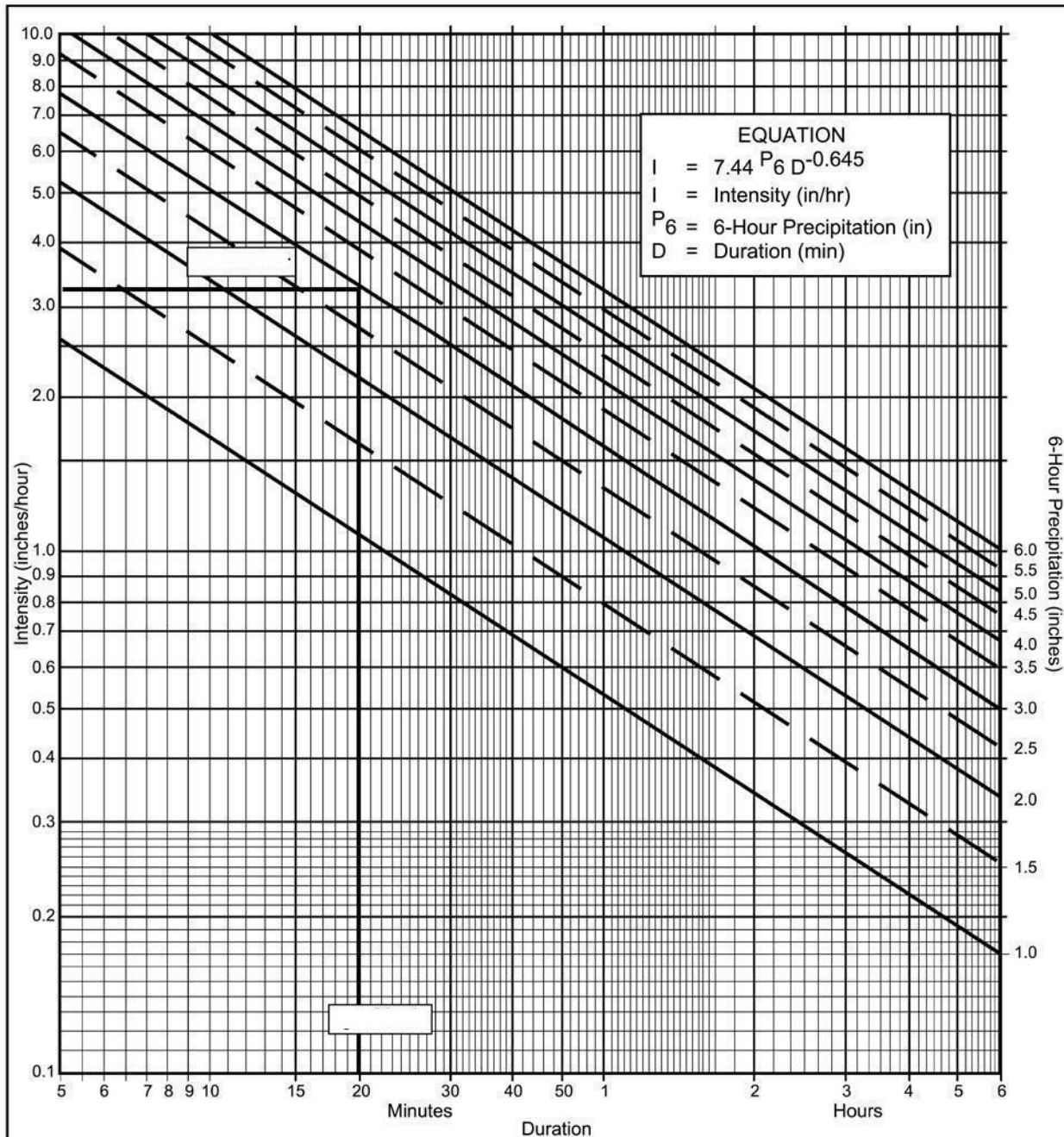




Directions for Application:

- (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) $P_6 = \underline{2.8}$ in., $P_{24} = \underline{6.2}$, $\frac{P_6}{P_{24}} = \underline{45.2} \%^{(2)}$
- (c) Adjusted $P_6^{(2)} = \underline{2.8}$ in.
- (d) $t_x = \underline{\quad}$ min.
- (e) $I = \underline{\quad}$ in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
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	1.03	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	1.06	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	0.38	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

FIGURE

3-2

APPENDIX 3

AES 100-YEAR STORM EVENT CALCULATIONS- EXISTING CONDITIONS

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
2003,1985,1981 HYDROLOGY MANUAL

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Ver. 13.9 Release Date: 04/04/2008 License ID 1402

Analysis prepared by:

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***** DESCRIPTION OF STUDY *****
* LAKE JENNINGS MARKET PLACE - EXISTING CONDITIONS *
* SOUTHEAST CORNER OLDE HIGHWAY 80 AND LAKE JENNINGS PARK ROAD *
* COUNTY OF SAN DIEGO - STUART ENGINEERING JOB # 921-05-04 *

FILE NAME: 921HYD2.DAT
TIME/DATE OF STUDY: 11:19 02/12/2015

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 100.00
6-HOUR DURATION PRECIPITATION (INCHES) = 2.800
SPECIFIED MINIMUM PIPE SIZE(INCH) = 6.00
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	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0313 0.167	0.0150
2	25.0	15.0	0.020/0.020/0.020	0.50	1.50 0.0313 0.125	0.1000

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 100.00 TO NODE 105.00 IS CODE = 21

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

=====

*USER SPECIFIED(SUBAREA):

BARREN COVER RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
UPSTREAM ELEVATION(FEET) = 760.00

DOWNSTREAM ELEVATION (FEET) = 741.00
ELEVATION DIFFERENCE (FEET) = 19.00
SUBAREA OVERLAND TIME OF FLOW (MIN.) = 6.684
WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 6.117
SUBAREA RUNOFF (CFS) = 0.18
TOTAL AREA (ACRES) = 0.10 TOTAL RUNOFF (CFS) = 0.18

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) = 741.00 DOWNSTREAM (FEET) = 681.80
CHANNEL LENGTH THRU SUBAREA (FEET) = 600.00 CHANNEL SLOPE = 0.0987
CHANNEL BASE (FEET) = 0.00 "Z" FACTOR = 7.000
MANNING'S FACTOR = 0.030 MAXIMUM DEPTH (FEET) = 1.00
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 4.906

*USER SPECIFIED (SUBAREA):

BARREN COVER RUNOFF COEFFICIENT = .3000

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

TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 1.47

TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 3.67

AVERAGE FLOW DEPTH (FEET) = 0.24 TRAVEL TIME (MIN.) = 2.73

Tc (MIN.) = 9.41

SUBAREA AREA (ACRES) = 1.73 SUBAREA RUNOFF (CFS) = 2.55

AREA-AVERAGE RUNOFF COEFFICIENT = 0.300

TOTAL AREA (ACRES) = 1.8 PEAK FLOW RATE (CFS) = 2.69

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH (FEET) = 0.30 FLOW VELOCITY (FEET/SEC.) = 4.26

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 110.00 = 700.00 FEET.

