: 20:09 03/24/2015

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 100.00
6-HOUR DURATION PRECIPITATION (INCHES) = 2.700
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

	HALF- WIDTH	CROWN TO CROSSFALL	STREET-CROSSFALL: IN- / OUT- / PARK- SIDE / SIDE/ WAY	CURB HEIGHT	GUTTER-GEOMETRIES: WIDTH	LIP	HIKE	MANNING FACTOR
NO.	(FT)	(FT)		(FT)	(FT)	(FT)	(FT)	(n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0313	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

FLOW PROCESS FROM NODE 701.00 TO NODE 707.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
=====

LAWNS, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = .2500
SOIL CLASSIFICATION IS "B"
S.C.S. CURVE NUMBER (AMC II) = 61
INITIAL SUBAREA FLOW-LENGTH(FEET) = 70.00
UPSTREAM ELEVATION(FEET) = 930.00
DOWNSTREAM ELEVATION(FEET) = 919.00
ELEVATION DIFFERENCE(FEET) = 11.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.942
WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!

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100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.364
SUBAREA RUNOFF(CFS) = 0.18
TOTAL AREA(ACRES) = 0.11 TOTAL RUNOFF(CFS) = 0.18
*****
FLOW PROCESS FROM NODE 707.00 TO NODE 708.00 IS CODE = 51
-----
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 919.00 DOWNSTREAM(FEET) = 824.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 470.00 CHANNEL SLOPE = 0.2021
CHANNEL BASE(FEET) = 5.00 "Z" FACTOR = 4.000
MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 2.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.795
LAWNS, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = .2500
SOIL CLASSIFICATION IS "B"
S.C.S. CURVE NUMBER (AMC II) = 61
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 0.43
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.39
AVERAGE FLOW DEPTH(FEET) = 0.04 TRAVEL TIME(MIN.) = 3.27
Tc(MIN.) = 9.22
SUBAREA AREA(ACRES) = 0.43 SUBAREA RUNOFF(CFS) = 0.52
AREA-AVERAGE RUNOFF COEFFICIENT = 0.250
TOTAL AREA(ACRES) = 0.5 PEAK FLOW RATE(CFS) = 0.65

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.04 FLOW VELOCITY(FEET/SEC.) = 2.92
LONGEST FLOWPATH FROM NODE 701.00 TO NODE 708.00 = 540.00 FEET.
*****
FLOW PROCESS FROM NODE 708.00 TO NODE 710.00 IS CODE = 51
-----
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 824.00 DOWNSTREAM(FEET) = 816.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 300.00 CHANNEL SLOPE = 0.0267
CHANNEL BASE(FEET) = 0.50 "Z" FACTOR = 0.750
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 1.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.521
LAWNS, GOLF COURSES, ETC. GOOD COVER RUNOFF COEFFICIENT = .2500
SOIL CLASSIFICATION IS "B"
S.C.S. CURVE NUMBER (AMC II) = 61
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.73
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.68
AVERAGE FLOW DEPTH(FEET) = 0.39 TRAVEL TIME(MIN.) = 0.88
Tc(MIN.) = 10.10
SUBAREA AREA(ACRES) = 1.92 SUBAREA RUNOFF(CFS) = 2.17
AREA-AVERAGE RUNOFF COEFFICIENT = 0.250
TOTAL AREA(ACRES) = 2.5 PEAK FLOW RATE(CFS) = 2.78

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.50 FLOW VELOCITY(FEET/SEC.) = 6.38
LONGEST FLOWPATH FROM NODE 701.00 TO NODE 710.00 = 840.00 FEET.
*****
FLOW PROCESS FROM NODE 706.00 TO NODE 710.00 IS CODE = 81
-----
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.521
OPEN BRUSH FAIR COVER RUNOFF COEFFICIENT = .2500

```

SOIL CLASSIFICATION IS "B"

S.C.S. CURVE NUMBER (AMC II) = 66

AREA-AVERAGE RUNOFF COEFFICIENT = 0.2500

SUBAREA AREA(ACRES) = 1.13 SUBAREA RUNOFF(CFS) = 1.28

TOTAL AREA(ACRES) = 3.6 TOTAL RUNOFF(CFS) = 4.06

TC(MIN.) = 10.10

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 3.6 TC(MIN.) = 10.10

PEAK FLOW RATE(CFS) = 4.06

=====

END OF RATIONAL METHOD ANALYSIS

APPENDIX 7

100-year Proposed Conditions Rational Method Computer Output

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE

Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT

2003,1985,1981 HYDROLOGY MANUAL

(c) Copyright 1982-2012 Advanced Engineering Software (aes)

Ver. 19.0 Release Date: 06/01/2012 License ID 1509

Analysis prepared by:

Project Design Consultants

701 B Street

Suite 800

619-235-6471

***** DESCRIPTION OF STUDY *****

* PDC JOB 2862.02 BRIGHTWATER RANCH *

* 100 YEAR PROPOSED CONDITIONS *

* SYSTEM 100 - AREA DRAINING TO FOXBOROUGH LN STORM DRAIN *

FILE NAME: S100P100.DAT

TIME/DATE OF STUDY: 10:23 06/13/2014

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 100.00

6-HOUR DURATION PRECIPITATION (INCHES) = 2.700

SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00

SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85

SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD

NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT- / PARK- SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	18.0	13.0	0.020/0.020/0.020	0.50	1.50 0.0313 0.125	0.0160

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET

as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)

2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN

OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

FLOW PROCESS FROM NODE 100.00 TO NODE 105.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

=====

*USER SPECIFIED(SUBAREA):

OPEN BRUSH FAIR COVER RUNOFF COEFFICIENT = .2500

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 67.00

UPSTREAM ELEVATION(FEET) = 938.00

DOWNSTREAM ELEVATION(FEET) = 912.00

ELEVATION DIFFERENCE(FEET) = 26.00

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.813

WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.455

SUBAREA RUNOFF(CFS) = 0.16

TOTAL AREA(ACRES) = 0.10 TOTAL RUNOFF(CFS) = 0.16

FLOW PROCESS FROM NODE 105.00 TO NODE 110.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 912.00 DOWNSTREAM(FEET) = 703.00

CHANNEL LENGTH THRU SUBAREA(FEET) = 675.00 CHANNEL SLOPE = 0.3096

CHANNEL BASE(FEET) = 2.00 "Z" FACTOR = 2.000

MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 1.00

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.576

*USER SPECIFIED(SUBAREA):

OPEN BRUSH FAIR COVER RUNOFF COEFFICIENT = .2500

S.C.S. CURVE NUMBER (AMC II) = 0

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.92

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.59

AVERAGE FLOW DEPTH(FEET) = 0.16 TRAVEL TIME(MIN.) = 1.48

Tc(MIN.) = 7.29

SUBAREA AREA(ACRES) = 3.94 SUBAREA RUNOFF(CFS) = 5.49

AREA-AVERAGE RUNOFF COEFFICIENT = 0.250

TOTAL AREA(ACRES) = 4.0 PEAK FLOW RATE(CFS) = 5.63

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.24 FLOW VELOCITY(FEET/SEC.) = 9.40

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 110.00 = 742.00 FEET.

FLOW PROCESS FROM NODE 110.00 TO NODE 175.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 699.00 DOWNSTREAM(FEET) = 628.00

FLOW LENGTH(FEET) = 592.00 MANNING'S N = 0.013

ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000

DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.0 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 14.10

ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 5.63

PIPE TRAVEL TIME(MIN.) = 0.70 Tc(MIN.) = 7.99
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 175.00 = 1334.00 FEET.

 FLOW PROCESS FROM NODE 110.00 TO NODE 175.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

=====

TOTAL NUMBER OF STREAMS = 3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 7.99
 RAINFALL INTENSITY(INCH/HR) = 5.26
 TOTAL STREAM AREA(ACRES) = 4.04
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.63

 FLOW PROCESS FROM NODE 111.00 TO NODE 112.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

=====

*USER SPECIFIED(SUBAREA):
 RESIDENTIAL (4.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
 S.C.S. CURVE NUMBER (AMC II) = 0
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 116.00
 UPSTREAM ELEVATION(FEET) = 695.00
 DOWNSTREAM ELEVATION(FEET) = 692.00
 ELEVATION DIFFERENCE(FEET) = 3.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 8.032
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 88.79
 (Reference: Table 3-1B of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.240
 SUBAREA RUNOFF(CFS) = 0.68
 TOTAL AREA(ACRES) = 0.29 TOTAL RUNOFF(CFS) = 0.68

 FLOW PROCESS FROM NODE 112.00 TO NODE 113.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>(STREET TABLE SECTION # 1 USED)<<<<

=====

UPSTREAM ELEVATION(FEET) = 692.00 DOWNSTREAM ELEVATION(FEET) = 635.00
 STREET LENGTH(FEET) = 516.00 CURB HEIGHT(INCHES) = 6.0
 STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 13.00
 INSIDE STREET CROSSFALL(DECIMAL) = 0.020
 OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
 STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
 Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0160

Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.28
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.24
 HALFSTREET FLOOD WIDTH(FEET) = 5.53
 AVERAGE FLOW VELOCITY(FEET/SEC.) = 5.37
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.27
 STREET FLOW TRAVEL TIME(MIN.) = 1.60 Tc(MIN.) = 9.63
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.660
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (4.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
 S.C.S. CURVE NUMBER (AMC II) = 0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.450
 SUBAREA AREA(ACRES) = 1.52 SUBAREA RUNOFF(CFS) = 3.19
 TOTAL AREA(ACRES) = 1.8 PEAK FLOW RATE(CFS) = 3.80

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.27 HALFSTREET FLOOD WIDTH(FEET) = 7.21
 FLOW VELOCITY(FEET/SEC.) = 5.95 DEPTH*VELOCITY(FT*FT/SEC.) = 1.61
 LONGEST FLOWPATH FROM NODE 111.00 TO NODE 113.00 = 632.00 FEET.

 FLOW PROCESS FROM NODE 113.00 TO NODE 175.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
 =====

ELEVATION DATA: UPSTREAM(FEET) = 629.00 DOWNSTREAM(FEET) = 628.00
 FLOW LENGTH(FEET) = 6.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 3.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 14.14
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 3.80
 PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 9.64
 LONGEST FLOWPATH FROM NODE 111.00 TO NODE 175.00 = 638.00 FEET.

 FLOW PROCESS FROM NODE 113.00 TO NODE 175.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
 =====

TOTAL NUMBER OF STREAMS = 3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.64
 RAINFALL INTENSITY(INCH/HR) = 4.66
 TOTAL STREAM AREA(ACRES) = 1.81
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.80

 FLOW PROCESS FROM NODE 150.00 TO NODE 155.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

=====

*USER SPECIFIED(SUBAREA):

OPEN BRUSH FAIR COVER RUNOFF COEFFICIENT = .2500

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 77.00

UPSTREAM ELEVATION(FEET) = 958.00

DOWNSTREAM ELEVATION(FEET) = 918.00

ELEVATION DIFFERENCE(FEET) = 40.00

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.232

WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.172

SUBAREA RUNOFF(CFS) = 0.17

TOTAL AREA(ACRES) = 0.11 TOTAL RUNOFF(CFS) = 0.17

FLOW PROCESS FROM NODE 155.00 TO NODE 160.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 918.00 DOWNSTREAM(FEET) = 674.00

CHANNEL LENGTH THRU SUBAREA(FEET) = 800.00 CHANNEL SLOPE = 0.3050

CHANNEL BASE(FEET) = 5.00 "Z" FACTOR = 5.000

MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 1.00

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.030

*USER SPECIFIED(SUBAREA):

OPEN BRUSH FAIR COVER RUNOFF COEFFICIENT = .2500

S.C.S. CURVE NUMBER (AMC II) = 0

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.49

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.73

AVERAGE FLOW DEPTH(FEET) = 0.11 TRAVEL TIME(MIN.) = 2.33

Tc(MIN.) = 8.56

SUBAREA AREA(ACRES) = 5.20 SUBAREA RUNOFF(CFS) = 6.54

AREA-AVERAGE RUNOFF COEFFICIENT = 0.250

TOTAL AREA(ACRES) = 5.3 PEAK FLOW RATE(CFS) = 6.68

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.16 FLOW VELOCITY(FEET/SEC.) = 7.33

LONGEST FLOWPATH FROM NODE 150.00 TO NODE 160.00 = 877.00 FEET.

FLOW PROCESS FROM NODE 160.00 TO NODE 170.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 674.00 DOWNSTREAM(FEET) = 632.00

CHANNEL LENGTH THRU SUBAREA(FEET) = 241.00 CHANNEL SLOPE = 0.1743

CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 2.000

MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 1.00

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.930

*USER SPECIFIED(SUBAREA):

OPEN BRUSH FAIR COVER RUNOFF COEFFICIENT = .2500
 S.C.S. CURVE NUMBER (AMC II) = 0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 7.15
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/sec.) = 14.82
 AVERAGE FLOW DEPTH(Feet) = 0.49 TRAVEL TIME(MIN.) = 0.27
 Tc(MIN.) = 8.83
 SUBAREA AREA(ACRES) = 0.77 SUBAREA RUNOFF(CFS) = 0.95
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.250
 TOTAL AREA(ACRES) = 6.1 PEAK FLOW RATE(CFS) = 7.49

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(Feet) = 0.50 FLOW VELOCITY(Feet/sec.) = 15.06
 LONGEST FLOWPATH FROM NODE 150.00 TO NODE 170.00 = 1118.00 FEET.

 FLOW PROCESS FROM NODE 170.00 TO NODE 175.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====
 ELEVATION DATA: UPSTREAM(Feet) = 629.00 DOWNSTREAM(Feet) = 628.00
 FLOW LENGTH(Feet) = 82.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.1 INCHES
 PIPE-FLOW VELOCITY(Feet/sec.) = 6.55
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 7.49
 PIPE TRAVEL TIME(MIN.) = 0.21 Tc(MIN.) = 9.04
 LONGEST FLOWPATH FROM NODE 150.00 TO NODE 175.00 = 1200.00 FEET.

 FLOW PROCESS FROM NODE 170.00 TO NODE 175.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

=====
 TOTAL NUMBER OF STREAMS = 3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.04
 RAINFALL INTENSITY(INCH/HR) = 4.86
 TOTAL STREAM AREA(ACRES) = 6.08
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 7.49

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/ HOUR)	AREA (ACRE)
1	5.63	7.99	5.256	4.04
2	3.80	9.64	4.658	1.81
3	7.49	9.04	4.856	6.08

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 3 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	15.41	7.99	5.256
2	16.26	9.04	4.856
3	15.98	9.64	4.658

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 16.26 Tc(MIN.) = 9.04

TOTAL AREA(ACRES) = 11.9

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 175.00 = 1334.00 FEET.

FLOW PROCESS FROM NODE 175.00 TO NODE 176.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 628.00 DOWNSTREAM(FEET) = 627.00

FLOW LENGTH(FEET) = 26.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 18.0 INCH PIPE IS 12.8 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 12.08

ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 16.26

PIPE TRAVEL TIME(MIN.) = 0.04 Tc(MIN.) = 9.07

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 176.00 = 1360.00 FEET.

FLOW PROCESS FROM NODE 175.00 TO NODE 176.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

TOTAL NUMBER OF STREAMS = 2

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:

TIME OF CONCENTRATION(MIN.) = 9.07

RAINFALL INTENSITY(INCH/HR) = 4.84

TOTAL STREAM AREA(ACRES) = 11.93

PEAK FLOW RATE(CFS) AT CONFLUENCE = 16.26

FLOW PROCESS FROM NODE 114.00 TO NODE 115.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

*USER SPECIFIED(SUBAREA):

RESIDENTIAL (4.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .4500

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 95.00

UPSTREAM ELEVATION(FEET) = 696.00

DOWNSTREAM ELEVATION(FEET) = 694.00

ELEVATION DIFFERENCE(FEET) = 2.00

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 8.245

WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
THE MAXIMUM OVERLAND FLOW LENGTH = 81.58

(Reference: Table 3-1B of Hydrology Manual)

THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.152

SUBAREA RUNOFF(CFS) = 0.74

TOTAL AREA(ACRES) = 0.32 TOTAL RUNOFF(CFS) = 0.74

FLOW PROCESS FROM NODE 115.00 TO NODE 176.00 IS CODE = 62

>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>>(STREET TABLE SECTION # 1 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 694.00 DOWNSTREAM ELEVATION(FEET) = 635.00

STREET LENGTH(FEET) = 677.00 CURB HEIGHT(INCHES) = 6.0

STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 13.00

INSIDE STREET CROSSFALL(DECIMAL) = 0.020

OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1

STREET PARKWAY CROSSFALL(DECIMAL) = 0.020

Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0160

Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.89

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.28

HALFSTREET FLOOD WIDTH(FEET) = 7.72

AVERAGE FLOW VELOCITY(FEET/SEC.) = 5.46

PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.53

STREET FLOW TRAVEL TIME(MIN.) = 2.07 Tc(MIN.) = 10.31

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.460

*USER SPECIFIED(SUBAREA):

RESIDENTIAL (4.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .4500

S.C.S. CURVE NUMBER (AMC II) = 0

AREA-AVERAGE RUNOFF COEFFICIENT = 0.450

SUBAREA AREA(ACRES) = 3.13 SUBAREA RUNOFF(CFS) = 6.28

TOTAL AREA(ACRES) = 3.5 PEAK FLOW RATE(CFS) = 6.92

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.33 HALFSTREET FLOOD WIDTH(FEET) = 10.00

FLOW VELOCITY(FEET/SEC.) = 6.19 DEPTH*VELOCITY(FT*FT/SEC.) = 2.02

LONGEST FLOWPATH FROM NODE 114.00 TO NODE 176.00 = 772.00 FEET.

FLOW PROCESS FROM NODE 115.00 TO NODE 176.00 IS CODE = 1

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

TOTAL NUMBER OF STREAMS = 2

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:

TIME OF CONCENTRATION(MIN.) = 10.31
 RAINFALL INTENSITY(INCH/HR) = 4.46
 TOTAL STREAM AREA(ACRES) = 3.45
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 6.92

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	16.26	9.07	4.844	11.93
2	6.92	10.31	4.460	3.45

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	22.35	9.07	4.844
2	21.89	10.31	4.460

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 22.35 Tc(MIN.) = 9.07
 TOTAL AREA(ACRES) = 15.4
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 176.00 = 1360.00 FEET.

 FLOW PROCESS FROM NODE 176.00 TO NODE 185.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 627.00 DOWNSTREAM(FEET) = 598.00
 FLOW LENGTH(FEET) = 172.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 9.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 23.16
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 22.35
 PIPE TRAVEL TIME(MIN.) = 0.12 Tc(MIN.) = 9.20
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 185.00 = 1532.00 FEET.

 FLOW PROCESS FROM NODE 176.00 TO NODE 185.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

=====

TOTAL NUMBER OF STREAMS = 3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.20
 RAINFALL INTENSITY(INCH/HR) = 4.80
 TOTAL STREAM AREA(ACRES) = 15.38
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 22.35

 FLOW PROCESS FROM NODE 120.00 TO NODE 125.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
 =====

*USER SPECIFIED(SUBAREA):
 OPEN BRUSH FAIR COVER RUNOFF COEFFICIENT = .2500
 S.C.S. CURVE NUMBER (AMC II) = 0
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 84.00
 UPSTREAM ELEVATION(FEET) = 726.50
 DOWNSTREAM ELEVATION(FEET) = 709.00
 ELEVATION DIFFERENCE(FEET) = 17.50
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.509
 WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.001
 SUBAREA RUNOFF(CFS) = 0.32
 TOTAL AREA(ACRES) = 0.21 TOTAL RUNOFF(CFS) = 0.32

 FLOW PROCESS FROM NODE 125.00 TO NODE 126.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
 =====

ELEVATION DATA: UPSTREAM(FEET) = 709.00 DOWNSTREAM(FEET) = 651.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 608.00 CHANNEL SLOPE = 0.0954
 CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 2.000
 MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.348

*USER SPECIFIED(SUBAREA):
 OPEN BRUSH FAIR COVER RUNOFF COEFFICIENT = .2500
 S.C.S. CURVE NUMBER (AMC II) = 0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.38
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.96
 AVERAGE FLOW DEPTH(FEET) = 0.29 TRAVEL TIME(MIN.) = 1.27
 Tc(MIN.) = 7.78
 SUBAREA AREA(ACRES) = 1.59 SUBAREA RUNOFF(CFS) = 2.13
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.250
 TOTAL AREA(ACRES) = 1.8 PEAK FLOW RATE(CFS) = 2.41

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.36 FLOW VELOCITY(FEET/SEC.) = 9.11
 LONGEST FLOWPATH FROM NODE 120.00 TO NODE 126.00 = 692.00 FEET.

 FLOW PROCESS FROM NODE 126.00 TO NODE 185.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
 =====

ELEVATION DATA: UPSTREAM(FEET) = 651.00 DOWNSTREAM(FEET) = 601.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 313.00 CHANNEL SLOPE = 0.1597
 CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 2.000

MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.151
 *USER SPECIFIED(SUBAREA):
 LAWNS, GOLF COURSES, ETC. FAIR COVER RUNOFF COEFFICIENT = .2500
 S.C.S. CURVE NUMBER (AMC II) = 0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.61
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 11.24
 AVERAGE FLOW DEPTH(FEET) = 0.34 TRAVEL TIME(MIN.) = 0.46
 Tc(MIN.) = 8.25
 SUBAREA AREA(ACRES) = 0.31 SUBAREA RUNOFF(CFS) = 0.40
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.250
 TOTAL AREA(ACRES) = 2.1 PEAK FLOW RATE(CFS) = 2.72

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.35 FLOW VELOCITY(FEET/SEC.) = 11.34
 LONGEST FLOWPATH FROM NODE 120.00 TO NODE 185.00 = 1005.00 FEET.

 FLOW PROCESS FROM NODE 126.00 TO NODE 185.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

=====

TOTAL NUMBER OF STREAMS = 3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 8.25
 RAINFALL INTENSITY(INCH/HR) = 5.15
 TOTAL STREAM AREA(ACRES) = 2.11
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.72

 FLOW PROCESS FROM NODE 130.00 TO NODE 135.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

=====

OPEN BRUSH FAIR COVER RUNOFF COEFFICIENT = .2500
 SOIL CLASSIFICATION IS "B"
 S.C.S. CURVE NUMBER (AMC II) = 66
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 186.00
 UPSTREAM ELEVATION(FEET) = 628.00
 DOWNSTREAM ELEVATION(FEET) = 616.00
 ELEVATION DIFFERENCE(FEET) = 12.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 8.219
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 100.00
 (Reference: Table 3-1B of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.163
 SUBAREA RUNOFF(CFS) = 0.17
 TOTAL AREA(ACRES) = 0.13 TOTAL RUNOFF(CFS) = 0.17

 FLOW PROCESS FROM NODE 135.00 TO NODE 185.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