FLOW PROCESS FROM NODE 110.00 TO NODE 110.00 IS CODE = 81

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

=====

100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 4.906

*USER SPECIFIED (SUBAREA):

BARREN COVER RUNOFF COEFFICIENT = .3600

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

AREA-AVERAGE RUNOFF COEFFICIENT = 0.3270

SUBAREA AREA (ACRES) = 1.50 SUBAREA RUNOFF (CFS) = 2.65

TOTAL AREA (ACRES) = 3.3 TOTAL RUNOFF (CFS) = 5.34

TC (MIN.) = 9.41

FLOW PROCESS FROM NODE 110.00 TO NODE 120.00 IS CODE = 41

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

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

=====

ELEVATION DATA: UPSTREAM (FEET) = 681.80 DOWNSTREAM (FEET) = 681.10

FLOW LENGTH (FEET) = 50.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 24.0 INCH PIPE IS 7.4 INCHES

PIPE-FLOW VELOCITY (FEET/SEC.) = 6.52

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

PIPE-FLOW (CFS) = 5.34

PIPE TRAVEL TIME(MIN.) = 0.13 Tc(MIN.) = 9.54
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 120.00 = 750.00 FEET.

FLOW PROCESS FROM NODE 120.00 TO NODE 120.00 IS CODE = 81

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

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR)	=	4.864
*USER SPECIFIED(SUBAREA):		
STREETS & ROADS (DITCHES) RUNOFF COEFFICIENT	=	.6600
S.C.S. CURVE NUMBER (AMC II)	=	0
AREA-AVERAGE RUNOFF COEFFICIENT	=	0.3855
SUBAREA AREA(ACRES)	=	0.71
SUBAREA RUNOFF(CFS)	=	2.28
TOTAL AREA(ACRES)	=	4.0
TOTAL RUNOFF(CFS)	=	7.58
TC(MIN.)	=	9.54

FLOW PROCESS FROM NODE 120.00 TO NODE 130.00 IS CODE = 51

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

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

=====

ELEVATION DATA: UPSTREAM(FEET)	=	681.10	DOWNSTREAM(FEET)	=	669.00
CHANNEL LENGTH THRU SUBAREA(FEET)	=	490.00	CHANNEL SLOPE	=	0.0247
CHANNEL BASE(FEET)	=	10.00	"Z" FACTOR	=	10.000
MANNING'S FACTOR	=	0.015	MAXIMUM DEPTH(FEET)	=	0.50
100 YEAR RAINFALL INTENSITY(INCH/HOUR)	=	4.359			
*USER SPECIFIED(SUBAREA):					
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT	=	.4200			
S.C.S. CURVE NUMBER (AMC II)	=	0			
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS)	=	9.85			
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.)	=	4.63			
AVERAGE FLOW DEPTH(FEET)	=	0.18	TRAVEL TIME(MIN.)	=	1.76
Tc(MIN.)	=	11.30			
SUBAREA AREA(ACRES)	=	2.49	SUBAREA RUNOFF(CFS)	=	4.56
AREA-AVERAGE RUNOFF COEFFICIENT	=	0.399			
TOTAL AREA(ACRES)	=	6.5	PEAK FLOW RATE(CFS)	=	11.35

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET)	=	0.20	FLOW VELOCITY(FEET/SEC.)	=	4.86
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 130.00	=	1240.00	FEET.		

FLOW PROCESS FROM NODE 130.00 TO NODE 140.00 IS CODE = 41

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

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

=====

ELEVATION DATA: UPSTREAM(FEET)	=	669.00	DOWNSTREAM(FEET)	=	667.00
FLOW LENGTH(FEET)	=	40.00	MANNING'S N	=	0.013
ASSUME FULL-FLOWING PIPELINE					
PIPE-FLOW VELOCITY(FEET/SEC.)	=	14.45			
PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)					
GIVEN PIPE DIAMETER(INCH)	=	12.00	NUMBER OF PIPES	=	1
PIPE-FLOW(CFS)	=	11.35			
PIPE TRAVEL TIME(MIN.)	=	0.05	Tc(MIN.)	=	11.35
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 140.00	=	1280.00	FEET.		

FLOW PROCESS FROM NODE 140.00 TO NODE 150.00 IS CODE = 51

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 667.00 DOWNSTREAM(FEET) = 655.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 420.00 CHANNEL SLOPE = 0.0286
CHANNEL BASE(FEET) = 20.00 "Z" FACTOR = 20.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH(FEET) = 3.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.981
*USER SPECIFIED(SUBAREA):
MEADOW POOR COVER RUNOFF COEFFICIENT = .3600
S.C.S. CURVE NUMBER (AMC II) = 0
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 12.86
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.21
AVERAGE FLOW DEPTH(FEET) = 0.13 TRAVEL TIME(MIN.) = 1.66
Tc(MIN.) = 13.01
SUBAREA AREA(ACRES) = 2.11 SUBAREA RUNOFF(CFS) = 3.02
AREA-AVERAGE RUNOFF COEFFICIENT = 0.389
TOTAL AREA(ACRES) = 8.6 PEAK FLOW RATE(CFS) = 13.39

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.14 FLOW VELOCITY(FEET/SEC.) = 4.19
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 150.00 = 1700.00 FEET.

FLOW PROCESS FROM NODE 200.00 TO NODE 205.00 IS CODE = 21

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

=====

*USER SPECIFIED(SUBAREA):
MEADOW POOR COVER RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
UPSTREAM ELEVATION(FEET) = 691.00
DOWNSTREAM ELEVATION(FEET) = 687.00
ELEVATION DIFFERENCE(FEET) = 4.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 9.072
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.024
SUBAREA RUNOFF(CFS) = 0.14
TOTAL AREA(ACRES) = 0.09 TOTAL RUNOFF(CFS) = 0.14

FLOW PROCESS FROM NODE 205.00 TO NODE 210.00 IS CODE = 51

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 687.00 DOWNSTREAM(FEET) = 677.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 160.00 CHANNEL SLOPE = 0.0625
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 20.000
MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 0.50
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.572
*USER SPECIFIED(SUBAREA):
BARREN COVER RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) = 0
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 0.58
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 1.87
AVERAGE FLOW DEPTH(FEET) = 0.12 TRAVEL TIME(MIN.) = 1.43
Tc(MIN.) = 10.50

SUBAREA AREA(ACRES) = 0.65 SUBAREA RUNOFF(CFS) = 0.89
AREA-AVERAGE RUNOFF COEFFICIENT = 0.300
TOTAL AREA(ACRES) = 0.7 PEAK FLOW RATE(CFS) = 1.01

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.15 FLOW VELOCITY(FEET/SEC.) = 2.26
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 210.00 = 260.00 FEET.

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

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

=====

*USER SPECIFIED(SUBAREA):

MEADOW POOR COVER RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
UPSTREAM ELEVATION(FEET) = 691.00
DOWNSTREAM ELEVATION(FEET) = 688.00
ELEVATION DIFFERENCE(FEET) = 3.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 9.985
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.722
SUBAREA RUNOFF(CFS) = 0.13
TOTAL AREA(ACRES) = 0.09 TOTAL RUNOFF(CFS) = 0.13

FLOW PROCESS FROM NODE 305.00 TO NODE 310.00 IS CODE = 51

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

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 688.00 DOWNSTREAM(FEET) = 656.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 830.00 CHANNEL SLOPE = 0.0386
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 30.000
MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 0.50
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.410

*USER SPECIFIED(SUBAREA):

BARREN COVER RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) = 0
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.42
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.11
AVERAGE FLOW DEPTH(FEET) = 0.20 TRAVEL TIME(MIN.) = 6.56
Tc(MIN.) = 16.54
SUBAREA AREA(ACRES) = 4.40 SUBAREA RUNOFF(CFS) = 4.50
AREA-AVERAGE RUNOFF COEFFICIENT = 0.300
TOTAL AREA(ACRES) = 4.5 PEAK FLOW RATE(CFS) = 4.59

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.25 FLOW VELOCITY(FEET/SEC.) = 2.47
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 310.00 = 930.00 FEET.