```
=====
ELEVATION DATA: UPSTREAM(FEET) =    616.00  DOWNSTREAM(FEET) =    601.00
CHANNEL LENGTH THRU SUBAREA(FEET) =    409.00  CHANNEL SLOPE =    0.0367
CHANNEL BASE(FEET) =     0.00  "Z" FACTOR =    2.000
MANNING'S FACTOR = 0.015  MAXIMUM DEPTH(FEET) =    1.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =    4.600
OPEN BRUSH FAIR COVER RUNOFF COEFFICIENT = .2500
SOIL CLASSIFICATION IS "B"
S.C.S. CURVE NUMBER (AMC II) =    66
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =          0.43
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =    4.23
AVERAGE FLOW DEPTH(FEET) =    0.23  TRAVEL TIME(MIN.) =    1.61
Tc(MIN.) =    9.83
SUBAREA AREA(ACRES) =    0.46  SUBAREA RUNOFF(CFS) =    0.53
AREA-AVERAGE RUNOFF COEFFICIENT =    0.250
TOTAL AREA(ACRES) =    0.6  PEAK FLOW RATE(CFS) =    0.68
=====
```

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.27 FLOW VELOCITY(FEET/SEC.) = 4.66
 LONGEST FLOWPATH FROM NODE 130.00 TO NODE 185.00 = 595.00 FEET.

 FLOW PROCESS FROM NODE 135.00 TO NODE 185.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

```
=====
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:
TIME OF CONCENTRATION(MIN.) =    9.83
RAINFALL INTENSITY(INCH/HR) =    4.60
TOTAL STREAM AREA(ACRES) =    0.59
PEAK FLOW RATE(CFS) AT CONFLUENCE =    0.68
```

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	22.35	9.20	4.802	15.38
2	2.72	8.25	5.151	2.11
3	0.68	9.83	4.600	0.59

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 3 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	24.12	8.25	5.151
2	25.51	9.20	4.802
3	24.51	9.83	4.600

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 25.51 Tc(MIN.) = 9.20

TOTAL AREA(ACRES) = 18.1

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 185.00 = 1532.00 FEET.

FLOW PROCESS FROM NODE 180.00 TO NODE 185.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.802

*USER SPECIFIED(SUBAREA):

OPEN BRUSH FAIR COVER RUNOFF COEFFICIENT = .2500

S.C.S. CURVE NUMBER (AMC II) = 66

AREA-AVERAGE RUNOFF COEFFICIENT = 0.3080

SUBAREA AREA(ACRES) = 0.06 SUBAREA RUNOFF(CFS) = 0.07

TOTAL AREA(ACRES) = 18.1 TOTAL RUNOFF(CFS) = 26.83

TC(MIN.) = 9.20

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 18.1 TC(MIN.) = 9.20

PEAK FLOW RATE(CFS) = 26.83

=====

END OF RATIONAL METHOD ANALYSIS

□

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
2003,1985,1981 HYDROLOGY MANUAL
(c) Copyright 1982-2012 Advanced Engineering Software (aes)
Ver. 19.0 Release Date: 06/01/2012 License ID 1509

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* PDC JOB 2862.02 BRIGHTWATER RANCH *
* 100 YEAR PROPOSED CONDITIONS *
* SYSTEMS 200 & 300 - AREAS DRAINING TO ONSITE DETENTION BASIN *

FILE NAME: S200P100.DAT
TIME/DATE OF STUDY: 17:24 03/24/2015

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 100.00
6-HOUR DURATION PRECIPITATION (INCHES) = 2.700
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT- / PARK- SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH (FT)	LIP (FT)	HIKE (FT)	FACTOR (n)
1	18.0	13.0	0.020/0.020/0.020	0.50	1.50	0.0313	0.125	0.0160

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
 2. (Depth)*(Velocity) Constraint = 10.0 (FT*FT/S)
- *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

FLOW PROCESS FROM NODE 200.00 TO NODE 201.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=====

*USER SPECIFIED(SUBAREA):
RESIDENTIAL (4.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .4700
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 91.00
UPSTREAM ELEVATION(FEET) = 656.00
DOWNSTREAM ELEVATION(FEET) = 632.00
ELEVATION DIFFERENCE(FEET) = 24.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.022
WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.094
SUBAREA RUNOFF(CFS) = 0.37
TOTAL AREA(ACRES) = 0.11 TOTAL RUNOFF(CFS) = 0.37

FLOW PROCESS FROM NODE 201.00 TO NODE 202.00 IS CODE = 62

>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>>(STREET TABLE SECTION # 1 USED)<<<<<

=====

UPSTREAM ELEVATION(FEET) = 632.00 DOWNSTREAM ELEVATION(FEET) = 627.00
STREET LENGTH(FEET) = 480.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 13.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0160
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.61
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.33
HALFSTREET FLOOD WIDTH(FEET) = 10.36
AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.19
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.73
STREET FLOW TRAVEL TIME(MIN.) = 3.65 Tc(MIN.) = 8.67
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.987
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (4.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .4700
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.470
SUBAREA AREA(ACRES) = 1.88 SUBAREA RUNOFF(CFS) = 4.41
TOTAL AREA(ACRES) = 2.0 PEAK FLOW RATE(CFS) = 4.66

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.39 HALFSTREET FLOOD WIDTH(FEET) = 13.20
FLOW VELOCITY(FEET/SEC.) = 2.51 DEPTH*VELOCITY(FT*FT/SEC.) = 0.98
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 202.00 = 571.00 FEET.

FLOW PROCESS FROM NODE 202.00 TO NODE 225.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 624.00 DOWNSTREAM(FEET) = 623.80
FLOW LENGTH(FEET) = 6.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 6.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.45
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.66
PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 8.68
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 225.00 = 577.00 FEET.

FLOW PROCESS FROM NODE 202.00 TO NODE 225.00 IS CODE = 1

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

```

=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 8.68
RAINFALL INTENSITY(INCH/HR) = 4.98
TOTAL STREAM AREA(ACRES) = 1.99
PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.66
*****
FLOW PROCESS FROM NODE 210.00 TO NODE 215.00 IS CODE = 21
-----
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=====
*USER SPECIFIED(SUBAREA):
OPEN BRUSH FAIR COVER RUNOFF COEFFICIENT = .2500
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(Feet) = 101.00
UPSTREAM ELEVATION(Feet) = 760.00
DOWNSTREAM ELEVATION(Feet) = 736.00
ELEVATION DIFFERENCE(Feet) = 24.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 7.102
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
THE MAXIMUM OVERLAND FLOW LENGTH = 100.00
(Reference: Table 3-1B of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.673
SUBAREA RUNOFF(CFS) = 0.21
TOTAL AREA(ACRES) = 0.15 TOTAL RUNOFF(CFS) = 0.21
*****
FLOW PROCESS FROM NODE 215.00 TO NODE 220.00 IS CODE = 51
-----
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(Feet) = 736.00 DOWNSTREAM(Feet) = 644.00
CHANNEL LENGTH THRU SUBAREA(Feet) = 275.00 CHANNEL SLOPE = 0.3345
CHANNEL BASE(Feet) = 5.00 "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(Feet) = 1.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.140
*USER SPECIFIED(SUBAREA):
OPEN BRUSH FAIR COVER RUNOFF COEFFICIENT = .2500
S.C.S. CURVE NUMBER (AMC II) = 0
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.16
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) = 3.91
AVERAGE FLOW DEPTH(Feet) = 0.06 TRAVEL TIME(MIN.) = 1.17
Tc(MIN.) = 8.28
SUBAREA AREA(ACRES) = 1.47 SUBAREA RUNOFF(CFS) = 1.89
AREA-AVERAGE RUNOFF COEFFICIENT = 0.250
TOTAL AREA(ACRES) = 1.6 PEAK FLOW RATE(CFS) = 2.08

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(Feet) = 0.08 FLOW VELOCITY(Feet/Sec.) = 4.87
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 220.00 = 376.00 FEET.
*****
FLOW PROCESS FROM NODE 220.00 TO NODE 225.00 IS CODE = 31
-----
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(Feet) = 641.00 DOWNSTREAM(Feet) = 623.80
FLOW LENGTH(Feet) = 188.00 MANNING'S N = 0.013

```

ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 3.3 INCHES
 PIPE-FLOW VELOCITY(Feet/sec.) = 9.58
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 2.08
 PIPE TRAVEL TIME(MIN.) = 0.33 Tc(MIN.) = 8.60
 LONGEST FLOWPATH FROM NODE 210.00 TO NODE 225.00 = 564.00 FEET.

 FLOW PROCESS FROM NODE 220.00 TO NODE 225.00 IS CODE = 1

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 8.60
 RAINFALL INTENSITY(INCH/HR) = 5.01
 TOTAL STREAM AREA(ACRES) = 1.62
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.08

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	4.66	8.68	4.983	1.99
2	2.08	8.60	5.013	1.62

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	6.70	8.60	5.013
2	6.73	8.68	4.983

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 6.73 Tc(MIN.) = 8.68
 TOTAL AREA(ACRES) = 3.6
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE 225.00 = 577.00 FEET.

 FLOW PROCESS FROM NODE 225.00 TO NODE 207.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(Feet) = 623.80 DOWNSTREAM(Feet) = 623.50
 FLOW LENGTH(Feet) = 26.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.5 INCHES
 PIPE-FLOW VELOCITY(Feet/sec.) = 6.26
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 6.73
 PIPE TRAVEL TIME(MIN.) = 0.07 Tc(MIN.) = 8.75
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE 207.00 = 603.00 FEET.

 FLOW PROCESS FROM NODE 225.00 TO NODE 207.00 IS CODE = 1

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:

TIME OF CONCENTRATION(MIN.) = 8.75
RAINFALL INTENSITY(INCH/HR) = 4.96
TOTAL STREAM AREA(ACRES) = 3.61
PEAK FLOW RATE(CFS) AT CONFLUENCE = 6.73

FLOW PROCESS FROM NODE 205.00 TO NODE 206.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

=====

*USER SPECIFIED(SUBAREA):

RESIDENTIAL (4.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .4800

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 116.00

UPSTREAM ELEVATION(FEET) = 636.00

DOWNSTREAM ELEVATION(FEET) = 632.00

ELEVATION DIFFERENCE(FEET) = 4.00

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 7.243

WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN

THE MAXIMUM OVERLAND FLOW LENGTH = 96.12

(Reference: Table 3-1B of Hydrology Manual)

THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.602

SUBAREA RUNOFF(CFS) = 0.54

TOTAL AREA(ACRES) = 0.20 TOTAL RUNOFF(CFS) = 0.54

FLOW PROCESS FROM NODE 206.00 TO NODE 207.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>(STREET TABLE SECTION # 1 USED)<<<<

=====

UPSTREAM ELEVATION(FEET) = 632.00 DOWNSTREAM ELEVATION(FEET) = 627.00

STREET LENGTH(FEET) = 475.00 CURB HEIGHT(INCHES) = 6.0

STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 13.00

INSIDE STREET CROSSFALL(DECIMAL) = 0.020

OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1

STREET PARKWAY CROSSFALL(DECIMAL) = 0.020

Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0160

Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.18

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.32

HALFSTREET FLOOD WIDTH(FEET) = 9.54

AVERAGE FLOW VELOCITY(FEET/SEC.) = 2.12

PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.67

STREET FLOW TRAVEL TIME(MIN.) = 3.74 Tc(MIN.) = 10.98

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.282

*USER SPECIFIED(SUBAREA):

RESIDENTIAL (4.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .4800

S.C.S. CURVE NUMBER (AMC II) = 0

AREA-AVERAGE RUNOFF COEFFICIENT = 0.480

SUBAREA AREA(ACRES) = 1.58 SUBAREA RUNOFF(CFS) = 3.25

TOTAL AREA(ACRES) = 1.8 PEAK FLOW RATE(CFS) = 3.66

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.36 HALFSTREET FLOOD WIDTH(FEET) = 11.93

FLOW VELOCITY(FEET/SEC.) = 2.37 DEPTH*VELOCITY(FT*FT/SEC.) = 0.87

LONGEST FLOWPATH FROM NODE 205.00 TO NODE 207.00 = 591.00 FEET.

FLOW PROCESS FROM NODE 206.00 TO NODE 207.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<
=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 10.98
RAINFALL INTENSITY(INCH/HR) = 4.28
TOTAL STREAM AREA(ACRES) = 1.78
PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.66

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	6.73	8.75	4.957	3.61
2	3.66	10.98	4.282	1.78

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	9.65	8.75	4.957
2	9.47	10.98	4.282

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 9.65 Tc(MIN.) = 8.75
TOTAL AREA(ACRES) = 5.4
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 207.00 = 603.00 FEET.

FLOW PROCESS FROM NODE 207.00 TO NODE 230.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====

ELEVATION DATA: UPSTREAM(FEET) = 623.50 DOWNSTREAM(FEET) = 623.00
FLOW LENGTH(FEET) = 49.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 14.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.31
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 9.65
PIPE TRAVEL TIME(MIN.) = 0.13 Tc(MIN.) = 8.88
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 230.00 = 652.00 FEET.

FLOW PROCESS FROM NODE 230.00 TO NODE 235.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.911
*USER SPECIFIED(SUBAREA):
BARREN COVER RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3958
SUBAREA AREA(ACRES) = 0.64 SUBAREA RUNOFF(CFS) = 0.94
TOTAL AREA(ACRES) = 6.0 TOTAL RUNOFF(CFS) = 11.72
TC(MIN.) = 8.88

```

*****
FLOW PROCESS FROM NODE      230.00 TO NODE      235.00 IS CODE =  10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<
=====

*****
FLOW PROCESS FROM NODE      225.00 TO NODE      225.00 IS CODE =  13
-----
>>>>CLEAR THE MAIN-STREAM MEMORY<<<<
=====