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

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

=====

*USER SPECIFIED(SUBAREA):

NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .6000
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 80.00

UPSTREAM ELEVATION (FEET) = 670.70
DOWNSTREAM ELEVATION (FEET) = 668.50
ELEVATION DIFFERENCE (FEET) = 2.20
SUBAREA OVERLAND TIME OF FLOW (MIN.) = 5.746
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 6.744
SUBAREA RUNOFF (CFS) = 0.20
TOTAL AREA (ACRES) = 0.05 TOTAL RUNOFF (CFS) = 0.20

FLOW PROCESS FROM NODE 405.00 TO NODE 410.00 IS CODE = 61

>>>> COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA <<<<
>>>> (STANDARD CURB SECTION USED) <<<<

=====

UPSTREAM ELEVATION (FEET) = 668.00 DOWNSTREAM ELEVATION (FEET) = 660.00
STREET LENGTH (FEET) = 340.00 CURB HEIGHT (INCHES) = 6.0
STREET HALFWIDTH (FEET) = 40.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK (FEET) = 10.00
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 (curb-to-curb) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 0.95
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH (FEET) = 0.23
HALFSTREET FLOOD WIDTH (FEET) = 4.98
AVERAGE FLOW VELOCITY (FEET/SEC.) = 2.58
PRODUCT OF DEPTH&VELOCITY (FT*FT/SEC.) = 0.58
STREET FLOW TRAVEL TIME (MIN.) = 2.19 Tc (MIN.) = 7.94
100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 5.474
*USER SPECIFIED (SUBAREA):
NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .6000
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.600
SUBAREA AREA (ACRES) = 0.45 SUBAREA RUNOFF (CFS) = 1.48
TOTAL AREA (ACRES) = 0.5 PEAK FLOW RATE (CFS) = 1.64

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH (FEET) = 0.26 HALFSTREET FLOOD WIDTH (FEET) = 6.76
FLOW VELOCITY (FEET/SEC.) = 2.86 DEPTH*VELOCITY (FT*FT/SEC.) = 0.75
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 410.00 = 420.00 FEET.

FLOW PROCESS FROM NODE 410.00 TO NODE 410.00 IS CODE = 81

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

=====

100 YEAR RAINFALL INTENSITY (INCH/HOUR) = 5.474
*USER SPECIFIED (SUBAREA):
NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .6000
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6000
SUBAREA AREA (ACRES) = 0.50 SUBAREA RUNOFF (CFS) = 1.64
TOTAL AREA (ACRES) = 1.0 TOTAL RUNOFF (CFS) = 3.28
TC (MIN.) = 7.94


```

*****
FLOW PROCESS FROM NODE      500.00 TO NODE      505.00 IS CODE =   21
-----
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=====
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
S.C.S. CURVE NUMBER (AMC II) =      0
INITIAL SUBAREA FLOW-LENGTH(FEET) =    100.00
UPSTREAM ELEVATION(FEET) =      702.00
DOWNSTREAM ELEVATION(FEET) =      695.00
ELEVATION DIFFERENCE(FEET) =        7.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) =     6.117
100 YEAR RAINFALL INTENSITY(INCH/HOUR) =   6.478
SUBAREA RUNOFF(CFS) =      0.44
TOTAL AREA(ACRES) =      0.15   TOTAL RUNOFF(CFS) =      0.44

*****
FLOW PROCESS FROM NODE      505.00 TO NODE      510.00 IS CODE =   51
-----
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) =      695.00   DOWNSTREAM(FEET) =      689.50
CHANNEL LENGTH THRU SUBAREA(FEET) =      65.00   CHANNEL SLOPE =   0.0846
CHANNEL BASE(FEET) =      0.00   "Z" FACTOR =  20.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   0.50
100 YEAR RAINFALL INTENSITY(INCH/HOUR) =   6.162
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
S.C.S. CURVE NUMBER (AMC II) =      0
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.55
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.20
AVERAGE FLOW DEPTH(FEET) =   0.11   TRAVEL TIME(MIN.) =   0.49
Tc(MIN.) =   6.61
SUBAREA AREA(ACRES) =      0.08   SUBAREA RUNOFF(CFS) =      0.22
AREA-AVERAGE RUNOFF COEFFICIENT =   0.450
TOTAL AREA(ACRES) =      0.2   PEAK FLOW RATE(CFS) =      0.64

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =   0.12   FLOW VELOCITY(FEET/SEC.) =   2.24
LONGEST FLOWPATH FROM NODE      500.00 TO NODE      510.00 =   165.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) =      0.2   TC(MIN.) =      6.61
PEAK FLOW RATE(CFS) =      0.64
=====
END OF RATIONAL METHOD ANALYSIS

```

APPENDIX 4

AES 100-YEAR STORM EVENT CALCULATIONS- PROPOSED CONDITIONS

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
2003,1985,1981 HYDROLOGY MANUAL

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***** DESCRIPTION OF STUDY *****
* LAKE JENNINGS MARKETPLACE *
* PRELIMINARY PROPOSED DRAINAGE ANALYSIS *
* 921-13-05 -- ACE 2014-03-26- REVISED 2014-10-13 *

FILE NAME: 921HYDP.DAT
TIME/DATE OF STUDY: 08:52 02/11/2015

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 100.00
6-HOUR DURATION PRECIPITATION (INCHES) = 2.800
SPECIFIED MINIMUM PIPE SIZE(INCH) = 6.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
NOTE: CONSIDER ALL CONFLUENCE STREAM COMBINATIONS
FOR ALL DOWNSTREAM ANALYSES

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	HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH (FT)	LIP (FT)	HIKE (FT)	FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0313	0.167	0.0150
2	35.0	25.0	0.018/0.018/0.020	0.67	2.00	0.0313	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

- Relative Flow-Depth = 0.67 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
 - (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(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .3000

S.C.S. CURVE NUMBER (AMC II) = 93
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
 UPSTREAM ELEVATION(FEET) = 760.00
 DOWNSTREAM ELEVATION(FEET) = 741.00
 ELEVATION DIFFERENCE(FEET) = 19.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.684
 WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.117
 SUBAREA RUNOFF(CFS) = 0.18
 TOTAL AREA(ACRES) = 0.10 TOTAL RUNOFF(CFS) = 0.18

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

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

=====
 CHANNEL LENGTH THRU SUBAREA(FEET) = 600.00
 REPRESENTATIVE CHANNEL SLOPE = 0.1000
 CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 7.000
 MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.906
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .3000
 S.C.S. CURVE NUMBER (AMC II) = 93
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.47
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.67
 AVERAGE FLOW DEPTH(FEET) = 0.24 TRAVEL TIME(MIN.) = 2.73
 Tc(MIN.) = 9.41
 SUBAREA AREA(ACRES) = 1.73 SUBAREA RUNOFF(CFS) = 2.55
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.300
 TOTAL AREA(ACRES) = 1.8 PEAK FLOW RATE(CFS) = 2.69

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.29 FLOW VELOCITY(FEET/SEC.) = 4.43
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 110.00 = 700.00 FEET.