*****
FLOW PROCESS FROM NODE      321.00 TO NODE      322.00 IS CODE =  21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
=====
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6700
S.C.S. CURVE NUMBER (AMC II) =  0
INITIAL SUBAREA FLOW-LENGTH(FEET) =  97.00
UPSTREAM ELEVATION(FEET) =  810.00
DOWNSTREAM ELEVATION(FEET) =  804.00
ELEVATION DIFFERENCE(FEET) =  6.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) =  4.136
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
         THE MAXIMUM OVERLAND FLOW LENGTH =  96.19
         (Reference: Table 3-1B of Hydrology Manual)
         THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.114
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) =  0.62
TOTAL AREA(ACRES) =  0.13  TOTAL RUNOFF(CFS) =  0.62

*****
FLOW PROCESS FROM NODE      322.00 TO NODE      323.00 IS CODE =  62
-----
>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION #  1 USED)<<<<
=====
UPSTREAM ELEVATION(FEET) =  804.00  DOWNSTREAM ELEVATION(FEET) =  730.00
STREET LENGTH(FEET) =  1330.00  CURB HEIGHT(INCHES) =  6.0
STREET HALFWIDTH(FEET) =  18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
INSIDE STREET CROSSFALL(DECIMAL) =  0.020
OUTSIDE STREET CROSSFALL(DECIMAL) =  0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
STREET PARKWAY CROSSFALL(DECIMAL) =  0.020
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curb) =  0.0160
Manning's FRICTION FACTOR for Back-of-Walk Flow Section =  0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =  8.47
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) =  0.30
HALFSTREET FLOOD WIDTH(FEET) =  8.88
AVERAGE FLOW VELOCITY(FEET/SEC.) =  4.67
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =  1.42
STREET FLOW TRAVEL TIME(MIN.) =  4.75  Tc(MIN.) =  8.88
100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.910
*USER SPECIFIED(SUBAREA):

```

RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6700
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.670
SUBAREA AREA(ACRES) = 4.65 SUBAREA RUNOFF(CFS) = 15.30
TOTAL AREA(ACRES) = 4.8 PEAK FLOW RATE(CFS) = 15.72

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.36 HALFSTREET FLOOD WIDTH(FEET) = 11.58
FLOW VELOCITY(FEET/SEC.) = 5.39 DEPTH*VELOCITY(FT*FT/SEC.) = 1.93
LONGEST FLOWPATH FROM NODE 321.00 TO NODE 323.00 = 1427.00 FEET.

FLOW PROCESS FROM NODE 324.00 TO NODE 323.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.910
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6800
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6711
SUBAREA AREA(ACRES) = 0.59 SUBAREA RUNOFF(CFS) = 1.97
TOTAL AREA(ACRES) = 5.4 TOTAL RUNOFF(CFS) = 17.69
TC(MIN.) = 8.88

FLOW PROCESS FROM NODE 323.00 TO NODE 325.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====

ELEVATION DATA: UPSTREAM(FEET) = 727.00 DOWNSTREAM(FEET) = 711.00
FLOW LENGTH(FEET) = 122.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 9.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 19.89
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 17.69
PIPE TRAVEL TIME(MIN.) = 0.10 Tc(MIN.) = 8.99
LONGEST FLOWPATH FROM NODE 321.00 TO NODE 325.00 = 1549.00 FEET.

FLOW PROCESS FROM NODE 323.00 TO NODE 325.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 8.99
RAINFALL INTENSITY(INCH/HR) = 4.87
TOTAL STREAM AREA(ACRES) = 5.37
PEAK FLOW RATE(CFS) AT CONFLUENCE = 17.69

FLOW PROCESS FROM NODE 300.00 TO NODE 305.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
=====

*USER SPECIFIED(SUBAREA):
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 103.00
UPSTREAM ELEVATION(FEET) = 762.00

DOWNSTREAM ELEVATION(FEET) = 748.00
 ELEVATION DIFFERENCE(FEET) = 14.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.517
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
 THE MAXIMUM OVERLAND FLOW LENGTH = 100.00
 (Reference: Table 3-1B of Hydrology Manual)
 THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.996
 SUBAREA RUNOFF(CFS) = 0.17
 TOTAL AREA(ACRES) = 0.09 TOTAL RUNOFF(CFS) = 0.17

 FLOW PROCESS FROM NODE 305.00 TO NODE 325.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
 >>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 748.00 DOWNSTREAM(FEET) = 714.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 346.00 CHANNEL SLOPE = 0.0983
 CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 2.000
 MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.517
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
 S.C.S. CURVE NUMBER (AMC II) = 0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 0.57
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.42
 AVERAGE FLOW DEPTH(FEET) = 0.21 TRAVEL TIME(MIN.) = 0.90
 Tc(MIN.) = 7.42
 SUBAREA AREA(ACRES) = 0.45 SUBAREA RUNOFF(CFS) = 0.79
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.320
 TOTAL AREA(ACRES) = 0.5 PEAK FLOW RATE(CFS) = 0.95

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.25 FLOW VELOCITY(FEET/SEC.) = 7.35
 LONGEST FLOWPATH FROM NODE 300.00 TO NODE 325.00 = 449.00 FEET.

 FLOW PROCESS FROM NODE 305.00 TO NODE 325.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 7.42
 RAINFALL INTENSITY(INCH/HR) = 5.52
 TOTAL STREAM AREA(ACRES) = 0.54
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.95

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	17.69	8.99	4.874	5.37
2	0.95	7.42	5.517	0.54

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	15.56	7.42	5.517

2 18.54 8.99 4.874

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 18.54 Tc(MIN.) = 8.99

TOTAL AREA(ACRES) = 5.9

LONGEST FLOWPATH FROM NODE 321.00 TO NODE 325.00 = 1549.00 FEET.

FLOW PROCESS FROM NODE 325.00 TO NODE 346.00 IS CODE = 31

=====
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====

ELEVATION DATA: UPSTREAM(FEET) = 711.00 DOWNSTREAM(FEET) = 707.00

FLOW LENGTH(FEET) = 467.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 24.0 INCH PIPE IS 18.9 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 7.00

ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 18.54

PIPE TRAVEL TIME(MIN.) = 1.11 Tc(MIN.) = 10.10

LONGEST FLOWPATH FROM NODE 321.00 TO NODE 346.00 = 2016.00 FEET.

FLOW PROCESS FROM NODE 325.00 TO NODE 346.00 IS CODE = 1

=====
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
=====

TOTAL NUMBER OF STREAMS = 2

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:

TIME OF CONCENTRATION(MIN.) = 10.10

RAINFALL INTENSITY(INCH/HR) = 4.52

TOTAL STREAM AREA(ACRES) = 5.91

PEAK FLOW RATE(CFS) AT CONFLUENCE = 18.54

FLOW PROCESS FROM NODE 330.00 TO NODE 335.00 IS CODE = 21

=====
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
=====

*USER SPECIFIED(SUBAREA):

OPEN BRUSH FAIR COVER RUNOFF COEFFICIENT = .2500

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 60.00

UPSTREAM ELEVATION(FEET) = 991.00

DOWNSTREAM ELEVATION(FEET) = 970.00

ELEVATION DIFFERENCE(FEET) = 21.00

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.501

WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.689

SUBAREA RUNOFF(CFS) = 0.20

TOTAL AREA(ACRES) = 0.12 TOTAL RUNOFF(CFS) = 0.20

FLOW PROCESS FROM NODE 335.00 TO NODE 340.00 IS CODE = 51

=====
>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====

ELEVATION DATA: UPSTREAM(FEET) = 970.00 DOWNSTREAM(FEET) = 826.00

CHANNEL LENGTH THRU SUBAREA(FEET) = 434.00 CHANNEL SLOPE = 0.3318

CHANNEL BASE(FEET) = 5.00 "Z" FACTOR = 5.000

MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 1.00

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.696

```

*USER SPECIFIED(SUBAREA):
OPEN BRUSH FAIR COVER RUNOFF COEFFICIENT = .2500
S.C.S. CURVE NUMBER (AMC II) = 0
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.78
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/sec.) = 4.65
AVERAGE FLOW DEPTH(Feet) = 0.07 TRAVEL TIME(MIN.) = 1.56
Tc(MIN.) = 7.06
SUBAREA AREA(ACRES) = 2.21 SUBAREA RUNOFF(CFS) = 3.15
AREA-AVERAGE RUNOFF COEFFICIENT = 0.250
TOTAL AREA(ACRES) = 2.3 PEAK FLOW RATE(CFS) = 3.32

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(Feet) = 0.10 FLOW VELOCITY(Feet/sec.) = 5.90
LONGEST FLOWPATH FROM NODE 330.00 TO NODE 340.00 = 494.00 FEET.

*****
FLOW PROCESS FROM NODE 340.00 TO NODE 345.00 IS CODE = 51
-----
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(Feet) = 826.00 DOWNSTREAM(Feet) = 719.00
CHANNEL LENGTH THRU SUBAREA(Feet) = 642.00 CHANNEL SLOPE = 0.1667
CHANNEL BASE(Feet) = 5.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(Feet) = 1.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.079
*USER SPECIFIED(SUBAREA):
OPEN BRUSH FAIR COVER RUNOFF COEFFICIENT = .2500
S.C.S. CURVE NUMBER (AMC II) = 0
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 11.39
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/sec.) = 7.80
AVERAGE FLOW DEPTH(Feet) = 0.26 TRAVEL TIME(MIN.) = 1.37
Tc(MIN.) = 8.43
SUBAREA AREA(ACRES) = 12.69 SUBAREA RUNOFF(CFS) = 16.11
AREA-AVERAGE RUNOFF COEFFICIENT = 0.250
TOTAL AREA(ACRES) = 15.0 PEAK FLOW RATE(CFS) = 19.07

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(Feet) = 0.36 FLOW VELOCITY(Feet/sec.) = 9.22
LONGEST FLOWPATH FROM NODE 330.00 TO NODE 345.00 = 1136.00 FEET.

*****
FLOW PROCESS FROM NODE 345.00 TO NODE 346.00 IS CODE = 31
-----
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(Feet) = 716.00 DOWNSTREAM(Feet) = 707.00
FLOW LENGTH(Feet) = 167.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 12.7 INCHES
PIPE-FLOW VELOCITY(Feet/sec.) = 14.28
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 19.07
PIPE TRAVEL TIME(MIN.) = 0.19 Tc(MIN.) = 8.62
LONGEST FLOWPATH FROM NODE 330.00 TO NODE 346.00 = 1303.00 FEET.

*****
FLOW PROCESS FROM NODE 345.00 TO NODE 346.00 IS CODE = 1
-----
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
=====
TOTAL NUMBER OF STREAMS = 2

```

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 8.62
 RAINFALL INTENSITY(INCH/HR) = 5.00
 TOTAL STREAM AREA(ACRES) = 15.02
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 19.07

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	18.54	10.10	4.520	5.91
2	19.07	8.62	5.005	15.02

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	35.81	8.62	5.005
2	35.76	10.10	4.520

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 35.81 Tc(MIN.) = 8.62
 TOTAL AREA(ACRES) = 20.9
 LONGEST FLOWPATH FROM NODE 321.00 TO NODE 346.00 = 2016.00 FEET.

 FLOW PROCESS FROM NODE 346.00 TO NODE 329.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 707.00 DOWNSTREAM(FEET) = 678.00
 FLOW LENGTH(FEET) = 346.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 21.0 INCH PIPE IS 14.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 19.73
 ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 35.81
 PIPE TRAVEL TIME(MIN.) = 0.29 Tc(MIN.) = 8.92
 LONGEST FLOWPATH FROM NODE 321.00 TO NODE 329.00 = 2362.00 FEET.

 FLOW PROCESS FROM NODE 346.00 TO NODE 329.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

TOTAL NUMBER OF STREAMS = 3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 8.92
 RAINFALL INTENSITY(INCH/HR) = 4.90
 TOTAL STREAM AREA(ACRES) = 20.93
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 35.81

 FLOW PROCESS FROM NODE 341.00 TO NODE 342.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

*USER SPECIFIED(SUBAREA):
 RESIDENTIAL (4.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
 S.C.S. CURVE NUMBER (AMC II) = 0
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 161.00
 UPSTREAM ELEVATION(FEET) = 714.00

DOWNSTREAM ELEVATION(FEET) = 711.00
ELEVATION DIFFERENCE(FEET) = 3.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 8.302
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
THE MAXIMUM OVERLAND FLOW LENGTH = 78.63
(Reference: Table 3-1B of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.129
SUBAREA RUNOFF(CFS) = 0.87
TOTAL AREA(ACRES) = 0.37 TOTAL RUNOFF(CFS) = 0.87

FLOW PROCESS FROM NODE 342.00 TO NODE 347.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<

=====

UPSTREAM ELEVATION(FEET) = 711.00 DOWNSTREAM ELEVATION(FEET) = 682.00
STREET LENGTH(FEET) = 487.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 13.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0160
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.22
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.28
HALFSTREET FLOOD WIDTH(FEET) = 7.72
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.51
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.26
STREET FLOW TRAVEL TIME(MIN.) = 1.80 Tc(MIN.) = 10.10
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.519
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (4.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.460
SUBAREA AREA(ACRES) = 2.25 SUBAREA RUNOFF(CFS) = 4.68
TOTAL AREA(ACRES) = 2.6 PEAK FLOW RATE(CFS) = 5.45

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.32 HALFSTREET FLOOD WIDTH(FEET) = 9.80
FLOW VELOCITY(FEET/SEC.) = 5.05 DEPTH*VELOCITY(FT*FT/SEC.) = 1.63
LONGEST FLOWPATH FROM NODE 341.00 TO NODE 347.00 = 648.00 FEET.

FLOW PROCESS FROM NODE 347.00 TO NODE 329.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 679.00 DOWNSTREAM(FEET) = 678.00
FLOW LENGTH(FEET) = 6.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 4.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.71
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 5.45

PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 10.11
LONGEST FLOWPATH FROM NODE 341.00 TO NODE 329.00 = 654.00 FEET.

FLOW PROCESS FROM NODE 347.00 TO NODE 329.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

=====

TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 10.11
RAINFALL INTENSITY(INCH/HR) = 4.52
TOTAL STREAM AREA(ACRES) = 2.62
PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.45

FLOW PROCESS FROM NODE 326.00 TO NODE 327.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

=====

*USER SPECIFIED(SUBAREA):
RESIDENTIAL (4.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .4800
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 124.00
UPSTREAM ELEVATION(FEET) = 711.00
DOWNSTREAM ELEVATION(FEET) = 710.00
ELEVATION DIFFERENCE(FEET) = 1.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 9.460
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
THE MAXIMUM OVERLAND FLOW LENGTH = 62.26
(Reference: Table 3-1B of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.715
SUBAREA RUNOFF(CFS) = 0.50
TOTAL AREA(ACRES) = 0.22 TOTAL RUNOFF(CFS) = 0.50

FLOW PROCESS FROM NODE 327.00 TO NODE 328.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<

=====

UPSTREAM ELEVATION(FEET) = 710.00 DOWNSTREAM ELEVATION(FEET) = 681.00
STREET LENGTH(FEET) = 362.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 13.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0160
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.55
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.22
HALFSTREET FLOOD WIDTH(FEET) = 4.81
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.43
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.98
STREET FLOW TRAVEL TIME(MIN.) = 1.36 Tc(MIN.) = 10.82
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.323

*USER SPECIFIED(SUBAREA):

RESIDENTIAL (4.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .4800
 S.C.S. CURVE NUMBER (AMC II) = 0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.480
 SUBAREA AREA(ACRES) = 1.01 SUBAREA RUNOFF(CFS) = 2.10
 TOTAL AREA(ACRES) = 1.2 PEAK FLOW RATE(CFS) = 2.55

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.25 HALFSTREET FLOOD WIDTH(FEET) = 6.40
 FLOW VELOCITY(FEET/SEC.) = 4.84 DEPTH*VELOCITY(FT*FT/SEC.) = 1.23
 LONGEST FLOWPATH FROM NODE 326.00 TO NODE 328.00 = 486.00 FEET.

FLOW PROCESS FROM NODE 328.00 TO NODE 329.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 679.00 DOWNSTREAM(FEET) = 678.00
 FLOW LENGTH(FEET) = 26.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 4.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.49
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 2.55
 PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 10.88
 LONGEST FLOWPATH FROM NODE 326.00 TO NODE 329.00 = 512.00 FEET.

FLOW PROCESS FROM NODE 328.00 TO NODE 329.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

TOTAL NUMBER OF STREAMS = 3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:
 TIME OF CONCENTRATION(MIN.) = 10.88
 RAINFALL INTENSITY(INCH/HR) = 4.31
 TOTAL STREAM AREA(ACRES) = 1.23
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.55

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	35.81	8.92	4.898	20.93
2	5.45	10.11	4.518	2.62
3	2.55	10.88	4.308	1.23

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 3 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	42.71	8.92	4.898
2	40.85	10.11	4.518
3	39.25	10.88	4.308

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 42.71 Tc(MIN.) = 8.92
 TOTAL AREA(ACRES) = 24.8
 LONGEST FLOWPATH FROM NODE 321.00 TO NODE 329.00 = 2362.00 FEET.

```

*****
FLOW PROCESS FROM NODE      329.00 TO NODE      358.00 IS CODE =  31
-----
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) =   678.00  DOWNSTREAM(FEET) =   645.00
FLOW LENGTH(FEET) =   367.00  MANNING'S N =   0.013
DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   20.76
ESTIMATED PIPE DIAMETER(INCH) =   21.00  NUMBER OF PIPES =    1
PIPE-FLOW(CFS) =   42.71
PIPE TRAVEL TIME(MIN.) =    0.29  Tc(MIN.) =    9.21
LONGEST FLOWPATH FROM NODE      321.00 TO NODE      358.00 =   2729.00 FEET.
*****
FLOW PROCESS FROM NODE      358.00 TO NODE      358.00 IS CODE =  10
-----
>>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
=====
*****
FLOW PROCESS FROM NODE      358.00 TO NODE      358.00 IS CODE =  13
-----
>>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
=====
*****
FLOW PROCESS FROM NODE      310.00 TO NODE      315.00 IS CODE =  21
-----
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=====
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
S.C.S. CURVE NUMBER (AMC II) =    0
INITIAL SUBAREA FLOW-LENGTH(FEET) =   119.00
UPSTREAM ELEVATION(FEET) =   736.00
DOWNSTREAM ELEVATION(FEET) =   726.00
ELEVATION DIFFERENCE(FEET) =    10.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.906
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
         THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
         (Reference: Table 3-1B of Hydrology Manual)
         THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) =   5.776
SUBAREA RUNOFF(CFS) =    0.20
TOTAL AREA(ACRES) =    0.11  TOTAL RUNOFF(CFS) =    0.20
*****
FLOW PROCESS FROM NODE      315.00 TO NODE      316.00 IS CODE =  51
-----
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) =   726.00  DOWNSTREAM(FEET) =   710.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   209.00  CHANNEL SLOPE =   0.0766
CHANNEL BASE(FEET) =    5.00  "Z" FACTOR =   5.000
MANNING'S FACTOR = 0.025  MAXIMUM DEPTH(FEET) =    1.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) =   5.041
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
S.C.S. CURVE NUMBER (AMC II) =    0
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    0.57

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TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.15
AVERAGE FLOW DEPTH(FEET) = 0.05 TRAVEL TIME(MIN.) = 1.62
Tc(MIN.) = 8.53
SUBAREA AREA(ACRES) = 0.45 SUBAREA RUNOFF(CFS) = 0.73
AREA-AVERAGE RUNOFF COEFFICIENT = 0.320
TOTAL AREA(ACRES) = 0.6 PEAK FLOW RATE(CFS) = 0.90

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.07 FLOW VELOCITY(FEET/SEC.) = 2.58
LONGEST FLOWPATH FROM NODE 310.00 TO NODE 316.00 = 328.00 FEET.