 FLOW PROCESS FROM NODE 110.00 TO NODE 110.00 IS CODE = 81

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

=====
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.906
 USER-SPECIFIED RUNOFF COEFFICIENT = .3600
 S.C.S. CURVE NUMBER (AMC II) = 76
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3270
 SUBAREA AREA(ACRES) = 1.50 SUBAREA RUNOFF(CFS) = 2.65
 TOTAL AREA(ACRES) = 3.3 TOTAL RUNOFF(CFS) = 5.34
 TC(MIN.) = 9.41

 FLOW PROCESS FROM NODE 110.00 TO NODE 120.00 IS CODE = 41

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

=====
 REPRESENTATIVE SLOPE = 0.0314
 FLOW LENGTH(FEET) = 56.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 6.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.71

GIVEN PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 5.34
PIPE TRAVEL TIME(MIN.) = 0.11 Tc(MIN.) = 9.52
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 120.00 = 756.00 FEET.

FLOW PROCESS FROM NODE 120.00 TO NODE 120.00 IS CODE = 81

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

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.870
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .8400
S.C.S. CURVE NUMBER (AMC II) = 76
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4323
SUBAREA AREA(ACRES) = 0.86 SUBAREA RUNOFF(CFS) = 3.52
TOTAL AREA(ACRES) = 4.2 TOTAL RUNOFF(CFS) = 8.82
TC(MIN.) = 9.52

FLOW PROCESS FROM NODE 120.00 TO NODE 125.00 IS CODE = 41

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

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

=====

REPRESENTATIVE SLOPE = 0.0250
FLOW LENGTH(Feet) = 445.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 9.5 INCHES
PIPE-FLOW VELOCITY(Feet/Sec.) = 9.36
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 8.82
PIPE TRAVEL TIME(MIN.) = 0.79 Tc(MIN.) = 10.31
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 125.00 = 1201.00 FEET.

FLOW PROCESS FROM NODE 125.00 TO NODE 125.00 IS CODE = 81

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

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.626
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .8700
S.C.S. CURVE NUMBER (AMC II) = 76
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4790
SUBAREA AREA(ACRES) = 0.50 SUBAREA RUNOFF(CFS) = 2.01
TOTAL AREA(ACRES) = 4.7 TOTAL RUNOFF(CFS) = 10.39
TC(MIN.) = 10.31

FLOW PROCESS FROM NODE 125.00 TO NODE 130.00 IS CODE = 41

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

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

=====

REPRESENTATIVE SLOPE = 0.0288
FLOW LENGTH(Feet) = 177.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.0 INCHES
PIPE-FLOW VELOCITY(Feet/Sec.) = 10.27
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 10.39

PIPE TRAVEL TIME(MIN.) = 0.29 Tc(MIN.) = 10.60
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 130.00 = 1378.00 FEET.

FLOW PROCESS FROM NODE 130.00 TO NODE 130.00 IS CODE = 81

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

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.544

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .8700

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

AREA-AVERAGE RUNOFF COEFFICIENT = 0.4980

SUBAREA AREA(ACRES) = 0.24 SUBAREA RUNOFF(CFS) = 0.95

TOTAL AREA(ACRES) = 4.9 TOTAL RUNOFF(CFS) = 11.16

TC(MIN.) = 10.60

FLOW PROCESS FROM NODE 130.00 TO NODE 135.00 IS CODE = 41

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

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

=====

REPRESENTATIVE SLOPE = 0.0863

FLOW LENGTH(FEET) = 102.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 18.0 INCH PIPE IS 7.6 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 15.76

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

PIPE-FLOW(CFS) = 11.16

PIPE TRAVEL TIME(MIN.) = 0.11 Tc(MIN.) = 10.71

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 135.00 = 1480.00 FEET.

FLOW PROCESS FROM NODE 135.00 TO NODE 135.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<

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

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

=====

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .8400

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 59.00

UPSTREAM ELEVATION(FEET) = 681.10

DOWNSTREAM ELEVATION(FEET) = 680.50

ELEVATION DIFFERENCE(FEET) = 0.60

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 3.575

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.377

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

SUBAREA RUNOFF(CFS) = 4.80

TOTAL AREA(ACRES) = 0.77 TOTAL RUNOFF(CFS) = 4.80

FLOW PROCESS FROM NODE 201.00 TO NODE 202.00 IS CODE = 31

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

```

>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 180.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 15.0 INCH PIPE IS 9.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.65
ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.80
PIPE TRAVEL TIME(MIN.) = 0.53 Tc(MIN.) = 4.11
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 202.00 = 239.00 FEET.

*****
FLOW PROCESS FROM NODE 203.00 TO NODE 205.00 IS CODE = 51
-----
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====
CHANNEL LENGTH THRU SUBAREA(FEET) = 54.00
REPRESENTATIVE CHANNEL SLOPE = 0.0850
CHANNEL BASE(FEET) = 30.00 "Z" FACTOR = 3.000
MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 5.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.377
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .8100
S.C.S. CURVE NUMBER (AMC II) = 76
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 7.12
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.71
AVERAGE FLOW DEPTH(FEET) = 0.09 TRAVEL TIME(MIN.) = 0.33
Tc(MIN.) = 4.44
SUBAREA AREA(ACRES) = 0.77 SUBAREA RUNOFF(CFS) = 4.63
AREA-AVERAGE RUNOFF COEFFICIENT = 0.825
TOTAL AREA(ACRES) = 1.5 PEAK FLOW RATE(CFS) = 9.43

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.10 FLOW VELOCITY(FEET/SEC.) = 3.05
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 205.00 = 293.00 FEET.

*****
FLOW PROCESS FROM NODE 205.00 TO NODE 210.00 IS CODE = 31
-----
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(FEET) = 233.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 13.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.58
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 9.43
PIPE TRAVEL TIME(MIN.) = 0.59 Tc(MIN.) = 5.03
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 210.00 = 526.00 FEET.

*****
FLOW PROCESS FROM NODE 210.00 TO NODE 210.00 IS CODE = 81
-----
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.350
USER-SPECIFIED RUNOFF COEFFICIENT = .8400

```

S.C.S. CURVE NUMBER (AMC II) = 96
AREA-AVERAGE RUNOFF COEFFICIENT = 0.8284
SUBAREA AREA(ACRES) = 0.46 SUBAREA RUNOFF(CFS) = 2.84
TOTAL AREA(ACRES) = 2.0 TOTAL RUNOFF(CFS) = 12.24
TC(MIN.) = 5.03

FLOW PROCESS FROM NODE 210.00 TO NODE 210.00 IS CODE = 81

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

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR)	=	7.350
USER-SPECIFIED RUNOFF COEFFICIENT	=	.8400
S.C.S. CURVE NUMBER (AMC II)	=	96
AREA-AVERAGE RUNOFF COEFFICIENT	=	0.8302
SUBAREA AREA(ACRES)	=	0.37
SUBAREA RUNOFF(CFS)	=	2.28
TOTAL AREA(ACRES)	=	2.4
TOTAL RUNOFF(CFS)	=	14.52
TC(MIN.)	=	5.03

FLOW PROCESS FROM NODE 210.00 TO NODE 215.00 IS CODE = 31

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

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

=====

REPRESENTATIVE SLOPE	=	0.0087
FLOW LENGTH(Feet)	=	55.00
MANNING'S N	=	0.013
DEPTH OF FLOW IN 24.0 INCH PIPE IS		14.9 INCHES
PIPE-FLOW VELOCITY(Feet/Sec.)	=	7.10
ESTIMATED PIPE DIAMETER(INCH)	=	24.00
NUMBER OF PIPES	=	1
PIPE-FLOW(CFS)	=	14.52
PIPE TRAVEL TIME(MIN.)	=	0.13
Tc(MIN.)	=	5.16
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 215.00	=	581.00 FEET.

FLOW PROCESS FROM NODE 215.00 TO NODE 215.00 IS CODE = 81

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

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR)	=	7.231
USER-SPECIFIED RUNOFF COEFFICIENT	=	.8400
S.C.S. CURVE NUMBER (AMC II)	=	96
AREA-AVERAGE RUNOFF COEFFICIENT	=	0.8310
SUBAREA AREA(ACRES)	=	0.21
SUBAREA RUNOFF(CFS)	=	1.28
TOTAL AREA(ACRES)	=	2.6
TOTAL RUNOFF(CFS)	=	15.56
TC(MIN.)	=	5.16

FLOW PROCESS FROM NODE 215.00 TO NODE 215.00 IS CODE = 81

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

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR)	=	7.231
USER-SPECIFIED RUNOFF COEFFICIENT	=	.8400
S.C.S. CURVE NUMBER (AMC II)	=	96
AREA-AVERAGE RUNOFF COEFFICIENT	=	0.8318
SUBAREA AREA(ACRES)	=	0.23
SUBAREA RUNOFF(CFS)	=	1.40
TOTAL AREA(ACRES)	=	2.8
TOTAL RUNOFF(CFS)	=	16.96
TC(MIN.)	=	5.16


```

*****
FLOW PROCESS FROM NODE      215.00 TO NODE      215.00 IS CODE =   10
-----
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<
=====

*****
FLOW PROCESS FROM NODE      250.00 TO NODE      255.00 IS CODE =   21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
=====
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .6000
S.C.S. CURVE NUMBER (AMC II) = 96
INITIAL SUBAREA FLOW-LENGTH(FEET) = 96.00
UPSTREAM ELEVATION(FEET) = 690.00
DOWNSTREAM ELEVATION(FEET) = 681.80
ELEVATION DIFFERENCE(FEET) = 8.20
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 4.314
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.377
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) = 1.46
TOTAL AREA(ACRES) = 0.33 TOTAL RUNOFF(CFS) = 1.46

*****
FLOW PROCESS FROM NODE      255.00 TO NODE      256.00 IS CODE =   31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0190
FLOW LENGTH(FEET) = 135.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 9.0 INCH PIPE IS 5.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.36
ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.46
PIPE TRAVEL TIME(MIN.) = 0.42 Tc(MIN.) = 4.73
LONGEST FLOWPATH FROM NODE 250.00 TO NODE 256.00 = 231.00 FEET.

*****
FLOW PROCESS FROM NODE      256.00 TO NODE      256.00 IS CODE =   81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.377
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
USER-SPECIFIED RUNOFF COEFFICIENT = .8400
S.C.S. CURVE NUMBER (AMC II) = 96
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6715
SUBAREA AREA(ACRES) = 0.14 SUBAREA RUNOFF(CFS) = 0.87
TOTAL AREA(ACRES) = 0.5 TOTAL RUNOFF(CFS) = 2.33
TC(MIN.) = 4.73

*****
FLOW PROCESS FROM NODE      256.00 TO NODE      260.00 IS CODE =   31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
REPRESENTATIVE SLOPE = 0.0150

```

FLOW LENGTH(FEET) = 398.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 6.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.53
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.33
PIPE TRAVEL TIME(MIN.) = 1.20 Tc(MIN.) = 5.93
LONGEST FLOWPATH FROM NODE 250.00 TO NODE 260.00 = 629.00 FEET.

FLOW PROCESS FROM NODE 260.00 TO NODE 260.00 IS CODE = 81

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

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR)	=	6.606
USER-SPECIFIED RUNOFF COEFFICIENT	=	.8400
S.C.S. CURVE NUMBER (AMC II)	=	96
AREA-AVERAGE RUNOFF COEFFICIENT	=	0.7557
SUBAREA AREA(ACRES)	=	0.47
SUBAREA RUNOFF(CFS)	=	2.61
TOTAL AREA(ACRES)	=	0.9
TOTAL RUNOFF(CFS)	=	4.69
TC(MIN.)	=	5.93

FLOW PROCESS FROM NODE 260.00 TO NODE 260.00 IS CODE = 81

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

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR)	=	6.606
USER-SPECIFIED RUNOFF COEFFICIENT	=	.8400
S.C.S. CURVE NUMBER (AMC II)	=	96
AREA-AVERAGE RUNOFF COEFFICIENT	=	0.7872
SUBAREA AREA(ACRES)	=	0.56
SUBAREA RUNOFF(CFS)	=	3.11
TOTAL AREA(ACRES)	=	1.5
TOTAL RUNOFF(CFS)	=	7.80
TC(MIN.)	=	5.93

FLOW PROCESS FROM NODE 260.00 TO NODE 260.00 IS CODE = 81

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

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR)	=	6.606
USER-SPECIFIED RUNOFF COEFFICIENT	=	.8400
S.C.S. CURVE NUMBER (AMC II)	=	96
AREA-AVERAGE RUNOFF COEFFICIENT	=	0.7972
SUBAREA AREA(ACRES)	=	0.35
SUBAREA RUNOFF(CFS)	=	1.94
TOTAL AREA(ACRES)	=	1.9
TOTAL RUNOFF(CFS)	=	9.74
TC(MIN.)	=	5.93

FLOW PROCESS FROM NODE 260.00 TO NODE 215.00 IS CODE = 31

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

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

=====

REPRESENTATIVE SLOPE	=	0.0150
FLOW LENGTH(FEET)	=	111.00
MANNING'S N	=	0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS	=	11.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.)	=	7.84
ESTIMATED PIPE DIAMETER(INCH)	=	18.00
NUMBER OF PIPES	=	1
PIPE-FLOW(CFS)	=	9.74
PIPE TRAVEL TIME(MIN.)	=	0.24
Tc(MIN.)	=	6.17

LONGEST FLOWPATH FROM NODE 250.00 TO NODE 215.00 = 740.00 FEET.

FLOW PROCESS FROM NODE 215.00 TO NODE 215.00 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	9.74	6.17	6.442	1.85

LONGEST FLOWPATH FROM NODE 250.00 TO NODE 215.00 = 740.00 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	16.96	5.16	7.231	2.82

LONGEST FLOWPATH FROM NODE 200.00 TO NODE 215.00 = 581.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	25.11	5.16	7.231
2	24.85	6.17	6.442

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 25.11 Tc(MIN.) = 5.16

TOTAL AREA(ACRES) = 4.7

FLOW PROCESS FROM NODE 215.00 TO NODE 265.00 IS CODE = 31

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

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

=====

REPRESENTATIVE SLOPE = 0.0210

FLOW LENGTH(Feet) = 213.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 24.0 INCH PIPE IS 16.0 INCHES

PIPE-FLOW VELOCITY(Feet/Sec.) = 11.26

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

PIPE-FLOW(CFS) = 25.11

PIPE TRAVEL TIME(MIN.) = 0.32 Tc(MIN.) = 5.47

LONGEST FLOWPATH FROM NODE 250.00 TO NODE 265.00 = 953.00 FEET.