FLOW PROCESS FROM NODE 316.00 TO NODE 320.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 710.00 DOWNSTREAM(FEET) = 706.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 230.00 CHANNEL SLOPE = 0.0174
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 1.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.726

*USER SPECIFIED(SUBAREA):

RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200

S.C.S. CURVE NUMBER (AMC II) = 0

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.43

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.28

AVERAGE FLOW DEPTH(FEET) = 0.41 TRAVEL TIME(MIN.) = 0.90

Tc(MIN.) = 9.43

SUBAREA AREA(ACRES) = 0.70 SUBAREA RUNOFF(CFS) = 1.06

AREA-AVERAGE RUNOFF COEFFICIENT = 0.320

TOTAL AREA(ACRES) = 1.3 PEAK FLOW RATE(CFS) = 1.91

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.46 FLOW VELOCITY(FEET/SEC.) = 4.49
LONGEST FLOWPATH FROM NODE 310.00 TO NODE 320.00 = 558.00 FEET.

FLOW PROCESS FROM NODE 320.00 TO NODE 356.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 703.00 DOWNSTREAM(FEET) = 671.00
FLOW LENGTH(FEET) = 181.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 2.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.79
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.91
PIPE TRAVEL TIME(MIN.) = 0.26 Tc(MIN.) = 9.68
LONGEST FLOWPATH FROM NODE 310.00 TO NODE 356.00 = 739.00 FEET.

FLOW PROCESS FROM NODE 320.00 TO NODE 356.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

=====

TOTAL NUMBER OF STREAMS = 2

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:

TIME OF CONCENTRATION(MIN.) = 9.68

RAINFALL INTENSITY(INCH/HR) = 4.65

TOTAL STREAM AREA(ACRES) = 1.26

PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.91

FLOW PROCESS FROM NODE 303.00 TO NODE 304.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
=====

*USER SPECIFIED(SUBAREA):
RESIDENTIAL (4.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 91.00
UPSTREAM ELEVATION(FEET) = 714.00
DOWNSTREAM ELEVATION(FEET) = 711.00
ELEVATION DIFFERENCE(FEET) = 3.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 7.499
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.477
SUBAREA RUNOFF(CFS) = 0.71
TOTAL AREA(ACRES) = 0.29 TOTAL RUNOFF(CFS) = 0.71

FLOW PROCESS FROM NODE 304.00 TO NODE 354.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<
=====

UPSTREAM ELEVATION(FEET) = 711.00 DOWNSTREAM ELEVATION(FEET) = 675.00
STREET LENGTH(FEET) = 542.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 13.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0160
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.36
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.28
HALFSTREET FLOOD WIDTH(FEET) = 7.67
AVERAGE FLOW VELOCITY(FT/SEC.) = 4.77
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.33
STREET FLOW TRAVEL TIME(MIN.) = 1.90 Tc(MIN.) = 9.40
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.736

*USER SPECIFIED(SUBAREA):
RESIDENTIAL (4.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.450
SUBAREA AREA(ACRES) = 2.48 SUBAREA RUNOFF(CFS) = 5.29
TOTAL AREA(ACRES) = 2.8 PEAK FLOW RATE(CFS) = 5.90

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.32 HALFSTREET FLOOD WIDTH(FEET) = 9.90
FLOW VELOCITY(FT/SEC.) = 5.38 DEPTH*VELOCITY(FT*FT/SEC.) = 1.74
LONGEST FLOWPATH FROM NODE 303.00 TO NODE 354.00 = 633.00 FEET.

FLOW PROCESS FROM NODE 354.00 TO NODE 356.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

```

=====
ELEVATION DATA: UPSTREAM(FEET) = 672.00 DOWNSTREAM(FEET) = 671.00
FLOW LENGTH(FEET) = 86.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 9.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.09
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 5.90
PIPE TRAVEL TIME(MIN.) = 0.24 Tc(MIN.) = 9.63
LONGEST FLOWPATH FROM NODE 303.00 TO NODE 356.00 = 719.00 FEET.

*****
FLOW PROCESS FROM NODE 354.00 TO NODE 356.00 IS CODE = 1
-----
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 9.63
RAINFALL INTENSITY(INCH/HR) = 4.66
TOTAL STREAM AREA(ACRES) = 2.77
PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.90

** CONFLUENCE DATA **
STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 1.91 9.68 4.645 1.26
2 5.90 9.63 4.661 2.77

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **
STREAM RUNOFF Tc INTENSITY
NUMBER (CFS) (MIN.) (INCH/HOUR)
1 7.80 9.63 4.661
2 7.79 9.68 4.645

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 7.80 Tc(MIN.) = 9.63
TOTAL AREA(ACRES) = 4.0
LONGEST FLOWPATH FROM NODE 310.00 TO NODE 356.00 = 739.00 FEET.

*****
FLOW PROCESS FROM NODE 356.00 TO NODE 357.00 IS CODE = 31
-----
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 671.00 DOWNSTREAM(FEET) = 646.00
FLOW LENGTH(FEET) = 272.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 6.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 14.04
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 7.80
PIPE TRAVEL TIME(MIN.) = 0.32 Tc(MIN.) = 9.95
LONGEST FLOWPATH FROM NODE 310.00 TO NODE 357.00 = 1011.00 FEET.

*****
FLOW PROCESS FROM NODE 355.00 TO NODE 357.00 IS CODE = 81
-----

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>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.563
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (4.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4249
SUBAREA AREA(ACRES) = 2.49 SUBAREA RUNOFF(CFS) = 5.11
TOTAL AREA(ACRES) = 6.5 TOTAL RUNOFF(CFS) = 12.64
TC(MIN.) = 9.95

FLOW PROCESS FROM NODE 356.00 TO NODE 357.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 9.95
RAINFALL INTENSITY(INCH/HR) = 4.56
TOTAL STREAM AREA(ACRES) = 6.52
PEAK FLOW RATE(CFS) AT CONFLUENCE = 12.64

FLOW PROCESS FROM NODE 306.00 TO NODE 307.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

=====

*USER SPECIFIED(SUBAREA):
RESIDENTIAL (4.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .4700
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 97.00
UPSTREAM ELEVATION(FEET) = 712.00
DOWNSTREAM ELEVATION(FEET) = 708.00
ELEVATION DIFFERENCE(FEET) = 4.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.965
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.744
SUBAREA RUNOFF(CFS) = 0.24
TOTAL AREA(ACRES) = 0.09 TOTAL RUNOFF(CFS) = 0.24

FLOW PROCESS FROM NODE 307.00 TO NODE 350.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<

=====

UPSTREAM ELEVATION(FEET) = 708.00 DOWNSTREAM ELEVATION(FEET) = 650.00
STREET LENGTH(FEET) = 792.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 13.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0160
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.18
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.25
HALFSTREET FLOOD WIDTH(FEET) = 6.04

AVERAGE FLOW VELOCITY (FEET/SEC.) = 4.50
 PRODUCT OF DEPTH&VELOCITY (FT*FT/SEC.) = 1.11
 STREET FLOW TRAVEL TIME (MIN.) = 2.93 Tc (MIN.) = 9.90
 100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 4.580
 *USER SPECIFIED (SUBAREA):
 RESIDENTIAL (4.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .4700
 S.C.S. CURVE NUMBER (AMC II) = 0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.470
 SUBAREA AREA (ACRES) = 1.78 SUBAREA RUNOFF (CFS) = 3.83
 TOTAL AREA (ACRES) = 1.9 PEAK FLOW RATE (CFS) = 4.03

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH (FEET) = 0.29 HALFSTREET FLOOD WIDTH (FEET) = 8.17
 FLOW VELOCITY (FEET/SEC.) = 5.12 DEPTH*VELOCITY (FT*FT/SEC.) = 1.48
 LONGEST FLOWPATH FROM NODE 306.00 TO NODE 350.00 = 889.00 FEET.

FLOW PROCESS FROM NODE 350.00 TO NODE 357.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM (FEET) = 647.00 DOWNSTREAM (FEET) = 646.00
 FLOW LENGTH (FEET) = 6.00 MANNING'S N = 0.013
 ESTIMATED PIPE DIAMETER (INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 3.9 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 14.39
 ESTIMATED PIPE DIAMETER (INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 4.03
 PIPE TRAVEL TIME (MIN.) = 0.01 Tc (MIN.) = 9.90
 LONGEST FLOWPATH FROM NODE 306.00 TO NODE 357.00 = 895.00 FEET.

FLOW PROCESS FROM NODE 350.00 TO NODE 357.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION (MIN.) = 9.90
 RAINFALL INTENSITY (INCH/HR) = 4.58
 TOTAL STREAM AREA (ACRES) = 1.87
 PEAK FLOW RATE (CFS) AT CONFLUENCE = 4.03

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	12.64	9.95	4.563	6.52
2	4.03	9.90	4.578	1.87

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	16.62	9.90	4.578
2	16.65	9.95	4.563

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE (CFS) = 16.65 Tc (MIN.) = 9.95
 TOTAL AREA (ACRES) = 8.4

LONGEST FLOWPATH FROM NODE 310.00 TO NODE 357.00 = 1011.00 FEET.

FLOW PROCESS FROM NODE 357.00 TO NODE 358.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 646.00 DOWNSTREAM(FEET) = 645.00
FLOW LENGTH(FEET) = 54.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 14.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.26
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 16.65
PIPE TRAVEL TIME(MIN.) = 0.10 Tc(MIN.) = 10.05
LONGEST FLOWPATH FROM NODE 310.00 TO NODE 358.00 = 1065.00 FEET.

FLOW PROCESS FROM NODE 358.00 TO NODE 358.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<

=====

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	16.65	10.05	4.534	8.39

LONGEST FLOWPATH FROM NODE 310.00 TO NODE 358.00 = 1065.00 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	42.71	9.21	4.797	24.78

LONGEST FLOWPATH FROM NODE 321.00 TO NODE 358.00 = 2729.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	57.97	9.21	4.797
2	57.03	10.05	4.534

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 57.97 Tc(MIN.) = 9.21
TOTAL AREA(ACRES) = 33.2

FLOW PROCESS FROM NODE 358.00 TO NODE 358.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 2 <<<<

FLOW PROCESS FROM NODE 358.00 TO NODE 370.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 645.00 DOWNSTREAM(FEET) = 638.00
FLOW LENGTH(FEET) = 104.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 18.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 20.61
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 57.97

PIPE TRAVEL TIME(MIN.) = 0.08 Tc(MIN.) = 9.30
LONGEST FLOWPATH FROM NODE 321.00 TO NODE 370.00 = 2833.00 FEET.

FLOW PROCESS FROM NODE 358.00 TO NODE 370.00 IS CODE = 1

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
=====

TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 9.30
RAINFALL INTENSITY(INCH/HR) = 4.77
TOTAL STREAM AREA(ACRES) = 33.17
PEAK FLOW RATE(CFS) AT CONFLUENCE = 57.97

FLOW PROCESS FROM NODE 331.00 TO NODE 332.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=====

*USER SPECIFIED(SUBAREA):
RESIDENTIAL (4.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .4800
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 167.00
UPSTREAM ELEVATION(FEET) = 680.00
DOWNSTREAM ELEVATION(FEET) = 672.00
ELEVATION DIFFERENCE(FEET) = 8.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.603
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
THE MAXIMUM OVERLAND FLOW LENGTH = 99.48
(Reference: Table 3-1B of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.946
SUBAREA RUNOFF(CFS) = 1.34
TOTAL AREA(ACRES) = 0.47 TOTAL RUNOFF(CFS) = 1.34

FLOW PROCESS FROM NODE 332.00 TO NODE 365.00 IS CODE = 62

>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====

UPSTREAM ELEVATION(FEET) = 672.00 DOWNSTREAM ELEVATION(FEET) = 642.00
STREET LENGTH(FEET) = 390.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 13.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0160
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.90
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.26
HALFSTREET FLOOD WIDTH(FEET) = 6.90
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.88
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.29
STREET FLOW TRAVEL TIME(MIN.) = 1.33 Tc(MIN.) = 7.93
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.281

```

*USER SPECIFIED(SUBAREA):
RESIDENTIAL (4.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .4800
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.480
SUBAREA AREA(ACRES) = 1.23 SUBAREA RUNOFF(CFS) = 3.12
TOTAL AREA(ACRES) = 1.7 PEAK FLOW RATE(CFS) = 4.31

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.29 HALFSTREET FLOOD WIDTH(FEET) = 8.33
FLOW VELOCITY(FEET/SEC.) = 5.31 DEPTH*VELOCITY(FT*FT/SEC.) = 1.56
LONGEST FLOWPATH FROM NODE 331.00 TO NODE 365.00 = 557.00 FEET.

*****
FLOW PROCESS FROM NODE 365.00 TO NODE 370.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 639.00 DOWNSTREAM(FEET) = 638.00
FLOW LENGTH(FEET) = 26.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 8.70
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.31
PIPE TRAVEL TIME(MIN.) = 0.05 Tc(MIN.) = 7.98
LONGEST FLOWPATH FROM NODE 331.00 TO NODE 370.00 = 583.00 FEET.

*****
FLOW PROCESS FROM NODE 365.00 TO NODE 370.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
=====
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 7.98
RAINFALL INTENSITY(INCH/HR) = 5.26
TOTAL STREAM AREA(ACRES) = 1.70
PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.31

*****
FLOW PROCESS FROM NODE 348.00 TO NODE 349.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
=====
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (4.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .4700
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 123.00
UPSTREAM ELEVATION(FEET) = 682.00
DOWNSTREAM ELEVATION(FEET) = 675.00
ELEVATION DIFFERENCE(FEET) = 7.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.352
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
         THE MAXIMUM OVERLAND FLOW LENGTH = 100.00
         (Reference: Table 3-1B of Hydrology Manual)
         THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.096
SUBAREA RUNOFF(CFS) = 0.95
TOTAL AREA(ACRES) = 0.33 TOTAL RUNOFF(CFS) = 0.95

*****
FLOW PROCESS FROM NODE 349.00 TO NODE 360.00 IS CODE = 62

```

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 1 USED)<<<<

UPSTREAM ELEVATION(FEET) = 675.00 DOWNSTREAM ELEVATION(FEET) = 643.00
STREET LENGTH(FEET) = 425.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 13.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0160
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.12
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.27
HALFSTREET FLOOD WIDTH(FEET) = 7.21
AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.90
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 1.32
STREET FLOW TRAVEL TIME(MIN.) = 1.45 Tc(MIN.) = 7.80
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.341
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (4.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .4700
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.470
SUBAREA AREA(ACRES) = 1.73 SUBAREA RUNOFF(CFS) = 4.34
TOTAL AREA(ACRES) = 2.1 PEAK FLOW RATE(CFS) = 5.17

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.31 HALFSTREET FLOOD WIDTH(FEET) = 9.09
FLOW VELOCITY(FEET/SEC.) = 5.48 DEPTH*VELOCITY(FT*FT/SEC.) = 1.69
LONGEST FLOWPATH FROM NODE 348.00 TO NODE 360.00 = 548.00 FEET.

FLOW PROCESS FROM NODE 360.00 TO NODE 370.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 639.00 DOWNSTREAM(FEET) = 638.00
FLOW LENGTH(FEET) = 6.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 4.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.47
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 5.17
PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 7.81
LONGEST FLOWPATH FROM NODE 348.00 TO NODE 370.00 = 554.00 FEET.

FLOW PROCESS FROM NODE 360.00 TO NODE 370.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:
TIME OF CONCENTRATION(MIN.) = 7.81
RAINFALL INTENSITY(INCH/HR) = 5.34

TOTAL STREAM AREA(ACRES) = 2.06
PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.17

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	57.97	9.30	4.769	33.17
2	4.31	7.98	5.260	1.70
3	5.17	7.81	5.338	2.06

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 3 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	58.06	7.81	5.338
2	59.20	7.98	5.260
3	66.50	9.30	4.769

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 66.50 Tc(MIN.) = 9.30
TOTAL AREA(ACRES) = 36.9
LONGEST FLOWPATH FROM NODE 321.00 TO NODE 370.00 = 2833.00 FEET.

FLOW PROCESS FROM NODE 370.00 TO NODE 235.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 638.00 DOWNSTREAM(FEET) = 618.00
FLOW LENGTH(FEET) = 232.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 18.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 23.39
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 66.50
PIPE TRAVEL TIME(MIN.) = 0.17 Tc(MIN.) = 9.46
LONGEST FLOWPATH FROM NODE 321.00 TO NODE 235.00 = 3065.00 FEET.

FLOW PROCESS FROM NODE 370.00 TO NODE 235.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	66.50	9.46	4.715	36.93

LONGEST FLOWPATH FROM NODE 321.00 TO NODE 235.00 = 3065.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	11.72	8.88	4.911	6.03

LONGEST FLOWPATH FROM NODE 200.00 TO NODE 235.00 = 652.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	74.15	8.88	4.911
2	77.75	9.46	4.715

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE (CFS) = 77.75 Tc (MIN.) = 9.46
TOTAL AREA (ACRES) = 43.0

=====

END OF STUDY SUMMARY:

TOTAL AREA (ACRES) = 43.0 TC (MIN.) = 9.46
PEAK FLOW RATE (CFS) = 77.75

=====

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END OF RATIONAL METHOD ANALYSIS

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
2003,1985,1981 HYDROLOGY MANUAL
(c) Copyright 1982-2012 Advanced Engineering Software (aes)
Ver. 19.0 Release Date: 06/01/2012 License ID 1509

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* PDC JOB 2862.02 BRIGHTWATER RANCH *
* 100 YEAR PROPOSED CONDITIONS *
* SYSTEMS 400 & 500 - AREAS DRAINING TO WELLINGTON HILL DR STORM DRAIN *

FILE NAME: S400P100.DAT
TIME/DATE OF STUDY: 16:49 04/18/2015

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 100.00
6-HOUR DURATION PRECIPITATION (INCHES) = 2.700
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

	HALF- WIDTH	CROWN TO CROSSFALL	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT	GUTTER-GEOMETRIES: WIDTH	LIP	HIKE	MANNING FACTOR
NO.	(FT)	(FT)		(FT)	(FT)	(FT)	(FT)	(n)
1	18.0	13.0	0.020/0.020/0.020	0.50	1.50	0.0313	0.125	0.0170

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 1.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

FLOW PROCESS FROM NODE 400.00 TO NODE 405.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=====

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .2500
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 104.00
UPSTREAM ELEVATION(FEET) = 989.00
DOWNSTREAM ELEVATION(FEET) = 956.00
ELEVATION DIFFERENCE(FEET) = 33.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 7.102

WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN

THE MAXIMUM OVERLAND FLOW LENGTH = 100.00
(Reference: Table 3-1B of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.673
SUBAREA RUNOFF(CFS) = 0.18
TOTAL AREA(ACRES) = 0.13 TOTAL RUNOFF(CFS) = 0.18

FLOW PROCESS FROM NODE 405.00 TO NODE 410.00 IS CODE = 51

>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) =	956.00	DOWNSTREAM(FEET) =	696.00
CHANNEL LENGTH THRU SUBAREA(FEET) =	746.00	CHANNEL SLOPE =	0.3485
CHANNEL BASE(FEET) =	5.00	"Z" FACTOR =	5.000
MANNING'S FACTOR =	0.030	MAXIMUM DEPTH(FEET) =	1.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) =	4.871		
*USER SPECIFIED(SUBAREA):			
USER-SPECIFIED RUNOFF COEFFICIENT =	.2500		
S.C.S. CURVE NUMBER (AMC II) =	0		
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =	4.38		
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =	6.57		
AVERAGE FLOW DEPTH(FEET) =	0.12	TRAVEL TIME(MIN.) =	1.89
Tc(MIN.) =	9.00		
SUBAREA AREA(ACRES) =	6.83	SUBAREA RUNOFF(CFS) =	8.32
AREA-AVERAGE RUNOFF COEFFICIENT =	0.250		
TOTAL AREA(ACRES) =	7.0	PEAK FLOW RATE(CFS) =	8.47

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.17 FLOW VELOCITY(FEET/SEC.) = 8.37
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 410.00 = 850.00 FEET.

FLOW PROCESS FROM NODE 410.00 TO NODE 412.00 IS CODE = 51

>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) =	696.00	DOWNSTREAM(FEET) =	628.00
CHANNEL LENGTH THRU SUBAREA(FEET) =	459.00	CHANNEL SLOPE =	0.1481
CHANNEL BASE(FEET) =	0.00	"Z" FACTOR =	2.000
MANNING'S FACTOR =	0.015	MAXIMUM DEPTH(FEET) =	1.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) =	4.704		
*USER SPECIFIED(SUBAREA):			
USER-SPECIFIED RUNOFF COEFFICIENT =	.2600		
S.C.S. CURVE NUMBER (AMC II) =	0		
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =	9.69		
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =	15.36		
AVERAGE FLOW DEPTH(FEET) =	0.56	TRAVEL TIME(MIN.) =	0.50
Tc(MIN.) =	9.49		
SUBAREA AREA(ACRES) =	1.99	SUBAREA RUNOFF(CFS) =	2.43
AREA-AVERAGE RUNOFF COEFFICIENT =	0.252		
TOTAL AREA(ACRES) =	8.9	PEAK FLOW RATE(CFS) =	10.62

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.58 FLOW VELOCITY(FEET/SEC.) = 15.54
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 412.00 = 1309.00 FEET.

FLOW PROCESS FROM NODE 412.00 TO NODE 505.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

```

>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 625.00 DOWNSTREAM(FEET) = 621.80
FLOW LENGTH(FEET) = 16.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 5.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 21.07
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 10.62
PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 9.51
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 505.00 = 1325.00 FEET.

*****
FLOW PROCESS FROM NODE 505.00 TO NODE 510.00 IS CODE = 31
-----
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 621.80 DOWNSTREAM(FEET) = 620.10
FLOW LENGTH(FEET) = 68.30 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.75
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 10.62
PIPE TRAVEL TIME(MIN.) = 0.12 Tc(MIN.) = 9.62
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 510.00 = 1393.30 FEET.

*****
FLOW PROCESS FROM NODE 505.00 TO NODE 510.00 IS CODE = 1
-----
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 9.62
RAINFALL INTENSITY(INCH/HR) = 4.66
TOTAL STREAM AREA(ACRES) = 8.95
PEAK FLOW RATE(CFS) AT CONFLUENCE = 10.62

*****
FLOW PROCESS FROM NODE 415.00 TO NODE 510.00 IS CODE = 7
-----
>>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
=====
USER-SPECIFIED VALUES ARE AS FOLLOWS:
TC(MIN) = 10.00 RAIN INTENSITY(INCH/HOUR) = 4.55
TOTAL AREA(ACRES) = 4.54 TOTAL RUNOFF(CFS) = 0.30

*****
FLOW PROCESS FROM NODE 415.00 TO NODE 510.00 IS CODE = 1
-----
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 10.00
RAINFALL INTENSITY(INCH/HR) = 4.55
TOTAL STREAM AREA(ACRES) = 4.54
PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.30