FLOW PROCESS FROM NODE 265.00 TO NODE 265.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<

FLOW PROCESS FROM NODE 265.00 TO NODE 265.00 IS CODE = 12

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

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

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

=====

USER-SPECIFIED RUNOFF COEFFICIENT = .8400
S.C.S. CURVE NUMBER (AMC II) = 96
INITIAL SUBAREA FLOW-LENGTH(FEET) = 74.00
UPSTREAM ELEVATION(FEET) = 674.30
DOWNSTREAM ELEVATION(FEET) = 672.40
ELEVATION DIFFERENCE(FEET) = 1.90
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.940
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.377
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) = 2.79
TOTAL AREA(ACRES) = 0.45 TOTAL RUNOFF(CFS) = 2.79

FLOW PROCESS FROM NODE 305.00 TO NODE 310.00 IS CODE = 31

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

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

=====

REPRESENTATIVE SLOPE = 0.0105
FLOW LENGTH(FEET) = 206.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 8.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.01
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 2.79
PIPE TRAVEL TIME(MIN.) = 0.68 Tc(MIN.) = 3.62
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 310.00 = 280.00 FEET.

FLOW PROCESS FROM NODE 310.00 TO NODE 310.00 IS CODE = 81

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

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.377
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .8400
S.C.S. CURVE NUMBER (AMC II) = 96
AREA-AVERAGE RUNOFF COEFFICIENT = 0.8400
SUBAREA AREA(ACRES) = 0.42 SUBAREA RUNOFF(CFS) = 2.60
TOTAL AREA(ACRES) = 0.9 TOTAL RUNOFF(CFS) = 5.39
TC(MIN.) = 3.62

FLOW PROCESS FROM NODE 310.00 TO NODE 315.00 IS CODE = 31

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

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

=====

REPRESENTATIVE SLOPE = 0.0500
FLOW LENGTH(FEET) = 285.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 7.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 10.68
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 5.39
PIPE TRAVEL TIME(MIN.) = 0.44 Tc(MIN.) = 4.07
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 315.00 = 565.00 FEET.

FLOW PROCESS FROM NODE 315.00 TO NODE 315.00 IS CODE = 81

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

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.377
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
USER-SPECIFIED RUNOFF COEFFICIENT = .8400
S.C.S. CURVE NUMBER (AMC II) = 96
AREA-AVERAGE RUNOFF COEFFICIENT = 0.8400
SUBAREA AREA(ACRES) = 1.83 SUBAREA RUNOFF(CFS) = 11.34
TOTAL AREA(ACRES) = 2.7 TOTAL RUNOFF(CFS) = 16.73
TC(MIN.) = 4.07

FLOW PROCESS FROM NODE 315.00 TO NODE 315.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<

FLOW PROCESS FROM NODE 325.00 TO NODE 326.00 IS CODE = 21

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

=====

USER-SPECIFIED RUNOFF COEFFICIENT = .8400
S.C.S. CURVE NUMBER (AMC II) = 96
INITIAL SUBAREA FLOW-LENGTH(FEET) = 73.00
UPSTREAM ELEVATION(FEET) = 672.40
DOWNSTREAM ELEVATION(FEET) = 670.60
ELEVATION DIFFERENCE(FEET) = 1.80
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.960
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.377
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) = 0.43
TOTAL AREA(ACRES) = 0.07 TOTAL RUNOFF(CFS) = 0.43

FLOW PROCESS FROM NODE 326.00 TO NODE 330.00 IS CODE = 51

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

=====

CHANNEL LENGTH THRU SUBAREA(FEET) = 200.00
REPRESENTATIVE CHANNEL SLOPE = 0.0130
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 20.000
MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 0.50
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.205
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .8400
S.C.S. CURVE NUMBER (AMC II) = 96
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.09
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 1.50
AVERAGE FLOW DEPTH(FEET) = 0.26 TRAVEL TIME(MIN.) = 2.23
Tc(MIN.) = 5.19
SUBAREA AREA(ACRES) = 0.55 SUBAREA RUNOFF(CFS) = 3.33
AREA-AVERAGE RUNOFF COEFFICIENT = 0.840
TOTAL AREA(ACRES) = 0.6 PEAK FLOW RATE(CFS) = 3.75

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 0.33 FLOW VELOCITY(FEET/SEC.) = 1.71

LONGEST FLOWPATH FROM NODE 325.00 TO NODE 331.00 = 273.00 FEET.

FLOW PROCESS FROM NODE 330.00 TO NODE 335.00 IS CODE = 31

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

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

=====

REPRESENTATIVE SLOPE = 0.0125

FLOW LENGTH(Feet) = 35.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 12.0 INCH PIPE IS 9.5 INCHES

PIPE-FLOW VELOCITY(Feet/Sec.) = 5.63

ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 3.75

PIPE TRAVEL TIME(MIN.) = 0.10 Tc(MIN.) = 5.29

LONGEST FLOWPATH FROM NODE 325.00 TO NODE 335.00 = 308.00 FEET.

FLOW PROCESS FROM NODE 335.00 TO NODE 335.00 IS CODE = 81

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

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.113

USER-SPECIFIED RUNOFF COEFFICIENT = .8400

S.C.S. CURVE NUMBER (AMC II) = 96

AREA-AVERAGE RUNOFF COEFFICIENT = 0.8400

SUBAREA AREA(ACRES) = 0.54 SUBAREA RUNOFF(CFS) = 3.23

TOTAL AREA(ACRES) = 1.2 TOTAL RUNOFF(CFS) = 6.93

TC(MIN.) = 5.29

FLOW PROCESS FROM NODE 335.00 TO NODE 340.00 IS CODE = 31

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

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

=====

REPRESENTATIVE SLOPE = 0.0230

FLOW LENGTH(Feet) = 147.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 15.0 INCH PIPE IS 9.5 INCHES

PIPE-FLOW VELOCITY(Feet/Sec.) = 8.48

ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 6.93

PIPE TRAVEL TIME(MIN.) = 0.29 Tc(MIN.) = 5.58

LONGEST FLOWPATH FROM NODE 325.00 TO NODE 340.00 = 455.00 FEET.

FLOW PROCESS FROM NODE 340.00 TO NODE 340.00 IS CODE = 11

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

=====

** MAIN STREAM CONFLUENCE DATA **

STREAM	RUNOFF	Tc	INTENSITY	AREA
NUMBER	(CFS)	(MIN.)	(INCH/HOUR)	(ACRE)

1	6.93	5.58	6.874	1.16
---	------	------	-------	------

LONGEST FLOWPATH FROM NODE 325.00 TO NODE 340.00 = 455.00 FEET.

** MEMORY BANK # 2 CONFLUENCE DATA **

STREAM	RUNOFF	Tc	INTENSITY	AREA
NUMBER	(CFS)	(MIN.)	(INCH/HOUR)	(ACRE)

--	--	--	--	--

1 16.73 4.07 7.377 2.70
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 340.00 = 565.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	21.79	4.07	7.377
2	22.52	5.58	6.874

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 22.52 Tc(MIN.) = 5.58

TOTAL AREA(ACRES) = 3.9

FLOW PROCESS FROM NODE 340.00 TO NODE 340.00 IS CODE = 11

>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	21.79	4.07	7.377	3.86
2	22.52	5.58	6.874	3.86

LONGEST FLOWPATH FROM NODE 300.00 TO NODE 340.00 = 565.00 FEET.