** CONFLUENCE DATA **
STREAM RUNOFF Tc INTENSITY AREA

```

NUMBER	(CFS)	(MIN.)	(INCH/HOUR)	(ACRE)
1	10.62	9.62	4.663	8.95
2	0.30	10.00	4.549	4.54

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	10.91	9.62	4.663
2	10.66	10.00	4.549

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 10.91 Tc(MIN.) = 9.62

TOTAL AREA(ACRES) = 13.5

LONGEST FLOWPATH FROM NODE 400.00 TO NODE 510.00 = 1393.30 FEET.

FLOW PROCESS FROM NODE 510.00 TO NODE 515.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 620.10 DOWNSTREAM(FEET) = 617.50

FLOW LENGTH(FEET) = 44.40 MANNING'S N = 0.013

ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000

DEPTH OF FLOW IN 18.0 INCH PIPE IS 8.4 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 13.56

ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 10.91

PIPE TRAVEL TIME(MIN.) = 0.05 Tc(MIN.) = 9.68

LONGEST FLOWPATH FROM NODE 400.00 TO NODE 515.00 = 1437.70 FEET.

FLOW PROCESS FROM NODE 510.00 TO NODE 515.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

TOTAL NUMBER OF STREAMS = 3

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:

TIME OF CONCENTRATION(MIN.) = 9.68

RAINFALL INTENSITY(INCH/HR) = 4.65

TOTAL STREAM AREA(ACRES) = 13.49

PEAK FLOW RATE(CFS) AT CONFLUENCE = 10.91

FLOW PROCESS FROM NODE 235.00 TO NODE 515.00 IS CODE = 7

>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<

USER-SPECIFIED VALUES ARE AS FOLLOWS:

TC(MIN) = 13.46 RAIN INTENSITY(INCH/HOUR) = 3.76

TOTAL AREA(ACRES) = 43.00 TOTAL RUNOFF(CFS) = 51.59

→ $9.46 + (256 - 252) = 13.46$ (Detection time Quot)

FLOW PROCESS FROM NODE 235.00 TO NODE 515.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

TOTAL NUMBER OF STREAMS = 3

CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:

TIME OF CONCENTRATION(MIN.) = 13.46

RAINFALL INTENSITY(INCH/HR) = 3.76
TOTAL STREAM AREA(ACRES) = 43.00
PEAK FLOW RATE(CFS) AT CONFLUENCE = 51.59

FLOW PROCESS FROM NODE 420.00 TO NODE 425.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

=====

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .4100

S.C.S. CURVE NUMBER (AMC II) = 0

INITIAL SUBAREA FLOW-LENGTH(FEET) = 74.00

UPSTREAM ELEVATION(FEET) = 710.00

DOWNSTREAM ELEVATION(FEET) = 682.00

ELEVATION DIFFERENCE(FEET) = 28.00

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 4.959

WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.114

NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.

SUBAREA RUNOFF(CFS) = 0.32

TOTAL AREA(ACRES) = 0.11 TOTAL RUNOFF(CFS) = 0.32

FLOW PROCESS FROM NODE 425.00 TO NODE 430.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 682.00 DOWNSTREAM(FEET) = 626.00

CHANNEL LENGTH THRU SUBAREA(FEET) = 606.00 CHANNEL SLOPE = 0.0924

CHANNEL BASE(FEET) = 2.00 "Z" FACTOR = 2.000

MANNING'S FACTOR = 0.020 MAXIMUM DEPTH(FEET) = 1.00

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.081

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .4100

S.C.S. CURVE NUMBER (AMC II) = 0

TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 3.64

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.13

AVERAGE FLOW DEPTH(FEET) = 0.21 TRAVEL TIME(MIN.) = 1.42

Tc(MIN.) = 6.38

SUBAREA AREA(ACRES) = 2.65 SUBAREA RUNOFF(CFS) = 6.61

AREA-AVERAGE RUNOFF COEFFICIENT = 0.410

TOTAL AREA(ACRES) = 2.8 PEAK FLOW RATE(CFS) = 6.88

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.30 FLOW VELOCITY(FEET/SEC.) = 8.74

LONGEST FLOWPATH FROM NODE 420.00 TO NODE 430.00 = 680.00 FEET.

FLOW PROCESS FROM NODE 430.00 TO NODE 515.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 618.60 DOWNSTREAM(FEET) = 617.50

FLOW LENGTH(FEET) = 43.80 MANNING'S N = 0.013

ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000

DEPTH OF FLOW IN 18.0 INCH PIPE IS 8.2 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 8.80

ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 6.88

PIPE TRAVEL TIME(MIN.) = 0.08 Tc(MIN.) = 6.46

LONGEST FLOWPATH FROM NODE 420.00 TO NODE 515.00 = 723.80 FEET.

FLOW PROCESS FROM NODE 430.00 TO NODE 515.00 IS CODE = 1

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
=====

TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:
TIME OF CONCENTRATION(MIN.) = 6.46
RAINFALL INTENSITY(INCH/HR) = 6.03
TOTAL STREAM AREA(ACRES) = 2.76
PEAK FLOW RATE(CFS) AT CONFLUENCE = 6.88

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	10.91	9.68	4.646	13.49
2	51.59	13.46	3.756	43.00
3	6.88	6.46	6.031	2.76

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 3 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	40.04	6.46	6.031
2	53.30	9.68	4.646
3	64.69	13.46	3.756

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 64.69 Tc(MIN.) = 13.46
TOTAL AREA(ACRES) = 59.2
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 515.00 = 1437.70 FEET.

FLOW PROCESS FROM NODE 515.00 TO NODE 525.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====

ELEVATION DATA: UPSTREAM(FEET) = 617.50 DOWNSTREAM(FEET) = 609.60
FLOW LENGTH(FEET) = 88.60 MANNING'S N = 0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS 19.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 23.86
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 64.69
PIPE TRAVEL TIME(MIN.) = 0.06 Tc(MIN.) = 13.52
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 525.00 = 1526.30 FEET.

FLOW PROCESS FROM NODE 520.00 TO NODE 525.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.745
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.2902
SUBAREA AREA(ACRES) = 0.25 SUBAREA RUNOFF(CFS) = 0.28

TOTAL AREA(ACRES) = 59.5 TOTAL RUNOFF(CFS) = 64.69
TC(MIN.) = 13.52

NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 59.5 TC(MIN.) = 13.52
PEAK FLOW RATE(CFS) = 64.69

=====

END OF RATIONAL METHOD ANALYSIS

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
2003,1985,1981 HYDROLOGY MANUAL
(c) Copyright 1982-2012 Advanced Engineering Software (aes)
Ver. 19.0 Release Date: 06/01/2012 License ID 1509

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* PDC JOB 2862.02 BRIGHTWATER RANCH *
* 100 YEAR PROPOSED CONDITIONS *
* SYSTEM 700 - AREA DRAINING TO SOUTHWEST CORNER OF SITE *

FILE NAME: S700P100.DAT
TIME/DATE OF STUDY: 18:44 03/23/2015

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 100.00
6-HOUR DURATION PRECIPITATION (INCHES) = 2.700
SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH (FT)	LIP (FT)	HIKE (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0313	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
 2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
- *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

FLOW PROCESS FROM NODE 700.00 TO NODE 705.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=====

OPEN BRUSH FAIR COVER RUNOFF COEFFICIENT = .2500
SOIL CLASSIFICATION IS "B"
S.C.S. CURVE NUMBER (AMC II) = 66
INITIAL SUBAREA FLOW-LENGTH(FEET) = 70.00
UPSTREAM ELEVATION(FEET) = 930.00
DOWNSTREAM ELEVATION(FEET) = 920.00
ELEVATION DIFFERENCE(FEET) = 10.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.942
WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.364
SUBAREA RUNOFF(CFS) = 0.19
TOTAL AREA(ACRES) = 0.12 TOTAL RUNOFF(CFS) = 0.19

FLOW PROCESS FROM NODE 705.00 TO NODE 708.00 IS CODE = 51

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) =	919.00	DOWNSTREAM(FEET) =	831.00
CHANNEL LENGTH THRU SUBAREA(FEET) =	332.00	CHANNEL SLOPE =	0.2651
CHANNEL BASE(FEET) =	5.00	"Z" FACTOR =	5.000
MANNING'S FACTOR =	0.035	MAXIMUM DEPTH(FEET) =	1.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) =	5.446		
OPEN BRUSH FAIR COVER RUNOFF COEFFICIENT =	.2500		
SOIL CLASSIFICATION IS	"B"		
S.C.S. CURVE NUMBER (AMC II) =	66		
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =	1.05		
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =	3.41		
AVERAGE FLOW DEPTH(FEET) =	0.06	TRAVEL TIME(MIN.) =	1.62
Tc(MIN.) =	7.57		
SUBAREA AREA(ACRES) =	1.26	SUBAREA RUNOFF(CFS) =	1.72
AREA-AVERAGE RUNOFF COEFFICIENT =	0.250		
TOTAL AREA(ACRES) =	1.4	PEAK FLOW RATE(CFS) =	1.88

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.09 FLOW VELOCITY(FEET/SEC.) = 3.98
LONGEST FLOWPATH FROM NODE 700.00 TO NODE 708.00 = 402.00 FEET.

FLOW PROCESS FROM NODE 706.00 TO NODE 708.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) =	5.446
OPEN BRUSH FAIR COVER RUNOFF COEFFICIENT =	.2500
SOIL CLASSIFICATION IS	"B"
S.C.S. CURVE NUMBER (AMC II) =	66
AREA-AVERAGE RUNOFF COEFFICIENT =	0.2500
SUBAREA AREA(ACRES) =	1.13
SUBAREA RUNOFF(CFS) =	1.54
TOTAL AREA(ACRES) =	2.5
TOTAL RUNOFF(CFS) =	3.42
TC(MIN.) =	7.57

FLOW PROCESS FROM NODE 708.00 TO NODE 709.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) =	825.00	DOWNSTREAM(FEET) =	820.50
FLOW LENGTH(FEET) =	36.00	MANNING'S N =	0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO	18.000		
DEPTH OF FLOW IN 18.0 INCH PIPE IS	3.7 INCHES		
PIPE-FLOW VELOCITY(FEET/SEC.) =	12.87		
ESTIMATED PIPE DIAMETER(INCH) =	18.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	3.42		
PIPE TRAVEL TIME(MIN.) =	0.05	Tc(MIN.) =	7.61
LONGEST FLOWPATH FROM NODE 700.00 TO NODE 709.00 =	438.00 FEET.		

FLOW PROCESS FROM NODE 709.00 TO NODE 710.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) =	818.00	DOWNSTREAM(FEET) =	816.00
FLOW LENGTH(FEET) =	41.00	MANNING'S N =	0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO	18.000		
DEPTH OF FLOW IN 18.0 INCH PIPE IS	4.7 INCHES		
PIPE-FLOW VELOCITY(FEET/SEC.) =	9.22		
ESTIMATED PIPE DIAMETER(INCH) =	18.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	3.42		
PIPE TRAVEL TIME(MIN.) =	0.07	Tc(MIN.) =	7.69
LONGEST FLOWPATH FROM NODE	700.00	TO NODE	710.00 = 479.00 FEET.

FLOW PROCESS FROM NODE	710.00	TO NODE	710.00	IS CODE =	81
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>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) =	5.390		
OPEN BRUSH FAIR COVER RUNOFF COEFFICIENT =	.2500		
SOIL CLASSIFICATION IS "B"			
S.C.S. CURVE NUMBER (AMC II) =	66		
AREA-AVERAGE RUNOFF COEFFICIENT =	0.2500		
SUBAREA AREA(ACRES) =	0.57	SUBAREA RUNOFF(CFS) =	0.77
TOTAL AREA(ACRES) =	3.1	TOTAL RUNOFF(CFS) =	4.15
TC(MIN.) =	7.69		

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES)	=	3.1	TC(MIN.) =	7.69
PEAK FLOW RATE(CFS)	=	4.15		

=====

END OF RATIONAL METHOD ANALYSIS

APPENDIX 8

Preliminary Hydraulic Calculations

Capacity of Existing 30 inch CIPCP on Foxbrough at S=0.02

Worksheet for Circular Channel

Project Description	
Worksheet	Ex 30-in CIPCP Foxborou
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Capacity

Input Data	
Mannings Coeff	0.013
Channel Slope	020000 ft/ft
Diameter	30.0 in

Results	
Depth	2.50 ft
Discharge	58.00 cfs
Flow Area	4.9 ft²
Wetted Perime	7.85 ft
Top Width	0.00 ft
Critical Depth	2.38 ft
Percent Full	100.0 %
Critical Slope	017335 ft/ft
Velocity	11.82 ft/s
Velocity Head	2.17 ft
Specific Energ	4.67 ft
Froude Numbe	0.00
Maximum Disc	62.40 cfs
Discharge Full	58.00 cfs
Slope Full	020000 ft/ft
Flow Type	N/A

Capacity of Existing 30 inch CIPCP on Wellington at s=0.062

Worksheet for Circular Channel

Project Description	
Worksheet	Ex 30-in CIPCP Wellington at
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Capacity

Input Data	
Mannings Coeff	0.013
Channel Slope	062000 ft/ft
Diameter	30.0 in

Results	
Depth	2.50 ft
Discharge	102.13 cfs
Flow Area	4.9 ft²
Wetted Perime	7.85 ft
Top Width	0.00 ft
Critical Depth	2.49 ft
Percent Full	100.0 %
Critical Slope	058309 ft/ft
Velocity	20.80 ft/s
Velocity Head	6.73 ft
Specific Energ	9.23 ft
Froude Numbe	0.00
Maximum Disc	109.86 cfs
Discharge Full	102.13 cfs
Slope Full	062000 ft/ft
Flow Type	N/A

Existing Conditions at Node 185 Culvert

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Roughness Coefficient 0.013
Channel Slope 0.11760 ft/ft
Diameter 2.50 ft
Discharge 26.51 ft³/s

Results

Normal Depth 0.74 ft
Flow Area 1.21 ft²
Wetted Perimeter 2.87 ft
Hydraulic Radius 0.42 ft
Top Width 2.28 ft
Critical Depth 1.76 ft
Percent Full 29.4 %
Critical Slope 0.00591 ft/ft
Velocity 22.00 ft/s
Velocity Head 7.52 ft
Specific Energy 8.26 ft
Froude Number 5.33
Maximum Discharge 151.30 ft³/s
Discharge Full 140.65 ft³/s
Slope Full 0.00418 ft/ft
Flow Type SuperCritical

GVF Input Data

Downstream Depth 0.00 ft
Length 0.00 ft
Number Of Steps 0

GVF Output Data

Upstream Depth 0.00 ft
Profile Description
Profile Headloss 0.00 ft
Average End Depth Over Rise 0.00 %
Normal Depth Over Rise 29.41 %
Downstream Velocity Infinity ft/s

Existing Conditions at Node 185 Culvert

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.74	ft
Critical Depth	1.76	ft
Channel Slope	0.11760	ft/ft
Critical Slope	0.00591	ft/ft

Existing Conditions at Node 356 Culvert

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.02000	ft/ft
Diameter	2.00	ft
Discharge	30.14	ft³/s

Results

Normal Depth	1.54	ft
Flow Area	2.60	ft²
Wetted Perimeter	4.29	ft
Hydraulic Radius	0.61	ft
Top Width	1.68	ft
Critical Depth	1.86	ft
Percent Full	77.2	%
Critical Slope	0.01535	ft/ft
Velocity	11.58	ft/s
Velocity Head	2.08	ft
Specific Energy	3.63	ft
Froude Number	1.64	
Maximum Discharge	34.41	ft³/s
Discharge Full	31.99	ft³/s
Slope Full	0.01775	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	77.21	%
Downstream Velocity	Infinity	ft/s

Existing Conditions at Node 356 Culvert

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.54	ft
Critical Depth	1.86	ft
Channel Slope	0.02000	ft/ft
Critical Slope	0.01535	ft/ft

Existing Conditions at Node 357 Culvert

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013
Channel Slope	0.15500 ft/ft
Diameter	1.50 ft
Discharge	19.12 ft ³ /s

Results

Normal Depth	0.72 ft
Flow Area	0.83 ft ²
Wetted Perimeter	2.29 ft
Hydraulic Radius	0.36 ft
Top Width	1.50 ft
Critical Depth	1.46 ft
Percent Full	47.8 %
Critical Slope	0.02935 ft/ft
Velocity	22.95 ft/s
Velocity Head	8.18 ft
Specific Energy	8.90 ft
Froude Number	5.43
Maximum Discharge	44.48 ft ³ /s
Discharge Full	41.35 ft ³ /s
Slope Full	0.03313 ft/ft
Flow Type	SuperCritical

GVF Input Data

Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.00 %
Normal Depth Over Rise	47.76 %
Downstream Velocity	Infinity ft/s

Existing Conditions at Node 357 Culvert

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.72	ft
Critical Depth	1.46	ft
Channel Slope	0.15500	ft/ft
Critical Slope	0.02935	ft/ft

Existing Conditions at Node 520 Culvert

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.06667	ft/ft
Diameter	2.50	ft
Discharge	12.24	ft ³ /s

Results

Normal Depth	0.57	ft
Flow Area	0.85	ft ²
Wetted Perimeter	2.50	ft
Hydraulic Radius	0.34	ft
Top Width	2.10	ft
Critical Depth	1.17	ft
Percent Full	23.0	%
Critical Slope	0.00442	ft/ft
Velocity	14.39	ft/s
Velocity Head	3.22	ft
Specific Energy	3.79	ft
Froude Number	3.99	
Maximum Discharge	113.92	ft ³ /s
Discharge Full	105.90	ft ³ /s
Slope Full	0.00089	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	22.96	%
Downstream Velocity	Infinity	ft/s

Existing Conditions at Node 520 Culvert

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.57	ft
Critical Depth	1.17	ft
Channel Slope	0.06667	ft/ft
Critical Slope	0.00442	ft/ft

Proposed Conditions at Node 185 Culvert

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013
Channel Slope	0.11760 ft/ft
Diameter	2.50 ft
Discharge	26.83 ft ³ /s

Results

Normal Depth	0.74 ft
Flow Area	1.22 ft ²
Wetted Perimeter	2.88 ft
Hydraulic Radius	0.42 ft
Top Width	2.28 ft
Critical Depth	1.77 ft
Percent Full	29.6 %
Critical Slope	0.00596 ft/ft
Velocity	22.07 ft/s
Velocity Head	7.57 ft
Specific Energy	8.31 ft
Froude Number	5.33
Maximum Discharge	151.30 ft ³ /s
Discharge Full	140.65 ft ³ /s
Slope Full	0.00428 ft/ft
Flow Type	SuperCritical

GVF Input Data

Downstream Depth	0.00 ft
Length	0.00 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00 ft
Profile Description	
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.00 %
Normal Depth Over Rise	29.60 %
Downstream Velocity	Infinity ft/s

Proposed Conditions at Node 185 Culvert

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.74	ft
Critical Depth	1.77	ft
Channel Slope	0.11760	ft/ft
Critical Slope	0.00596	ft/ft

Proposed Conditions at Node 525

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.05150	ft/ft
Diameter	2.50	ft
Discharge	90.90	ft³/s

Results

Normal Depth	2.00	ft
Flow Area	4.21	ft²
Wetted Perimeter	5.53	ft
Hydraulic Radius	0.76	ft
Top Width	2.00	ft
Critical Depth	2.48	ft
Percent Full	79.9	%
Critical Slope	0.04551	ft/ft
Velocity	21.61	ft/s
Velocity Head	7.26	ft
Specific Energy	9.26	ft
Froude Number	2.63	
Maximum Discharge	100.12	ft³/s
Discharge Full	93.08	ft³/s
Slope Full	0.04912	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	79.93	%
Downstream Velocity	Infinity	ft/s

Proposed Conditions at Node 525

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	2.00	ft
Critical Depth	2.48	ft
Channel Slope	0.05150	ft/ft
Critical Slope	0.04551	ft/ft

Brightwater Ranch
Preliminary Sizing for Brow Ditch Type 'F' Catch Basins

Cw= 2.6

Catch Basin Location	Node #	Proposed Condition 100 Year Discharge (cfs)	Number of Openings	Length of Opening (ft)	Weir Flow Analysis Head (ft)	Comment
Western Open Space	110	5.63	2	3	0.51	Regular
Western Open Space	170	7.49	3	3	0.47	Regular
Western Open Space	185	4.48	2	3	0.44	Regular
Western Open Space	220	2.08	2	3	0.26	Regular
Western Open Space	412	11.10	4	4	0.41	Mod. X=4'
Western Open Space	345	17.96	4	4	0.57	Mod. X=4'
Trailer Park West	325	0.85	2	3	0.14	Regular
Trailer Park East	320	1.91	2	3	0.25	Regular

Normal Depth in Brow Ditch at Node 110

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.03000	ft/ft
Constructed Depth	1.00	ft
Constructed Top Width	3.00	ft
Discharge	5.63	ft ³ /s

Results

Normal Depth	0.51	ft
Flow Area	0.73	ft ²
Wetted Perimeter	2.44	ft
Hydraulic Radius	0.30	ft
Top Width	2.15	ft
Critical Depth	0.78	ft
Critical Slope	0.00556	ft/ft
Velocity	7.69	ft/s
Velocity Head	0.92	ft
Specific Energy	1.43	ft
Froude Number	2.32	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.51	ft
Critical Depth	0.78	ft
Channel Slope	0.03000	ft/ft
Critical Slope	0.00556	ft/ft

Normal Depth in Brow Ditch at Node 170

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.05000	ft/ft
Constructed Depth	1.00	ft
Constructed Top Width	3.00	ft
Discharge	7.49	ft ³ /s

Results

Normal Depth	0.52	ft
Flow Area	0.75	ft ²
Wetted Perimeter	2.46	ft
Hydraulic Radius	0.30	ft
Top Width	2.16	ft
Critical Depth	0.90	ft
Critical Slope	0.00555	ft/ft
Velocity	10.02	ft/s
Velocity Head	1.56	ft
Specific Energy	2.08	ft
Froude Number	3.00	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.52	ft
Critical Depth	0.90	ft
Channel Slope	0.05000	ft/ft
Critical Slope	0.00555	ft/ft

Normal Depth in Brow Ditch at Node 185

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.00500	ft/ft
Constructed Depth	1.00	ft
Constructed Top Width	3.00	ft
Discharge	4.48	ft ³ /s

Results

Normal Depth	0.70	ft
Flow Area	1.18	ft ²
Wetted Perimeter	2.97	ft
Hydraulic Radius	0.40	ft
Top Width	2.52	ft
Critical Depth	0.70	ft
Critical Slope	0.00526	ft/ft
Velocity	3.79	ft/s
Velocity Head	0.22	ft
Specific Energy	0.93	ft
Froude Number	0.97	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.70	ft
Critical Depth	0.70	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00526	ft/ft

Normal Depth in Brow Ditch at Node 220

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.01000	ft/ft
Constructed Depth	1.00	ft
Constructed Top Width	3.00	ft
Discharge	2.08	ft³/s

Results

Normal Depth	0.41	ft
Flow Area	0.53	ft²
Wetted Perimeter	2.14	ft
Hydraulic Radius	0.25	ft
Top Width	1.93	ft
Critical Depth	0.47	ft
Critical Slope	0.00580	ft/ft
Velocity	3.91	ft/s
Velocity Head	0.24	ft
Specific Energy	0.65	ft
Froude Number	1.31	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.41	ft
Critical Depth	0.47	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00580	ft/ft

Normal Depth in Brow Ditch at Node 412

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.10000	ft/ft
Constructed Depth	1.00	ft
Constructed Top Width	3.50	ft
Discharge	11.10	ft ³ /s

Results

Normal Depth	0.49	ft
Flow Area	0.80	ft ²
Wetted Perimeter	2.69	ft
Hydraulic Radius	0.30	ft
Top Width	2.45	ft
Critical Depth	1.01	ft
Critical Slope	0.00540	ft/ft
Velocity	13.93	ft/s
Velocity Head	3.02	ft
Specific Energy	3.51	ft
Froude Number	4.30	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.49	ft
Critical Depth	1.01	ft
Channel Slope	0.10000	ft/ft
Critical Slope	0.00540	ft/ft

Normal Depth in Brow Ditch at Node 345

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.01000	ft/ft
Constructed Depth	1.00	ft
Constructed Top Width	4.00	ft
Discharge	17.96	ft³/s

Results

Normal Depth	0.99	ft
Flow Area	2.62	ft²
Wetted Perimeter	4.56	ft
Hydraulic Radius	0.57	ft
Top Width	3.98	ft
Critical Depth	1.21	ft
Critical Slope	0.00452	ft/ft
Velocity	6.85	ft/s
Velocity Head	0.73	ft
Specific Energy	1.72	ft
Froude Number	1.49	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.99	ft
Critical Depth	1.21	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00452	ft/ft

Normal Depth in Brow Ditch at Node 325

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.02000	ft/ft
Constructed Depth	1.00	ft
Constructed Top Width	3.00	ft
Discharge	0.85	ft ³ /s

Results

Normal Depth	0.23	ft
Flow Area	0.22	ft ²
Wetted Perimeter	1.53	ft
Hydraulic Radius	0.14	ft
Top Width	1.44	ft
Critical Depth	0.30	ft
Critical Slope	0.00666	ft/ft
Velocity	3.85	ft/s
Velocity Head	0.23	ft
Specific Energy	0.46	ft
Froude Number	1.73	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.23	ft
Critical Depth	0.30	ft