** MEMORY BANK # 3 CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	25.11	5.47	6.960	4.67
2	24.85	6.48	6.238	4.67

LONGEST FLOWPATH FROM NODE 250.00 TO NODE 340.00 = 953.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	40.46	4.07	7.377
2	47.20	5.47	6.960
3	47.32	5.58	6.874
4	45.29	6.48	6.238

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 47.32 Tc(MIN.) = 5.58

TOTAL AREA(ACRES) = 8.5

FLOW PROCESS FROM NODE 270.00 TO NODE 275.00 IS CODE = 31

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

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

=====

REPRESENTATIVE SLOPE = 0.0169

FLOW LENGTH(FEET) = 320.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 30.0 INCH PIPE IS 22.5 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 12.00

ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 47.32 ✓

PIPE TRAVEL TIME(MIN.) = 0.44 Tc(MIN.) = 6.02

LONGEST FLOWPATH FROM NODE 250.00 TO NODE 275.00 = 1273.00 FEET.

FLOW PROCESS FROM NODE 275.00 TO NODE 275.00 IS CODE = 81

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

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.542

USER-SPECIFIED RUNOFF COEFFICIENT = .7800

S.C.S. CURVE NUMBER (AMC II) = 93

AREA-AVERAGE RUNOFF COEFFICIENT = 0.8254

SUBAREA AREA(ACRES) = 0.49 SUBAREA RUNOFF(CFS) = 2.50

TOTAL AREA(ACRES) = 9.0 TOTAL RUNOFF(CFS) = 48.70

TC(MIN.) = 6.02

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)
1	54.92	4.53
2	49.27	5.92
3	48.70	6.02
4	45.29	6.93

NEW PEAK FLOW DATA ARE:

PEAK FLOW RATE(CFS) = 54.92 Tc(MIN.) = 4.53

FLOW PROCESS FROM NODE 275.00 TO NODE 275.00 IS CODE = 81

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

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.377

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

*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .7800

S.C.S. CURVE NUMBER (AMC II) = 93

AREA-AVERAGE RUNOFF COEFFICIENT = 0.8217

SUBAREA AREA(ACRES) = 0.79 SUBAREA RUNOFF(CFS) = 4.55

TOTAL AREA(ACRES) = 9.8 TOTAL RUNOFF(CFS) = 59.47

TC(MIN.) = 4.53

FLOW PROCESS FROM NODE 275.00 TO NODE 135.00 IS CODE = 31

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

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

REPRESENTATIVE SLOPE = 0.0100

FLOW LENGTH(FEET) = 145.00 MANNING'S N = 0.013

DEPTH OF FLOW IN 36.0 INCH PIPE IS 27.1 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 10.43

ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 59.47

PIPE TRAVEL TIME(MIN.) = 0.23 Tc(MIN.) = 4.76

LONGEST FLOWPATH FROM NODE 250.00 TO NODE 135.00 = 1418.00 FEET.

FLOW PROCESS FROM NODE 135.00 TO NODE 135.00 IS CODE = 11

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

** MAIN STREAM CONFLUENCE DATA **

STREAM	RUNOFF	Tc	INTENSITY	AREA
--------	--------	----	-----------	------

NUMBER	(CFS)	(MIN.)	(INCH/HOUR)	(ACRE)
1	59.47	4.76	7.377	9.81
2	53.35	6.15	6.453	9.81
3	52.74	6.26	6.382	9.81
4	48.17	7.18	5.843	9.81

LONGEST FLOWPATH FROM NODE 250.00 TO NODE 135.00 = 1418.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	11.16	10.71	4.515	4.93

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 135.00 = 1480.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	64.43	4.76	7.377
2	59.76	6.15	6.453
3	59.26	6.26	6.382
4	55.65	7.18	5.843
5	48.48	10.71	4.515

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 64.43 Tc(MIN.) = 4.76

TOTAL AREA(ACRES) = 14.7

FLOW PROCESS FROM NODE 135.00 TO NODE 140.00 IS CODE = 31

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

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

=====

REPRESENTATIVE SLOPE = 0.0100
FLOW LENGTH(Feet) = 58.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 36.0 INCH PIPE IS 29.2 INCHES
PIPE-FLOW VELOCITY(Feet/Sec.) = 10.48
ESTIMATED PIPE DIAMETER(INCH) = 36.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 64.43
PIPE TRAVEL TIME(MIN.) = 0.09 Tc(MIN.) = 4.85
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 140.00 = 1538.00 FEET.

FLOW PROCESS FROM NODE 160.00 TO NODE 165.00 IS CODE = 21

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

=====

*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .6900
S.C.S. CURVE NUMBER (AMC II) = 93
INITIAL SUBAREA FLOW-LENGTH(Feet) = 86.00
UPSTREAM ELEVATION(Feet) = 697.00
DOWNSTREAM ELEVATION(Feet) = 693.50
ELEVATION DIFFERENCE(Feet) = 3.50
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 4.287
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.377
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) = 1.12
TOTAL AREA(ACRES) = 0.22 TOTAL RUNOFF(CFS) = 1.12

FLOW PROCESS FROM NODE 165.00 TO NODE 170.00 IS CODE = 61

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STANDARD CURB SECTION USED)<<<<

=====

REPRESENTATIVE SLOPE =	0.0400	
STREET LENGTH(Feet) =	110.00	CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(Feet) =	50.00	

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(Feet) =	40.00
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) =	0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section =	0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =	1.68	
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:		
STREET FLOW DEPTH(Feet) =	0.25	
HALFSTREET FLOOD WIDTH(Feet) =	5.98	
AVERAGE FLOW VELOCITY(Feet/Sec.) =	3.53	
PRODUCT OF DEPTH&VELOCITY(Ft*Ft/Sec.) =	0.87	
STREET FLOW TRAVEL TIME(Min.) =	0.52	Tc(Min.) = 4.81
100 YEAR RAINFALL INTENSITY(INCH/HOUR) =	7.377	
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.		
*USER SPECIFIED(SUBAREA):		
USER-SPECIFIED RUNOFF COEFFICIENT =	.6900	
S.C.S. CURVE NUMBER (AMC II) =	93	
AREA-AVERAGE RUNOFF COEFFICIENT =	0.690	
SUBAREA AREA(ACRES) =	0.22	SUBAREA RUNOFF(CFS) = 1.12
TOTAL AREA(ACRES) =	0.4	PEAK FLOW RATE(CFS) = 2.24

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(Feet) =	0.26	HALFSTREET FLOOD WIDTH(Feet) =	6.91
FLOW VELOCITY(Feet/Sec.) =	3.76	DEPTH*VELOCITY(Ft*Ft/Sec.) =	0.99
LONGEST FLOWPATH FROM NODE	160.00	TO NODE	170.00 = 196.00 FEET.