Channel Slope	0.02000	ft/ft
Critical Slope	0.00666	ft/ft

Normal Depth in Brow Ditch at Node 320

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.06000	ft/ft
Constructed Depth	1.00	ft
Constructed Top Width	3.00	ft
Discharge	1.91	ft ³ /s

Results

Normal Depth	0.26	ft
Flow Area	0.27	ft ²
Wetted Perimeter	1.64	ft
Hydraulic Radius	0.16	ft
Top Width	1.53	ft
Critical Depth	0.45	ft
Critical Slope	0.00645	ft/ft
Velocity	7.20	ft/s
Velocity Head	0.81	ft
Specific Energy	1.07	ft
Froude Number	3.05	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.26	ft
Critical Depth	0.45	ft
Channel Slope	0.06000	ft/ft
Critical Slope	0.00645	ft/ft

APPENDIX 9

Supplemental Information

County of San Diego Hydrology Manual



Rainfall Isoplethals

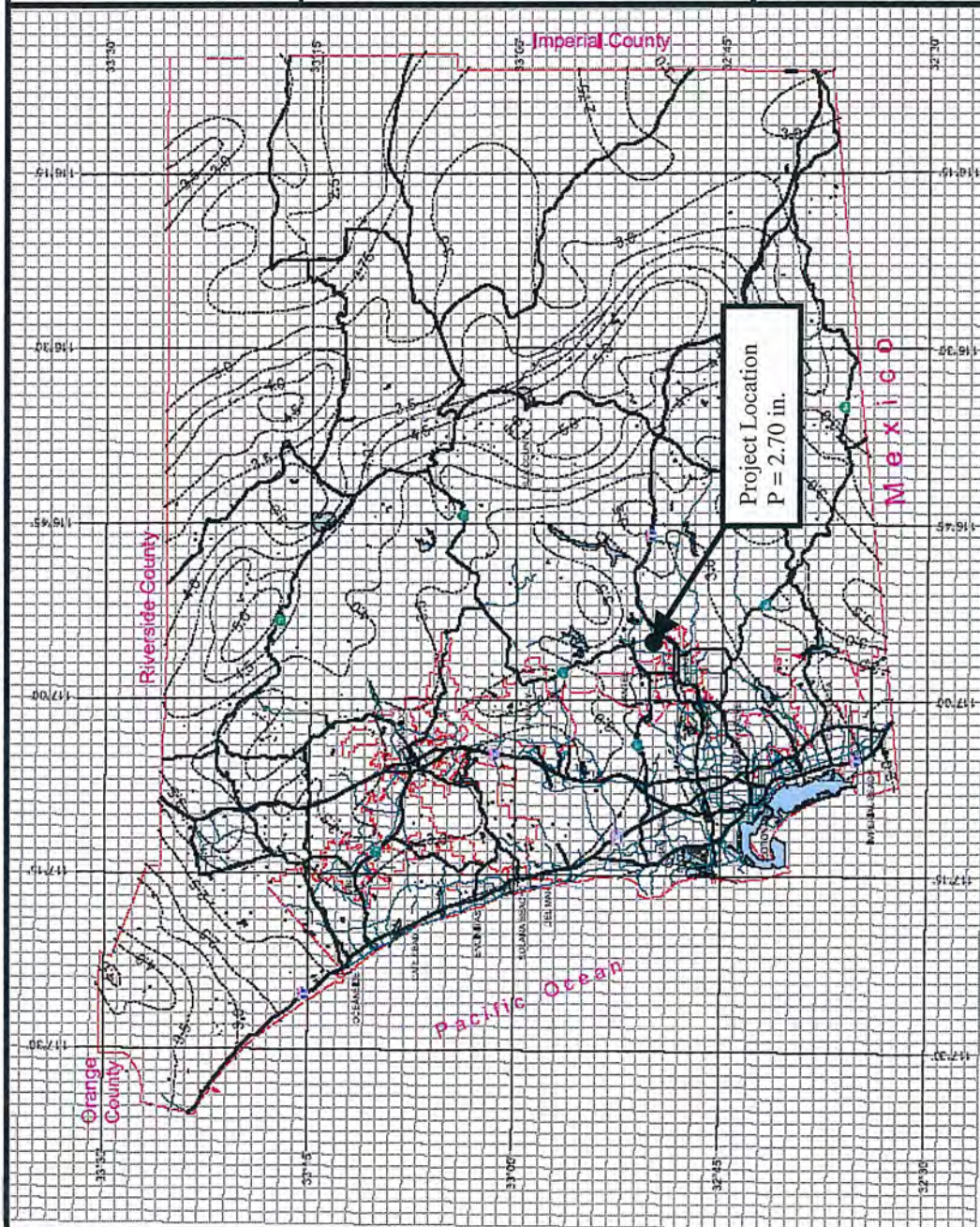
100 Year Rainfall Event - 6 Hours

Isopleth (inch)

DPW
GIS

SanGIS
San Diego County

This map was prepared by the San Diego County Department of Public Works, Division of Planning and Development, using data provided by the San Diego County Department of Public Works, Division of Planning and Development, and the San Diego County Department of Public Works, Division of Planning and Development. The map is for informational purposes only and should not be used for any other purpose. The map is not a warranty of any kind and the County of San Diego is not responsible for any errors or omissions. The map is not a warranty of any kind and the County of San Diego is not responsible for any errors or omissions.



County of San Diego Hydrology Manual



Rainfall Isopleths

100 Year Rainfall Event - 24 Hours

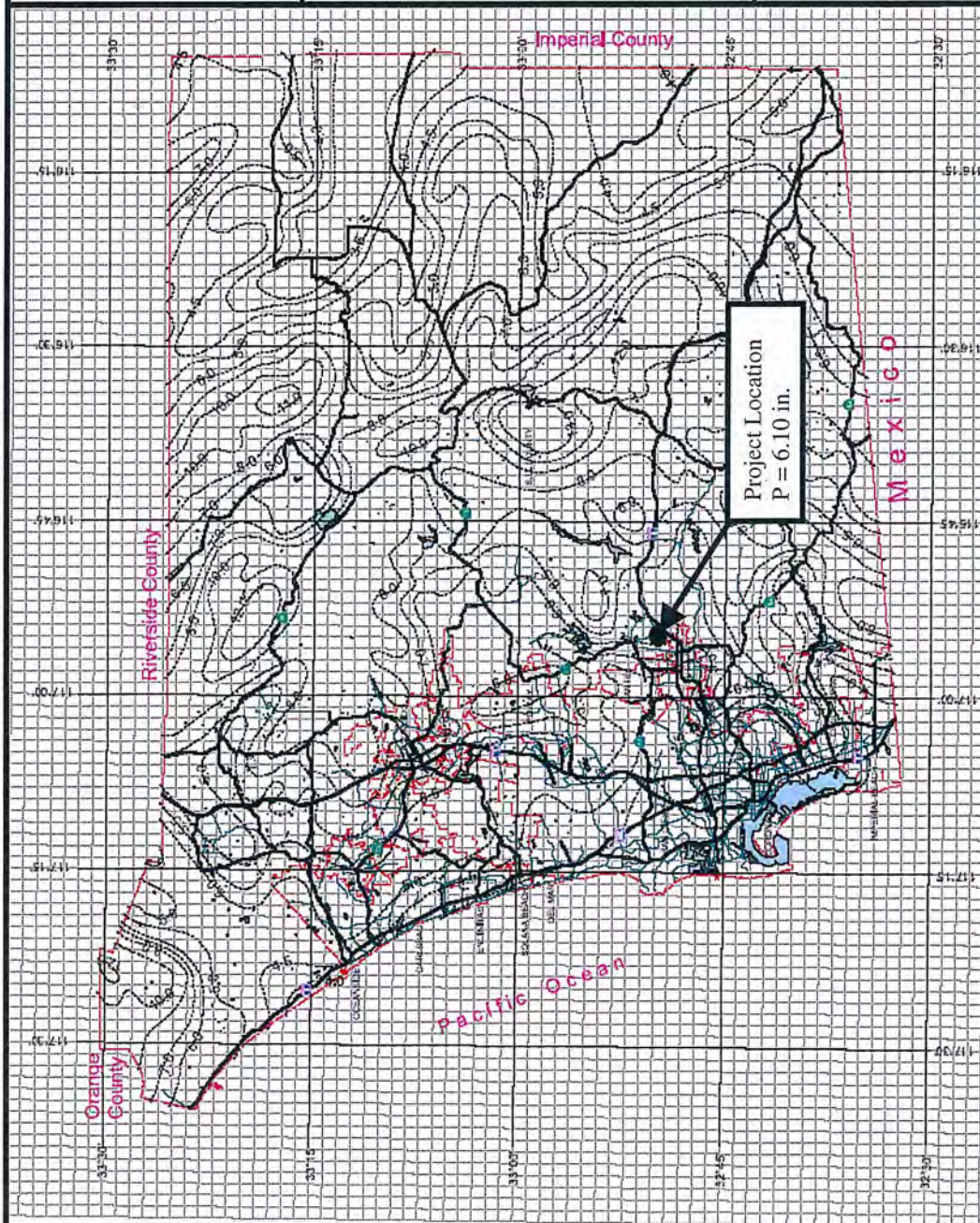
Isopleth (inches)

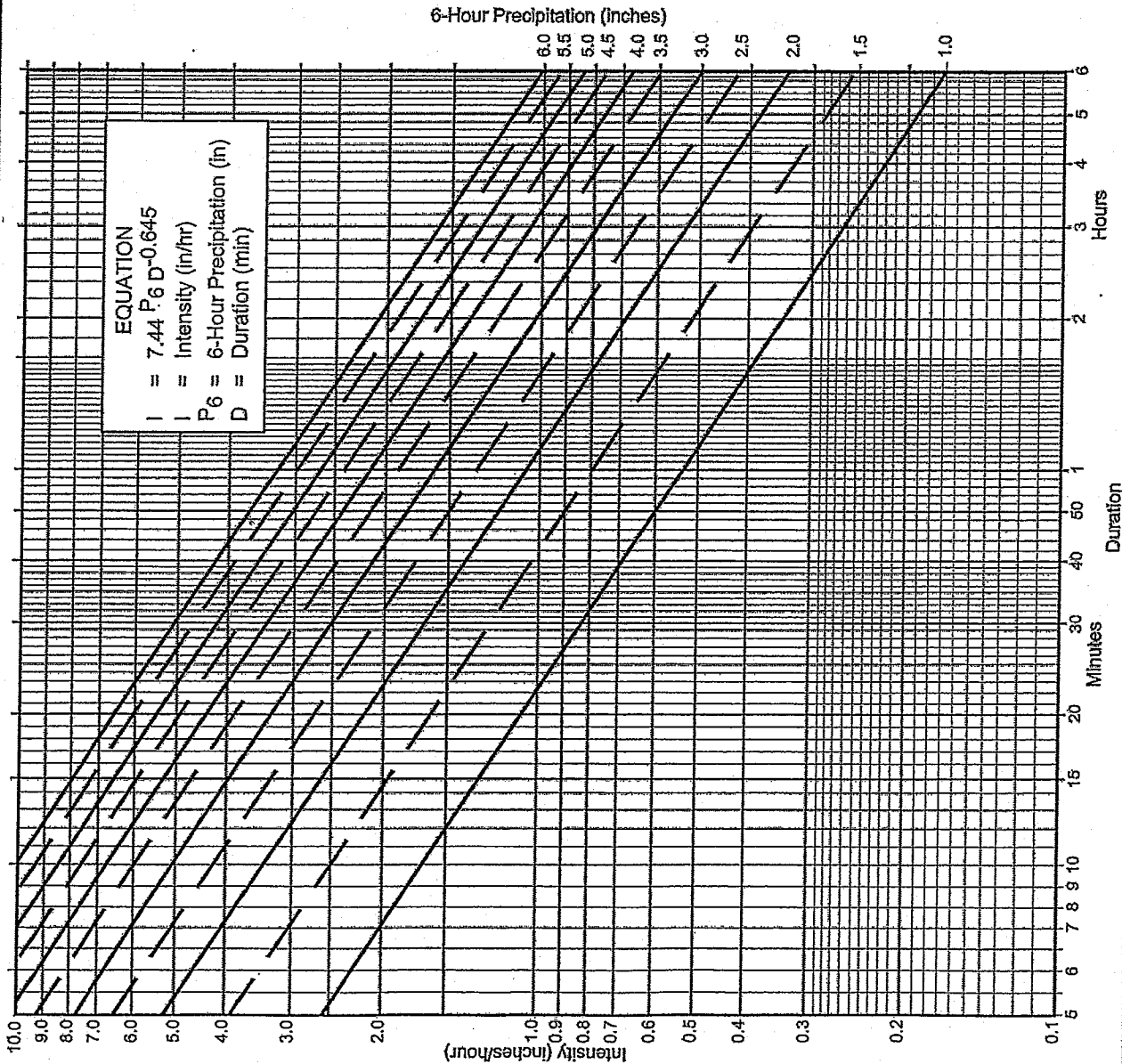
DPW
GIS

SanGIS
San Diego County

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3 0 3 Miles





Directions for Application:

- (1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).
- (2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicable to Desert).
- (3) Plot 6 hr precipitation on the right side of the chart.
- (4) Draw a line through the point parallel to the plotted lines.
- (5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 100 year

(b) $P_6 = 2.70$ in., $P_{24} = 6.05$ in. $\frac{P_6}{P_{24}} = \frac{45}{100} \%^{(2)}$

(c) Adjusted $P_6^{(2)} = 2.70$ in.

(d) $t_x =$ min.

(e) $I =$ in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P ₆	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	1	1	1	1	1	1	1	1	1	1	1
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.09	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.05	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.36	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

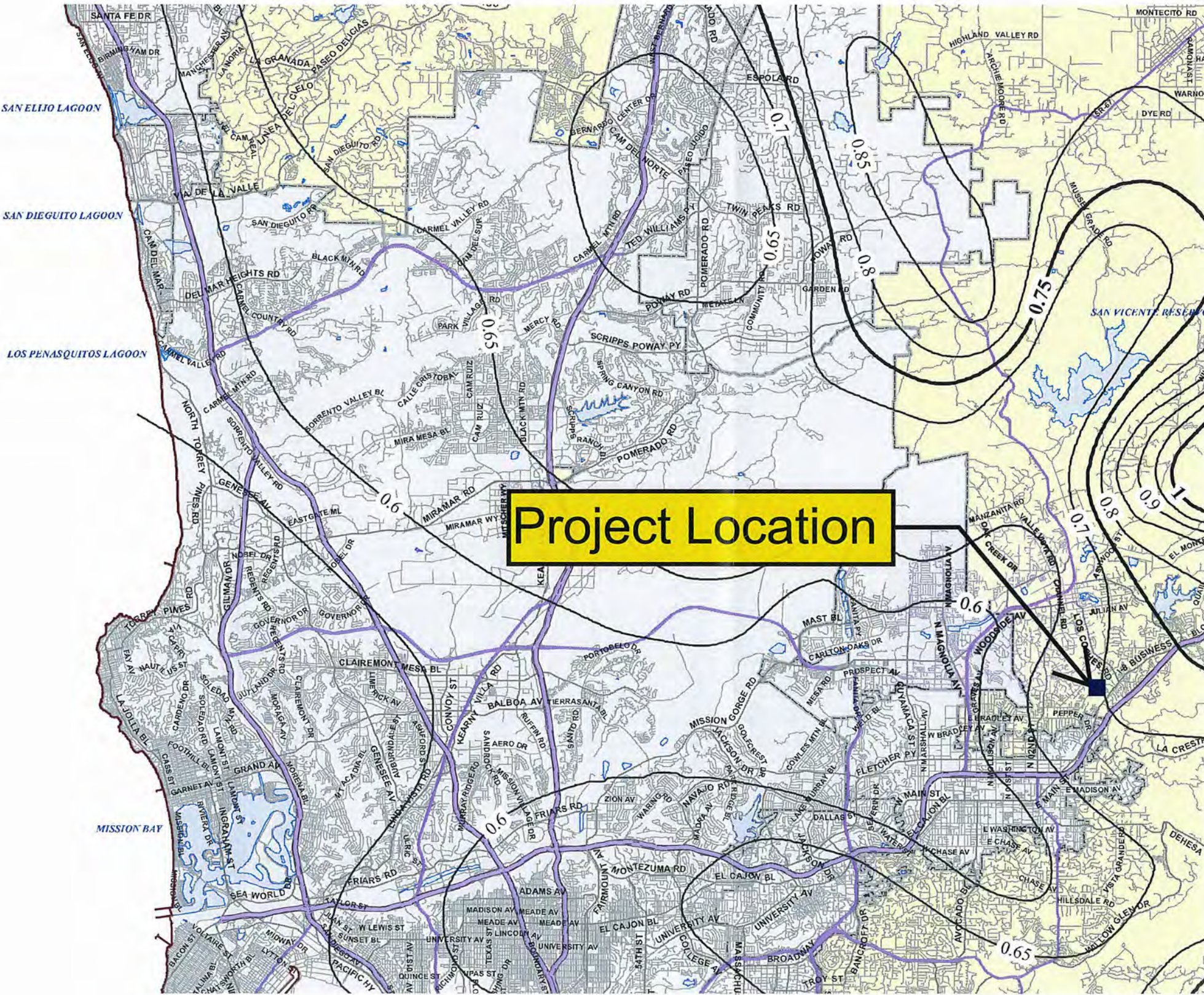
FIGURE

3-1

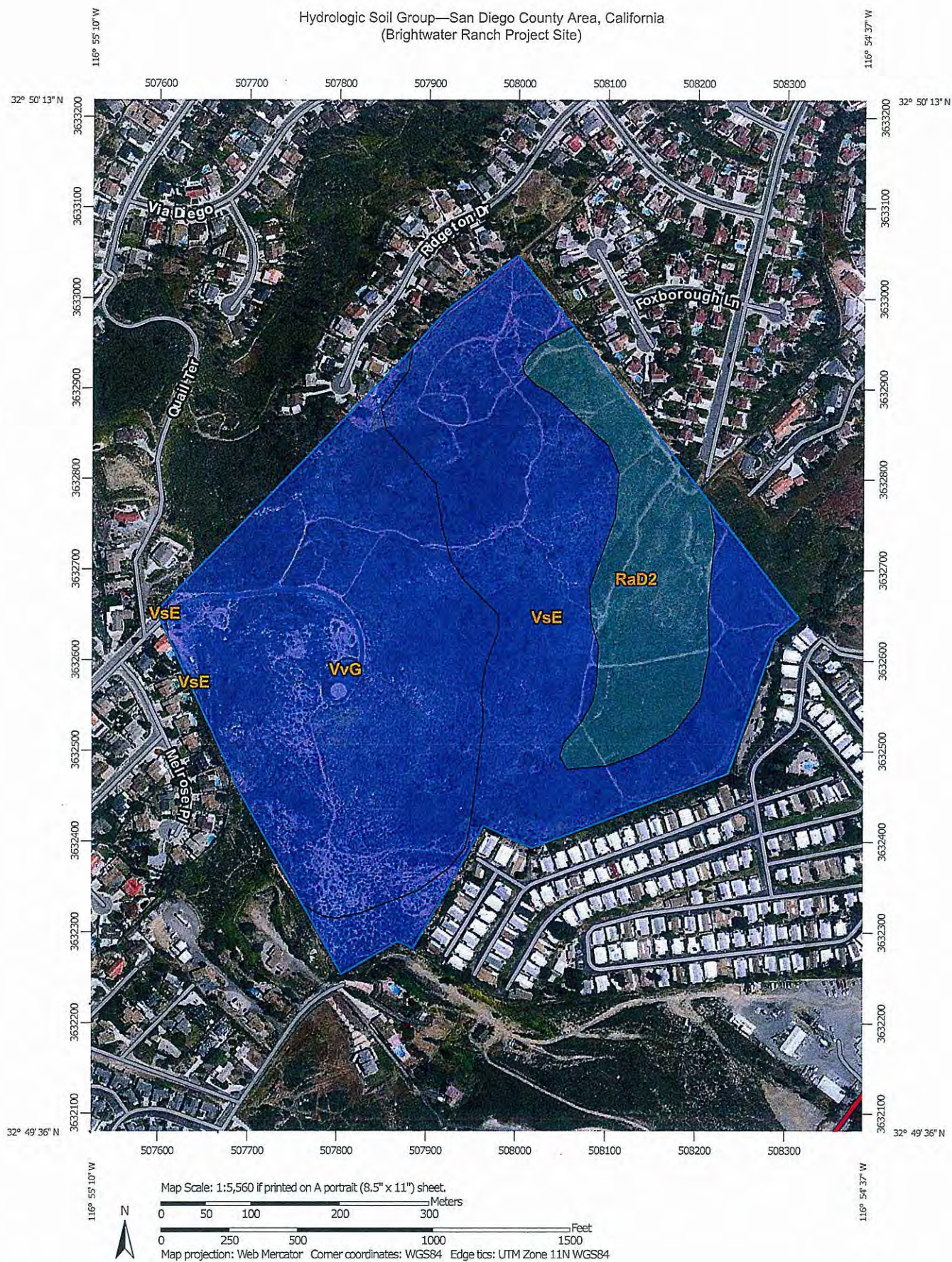
San Diego County 85th Percentile Isopluvials

- 85th Percentile Rainfall in Inches
- Freeway
- Highway
- Major Road
- Street
- Municipal Boundary
- Water Body

Note:
The 85th percentile is a 24-hour rainfall total.
It represents a value such that 85% of the
observed 24-hour rainfall totals will be less
than that value.



Hydrologic Soil Group—San Diego County Area, California
(Brightwater Ranch Project Site)



Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — San Diego County Area, California (CA638)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
RaD2	Ramona sandy loam, 9 to 15 percent slopes, eroded	C	12.1	15.8%
VsE	Vista coarse sandy loam, 15 to 30 percent slopes	B	30.7	40.1%
VvG	Vista rocky coarse sandy loam, 30 to 65 percent slopes	B	33.7	44.1%
Totals for Area of Interest			76.4	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

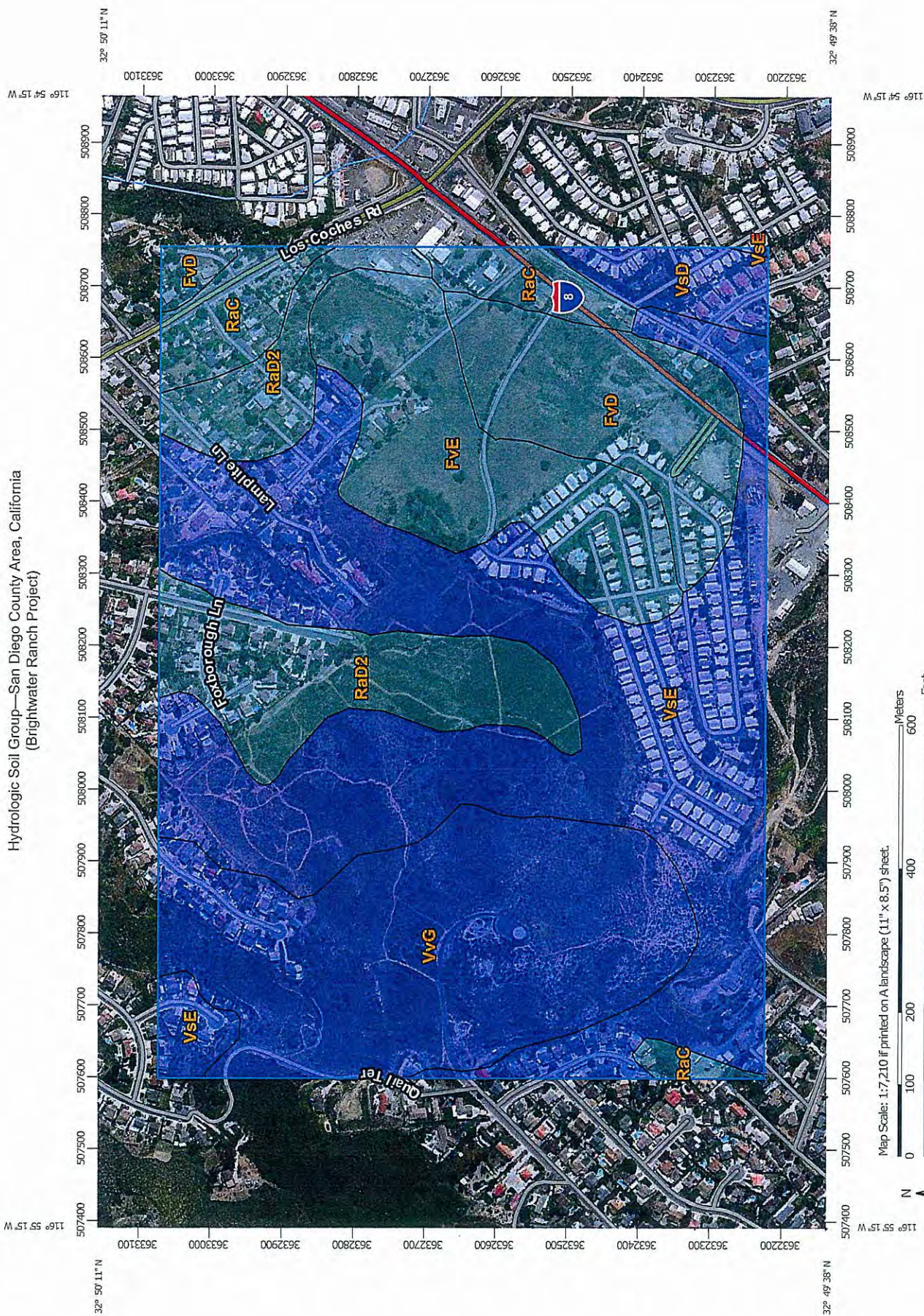
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

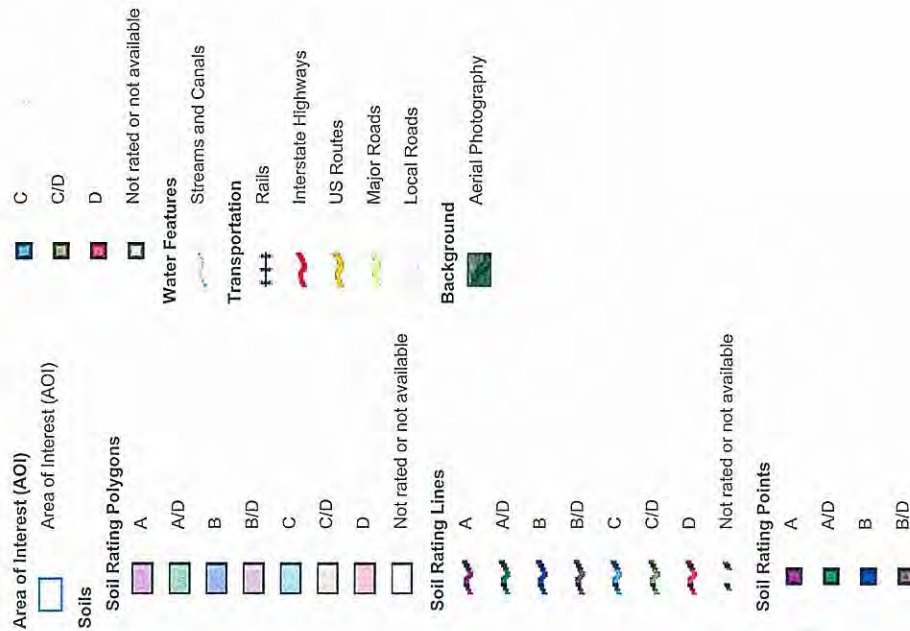
Hydrologic Soil Group—San Diego County Area, California (Brightwater Ranch Project)



Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — San Diego County Area, California (CA638)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
FvD	Fallbrook-Vista sandy loams, 9 to 15 percent slopes	C	22.4	9.2%
FvE	Fallbrook-Vista sandy loams, 15 to 30 percent slopes	C	27.6	11.3%
RaC	Ramona sandy loam, 5 to 9 percent slopes	C	12.7	5.2%
RaD2	Ramona sandy loam, 9 to 15 percent slopes, eroded	C	29.4	12.1%
VsD	Vista coarse sandy loam, 9 to 15 percent slopes	B	6.0	2.5%
VsE	Vista coarse sandy loam, 15 to 30 percent slopes	B	94.4	38.7%
VvG	Vista rocky coarse sandy loam, 30 to 65 percent slopes	B	51.3	21.0%
Totals for Area of Interest			243.8	100.0%

MAP LEGEND



MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 7, Nov 15, 2013

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

Date(s) aerial images were photographed: May 2, 2010—May 6, 2010

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

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

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Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

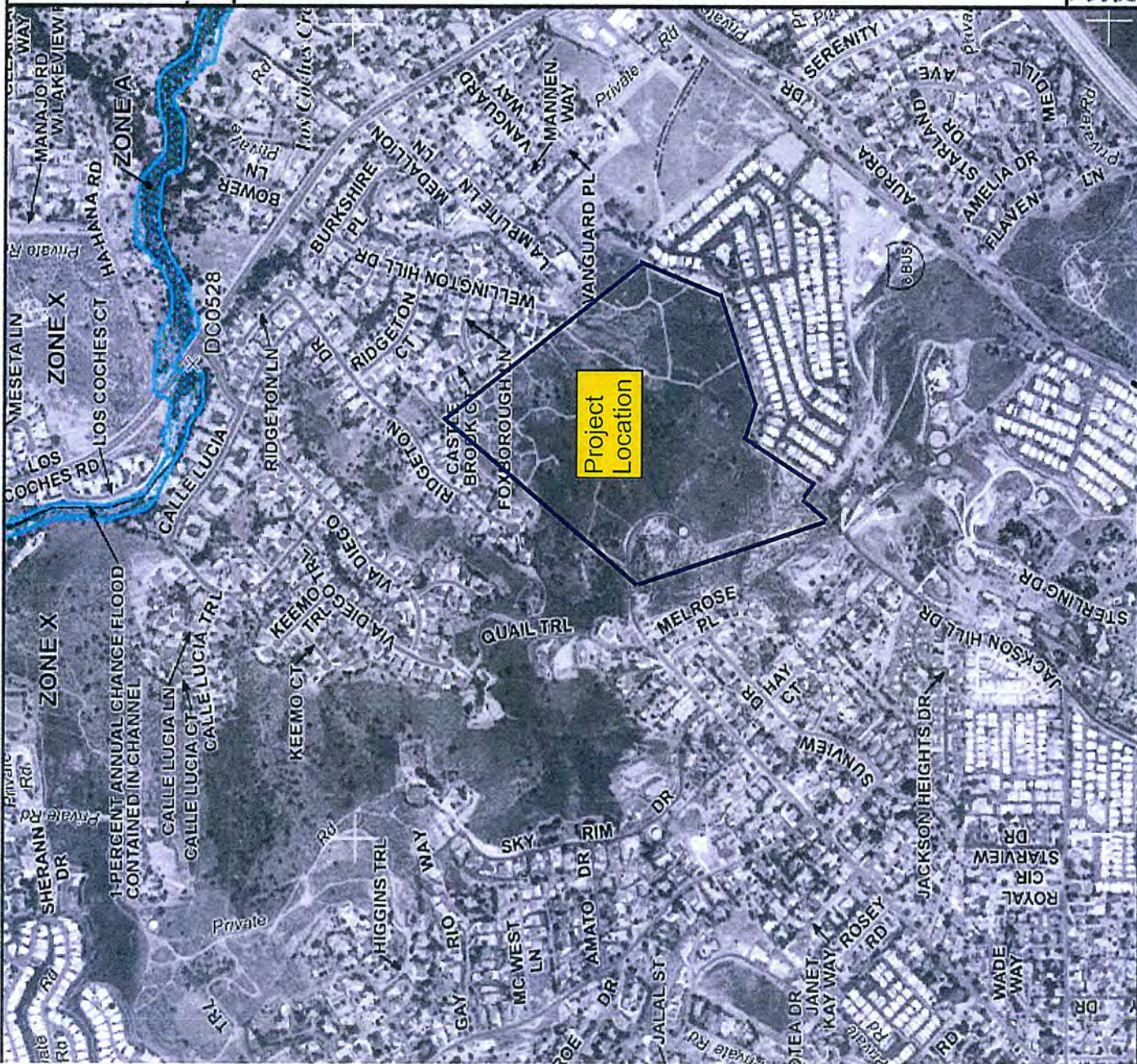
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

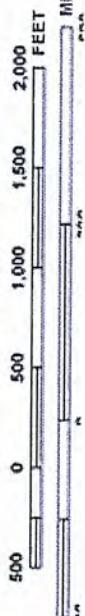
Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



MAP SCALE 1" = 1000'



NFIP

PANEL 1660G

FIRM

FLOOD INSURANCE RATE MAP
SAN DIEGO COUNTY,
CALIFORNIA
AND INCORPORATED AREAS

PANEL 1660 OF 2375

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
SAN DIEGO COUNTY	060228	1660	G
SAN DIEGO COUNTY	060228	1660	G

NOTES TO USER: This map number should not be used to determine flood insurance rates. The user should refer to the Flood Insurance Rate Map (FIRM) for the latest information about National Flood Insurance Program flood maps. Check the FEMA Flood Map Store at www.msc.fema.gov.

MAP NUMBER
06073C1660G

MAP REVISED
MAY 16, 2012



Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using FIRM On-Line. This map does not reflect changes or amendments which may have been subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov.

APPENDIX 10

CEQA Preliminary Drainage Study for Los Coches Estates by REC Consultants (For Reference Only)

**CEQA PRELIMINARY DRAINAGE STUDY,
FOR LOS COCHES ESTATES,
COUNTY OF SAN DIEGO**

March 18, 2004

TM 5306RPL2

Prepared for:
Tom and Ruth Odom
1440 Renwick Road
San Dimas, CA 91773
909-592-8344

Prepared by:
REC Consultants, Inc.
7445 Mission Valley Road, Suite 109
San Diego, CA 92108
(619) 688-0305



INTRODUCTION

The scope of this hydrology report is Los Coches Estates, a 78.2-Acre Parcel located near Highway 8 and Los Coches Blvd. Exit in the County of San Diego. The site is currently undeveloped with 2 drainage basins running through it.

Once developed, the site will consist of 72 lots with a lot size of approx. 10,000 sf to 20,000 sf. Much of the site will be dedicated to Open Space with a conservation easement due to the steep terrain of the site.

Offsite flows from onsite conditions will not be affecting existing conditions downstream at all. An inlet will be added onsite at the boundary of Wellington Hill Drive, so that there will not be any runoff offsite and downstream of the proposed subdivision. Also the rear of lots 48-59, which are adjacent to the northerly property boundary, drain into an existing brow ditch just offsite next to the boundary (See hydrology maps). The drainage area is actually decreased compared to the existing conditions, so the brow ditches are sufficient as-is.

The proposed development does not alter the existing drainage of any stream or river and the development will help eliminate erosion and silt onsite by taking water underground in storm drain pipes to connect to existing storm drain facilities downstream.

In comparing pre-development flows (Basins X and Y) and post development flows (Basins A and B), you see a slight overall increase in flow. Basin X actually decreases from 28.2 cfs to 27.4 cfs (due to a smaller drainage basin) and Basin Y increases from 60.2 cfs to 85.1 cfs. Both of these basins empty into an existing storm drain system. In reviewing the existing storm drain pipes that are shown on TM 3747-1 plans from the County of San Diego, (See Appendix – Report included herein) a larger offsite drainage basin was shown than what is currently out there. This assumption, makes the Q100 flow for these two basins combined less than the new proposed Q100 for the Los Coches development basins combined. (See chart next sheet for comparisons).

HYDROLOGY

Q100 Comparisons Chart

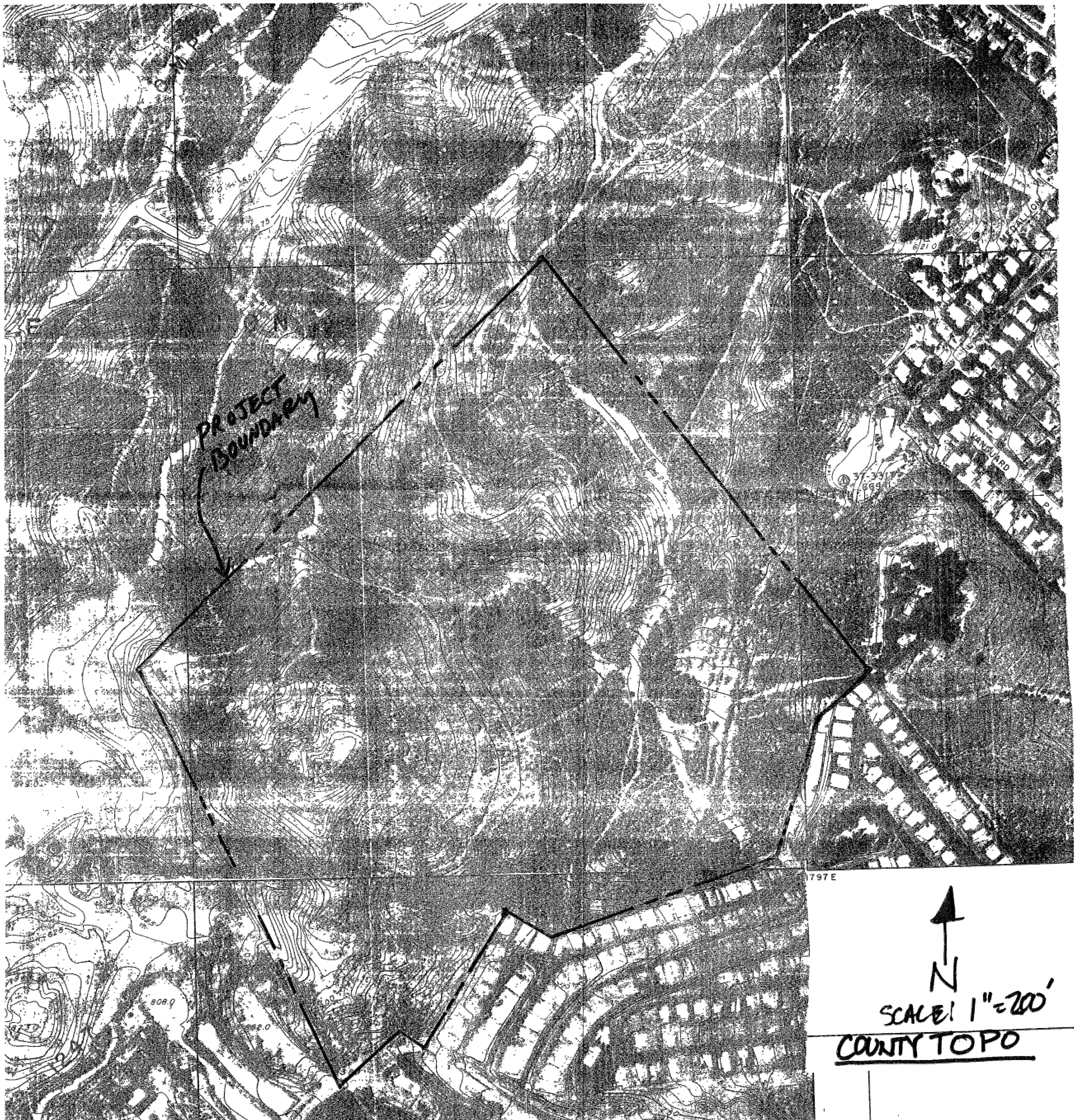
Proposed development vs. TM 3747-1 offsite flows

Basin A – proposed (See Hydro map)	Basin A1 – existing (Per TM 3747-1 Hydro report)
Q100 = 28.2 cfs	Q100 = 40.3 cfs

Basin B – proposed (See Hydro map)	Basin A2 – existing (Per TM 3747-1 Hydro report)
Q100 = 85.1 cfs	Q100 = 74.8 cfs

These two drainage basins enter separate storm drains (See TM 3747-1) and meet downstream approximately 600' at the intersection of Foxborough Lane and Wellington Hill Drive. The assumed flow at this point, per the existing drainage report, is greater than the proposed flow per calculations shown herein (115.1 cfs vs. 113.3 cfs). Therefore pipes downstream from this intersection are sufficient. See Hydraulic section in this report showing the first two reaches of 30" is sufficient to hold the 85.1 cfs, which is a slight increase from the 74.8 cfs shown in TM 3747-1 Hydrology Report.

Therefore the existing storm drain system this site is draining into, is sufficient to handle the post-development flows, with no detention or mitigation needed.



PROJECT
BOUNDARY



SCALE 1"=200'

COUNTY TOPO

RUNOFF COEFFICIENTS (RATIONAL METHOD)

DEVELOPED AREAS (URBAN)

~ 85% of site

~ 15% of site

Land Use	Coefficient, C Soil Group ⁽¹⁾			
	A	B	C	D
Residential:				
Single Family	.40	.45	.50	.55
Multi-Units	.45	.50	.60	.70
Mobile Homes	.45	.50	.55	.65
Rural (lots greater than 1/2 acre)	.30	.35	.40	.45
Commercial ⁽²⁾				
80% Impervious	.70	.75	.80	.85
Industrial ⁽²⁾				
90% Impervious	.80	.85	.90	.95

NOTES:

⁽¹⁾ Soil Group maps are available at the offices of the Department of Public Works.

⁽²⁾ Where actual conditions deviate significantly from the tabulated imperviousness values of 80% or 90%, the values given for coefficient C, may be revised by multiplying 80% or 90% by the ratio of actual imperviousness to the tabulated imperviousness. However, in no case shall the final coefficient be less than 0.50. For example: Consider commercial property on D soil group.

$$\text{Actual imperviousness} = 50\%$$

$$\text{Tabulated imperviousness} = 80\%$$

$$\text{Revised C} = \frac{50}{80} \times 0.85 = 0.53$$

** see soils Map next sheet for percentage of site in Group B and Group C.*