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES)	=	0.4	TC(Min.) =	4.81
PEAK FLOW RATE(CFS)	=	2.24		

=====

=====

END OF RATIONAL METHOD ANALYSIS

APPENDIX 5

AES 2-YEAR STORM EVENT CALCULATIONS- EXISTING CONDITIONS

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
2003,1985,1981 HYDROLOGY MANUAL

(c) Copyright 1982-2007 Advanced Engineering Software (aes)
Ver. 13.9 Release Date: 04/04/2008 License ID 1402

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

* LAKE JENNINGS MARKET PLACE - EXISTING CONDITIONS *

* SOUTHEAST CORNER OLDE HIGHWAY 80 AND LAKE JENNINGS PARK ROAD *

* COUNTY OF SAN DIEGO - STUART ENGINEERING JOB # 921-05-04 *

FILE NAME: 921HYD2.DAT
TIME/DATE OF STUDY: 11:59 02/12/2015

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 2.00
6-HOUR DURATION PRECIPITATION (INCHES) = 1.300
SPECIFIED MINIMUM PIPE SIZE(INCH) = 6.00
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	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0313 0.167	0.0150
2	25.0	15.0	0.020/0.020/0.020	0.50	1.50 0.0313 0.125	0.1000

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 100.00 TO NODE 105.00 IS CODE = 21

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

=====

*USER SPECIFIED(SUBAREA):

BARREN COVER RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
UPSTREAM ELEVATION(FEET) = 760.00

DOWNSTREAM ELEVATION(FEET) = 741.00
 ELEVATION DIFFERENCE(FEET) = 19.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.684
 WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
 2 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.840
 SUBAREA RUNOFF(CFS) = 0.09
 TOTAL AREA(ACRES) = 0.10 TOTAL RUNOFF(CFS) = 0.09

FLOW PROCESS FROM NODE 105.00 TO NODE 105.00 IS CODE = 81

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

=====
 2 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.840
 *USER SPECIFIED(SUBAREA):
 MEADOW POOR COVER RUNOFF COEFFICIENT = .3000
 S.C.S. CURVE NUMBER (AMC II) = 0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3000
 SUBAREA AREA(ACRES) = 1.73 SUBAREA RUNOFF(CFS) = 1.47
 TOTAL AREA(ACRES) = 1.8 TOTAL RUNOFF(CFS) = 1.56
 TC(MIN.) = 6.68

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) = 741.00 DOWNSTREAM(FEET) = 681.80
 CHANNEL LENGTH THRU SUBAREA(FEET) = 0.01 CHANNEL SLOPE = *****
 CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 7.000
 MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 1.00
 CHANNEL FLOW THRU SUBAREA(CFS) = 1.56
 FLOW VELOCITY(FEET/SEC.) = 199.94 FLOW DEPTH(FEET) = 0.03
 TRAVEL TIME(MIN.) = 0.00 Tc(MIN.) = 6.68
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 110.00 = 100.01 FEET.

FLOW PROCESS FROM NODE 110.00 TO NODE 110.00 IS CODE = 81

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

=====
 2 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.840
 *USER SPECIFIED(SUBAREA):
 BARREN COVER RUNOFF COEFFICIENT = .3600
 S.C.S. CURVE NUMBER (AMC II) = 0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3270
 SUBAREA AREA(ACRES) = 1.50 SUBAREA RUNOFF(CFS) = 1.53
 TOTAL AREA(ACRES) = 3.3 TOTAL RUNOFF(CFS) = 3.09
 TC(MIN.) = 6.68

FLOW PROCESS FROM NODE 110.00 TO NODE 120.00 IS CODE = 41

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

=====
 ELEVATION DATA: UPSTREAM(FEET) = 681.80 DOWNSTREAM(FEET) = 681.10
 FLOW LENGTH(FEET) = 50.00 MANNING'S N = 0.013
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 5.6 INCHES

PIPE-FLOW VELOCITY (FEET/SEC.) = 5.58
GIVEN PIPE DIAMETER (INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 3.09
PIPE TRAVEL TIME (MIN.) = 0.15 Tc (MIN.) = 6.83
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 120.00 = 150.01 FEET.

FLOW PROCESS FROM NODE 120.00 TO NODE 120.00 IS CODE = 81

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

=====

2 YEAR RAINFALL INTENSITY (INCH/HOUR) = 2.800
*USER SPECIFIED (SUBAREA):
STREETS & ROADS (DITCHES) RUNOFF COEFFICIENT = .6600
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3855
SUBAREA AREA (ACRES) = 0.71 SUBAREA RUNOFF (CFS) = 1.31
TOTAL AREA (ACRES) = 4.0 TOTAL RUNOFF (CFS) = 4.36
Tc (MIN.) = 6.83

FLOW PROCESS FROM NODE 120.00 TO NODE 130.00 IS CODE = 51

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

=====

ELEVATION DATA: UPSTREAM (FEET) = 681.10 DOWNSTREAM (FEET) = 669.00
CHANNEL LENGTH THRU SUBAREA (FEET) = 490.00 CHANNEL SLOPE = 0.0247
CHANNEL BASE (FEET) = 10.00 "Z" FACTOR = 10.000
MANNING'S FACTOR = 0.015 MAXIMUM DEPTH (FEET) = 0.50
2 YEAR RAINFALL INTENSITY (INCH/HOUR) = 2.340
*USER SPECIFIED (SUBAREA):
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4200
S.C.S. CURVE NUMBER (AMC II) = 0
TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 5.59
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 3.72
AVERAGE FLOW DEPTH (FEET) = 0.13 TRAVEL TIME (MIN.) = 2.19
Tc (MIN.) = 9.03
SUBAREA AREA (ACRES) = 2.49 SUBAREA RUNOFF (CFS) = 2.45 ✓
AREA-AVERAGE RUNOFF COEFFICIENT = 0.399
TOTAL AREA (ACRES) = 6.5 PEAK FLOW RATE (CFS) = 6.09

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH (FEET) = 0.14 FLOW VELOCITY (FEET/SEC.) = 3.81
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 130.00 = 640.01 FEET.

FLOW PROCESS FROM NODE 130.00 TO NODE 140.00 IS CODE = 41

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

=====

ELEVATION DATA: UPSTREAM (FEET) = 669.00 DOWNSTREAM (FEET) = 667.00
FLOW LENGTH (FEET) = 40.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 8.0 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 10.95
GIVEN PIPE DIAMETER (INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 6.09
PIPE TRAVEL TIME (MIN.) = 0.06 Tc (MIN.) = 9.09
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 140.00 = 680.01 FEET.

```

*****
FLOW PROCESS FROM NODE      140.00 TO NODE      150.00 IS CODE =  51
-----
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) =    667.00  DOWNSTREAM(FEET) =    655.00
CHANNEL LENGTH THRU SUBAREA(FEET) =    420.00  CHANNEL SLOPE =    0.0286
CHANNEL BASE(FEET) =    20.00  "Z" FACTOR =    20.000
MANNING'S FACTOR = 0.015  MAXIMUM DEPTH(FEET) =    3.00
  2 YEAR RAINFALL INTENSITY(INCH/HOUR) =    2.037
*USER SPECIFIED(SUBAREA):
MEADOW POOR COVER RUNOFF COEFFICIENT = .3600
S.C.S. CURVE NUMBER (AMC II) =    0
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    6.87
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =    3.32
AVERAGE FLOW DEPTH(FEET) =    0.09  TRAVEL TIME(MIN.) =    2.11
Tc(MIN.) =    11.20
SUBAREA AREA(ACRES) =    2.11  SUBAREA RUNOFF(CFS) =    1.55 ✓
AREA-AVERAGE RUNOFF COEFFICIENT =    0.389
TOTAL AREA(ACRES) =    8.6  PEAK FLOW RATE(CFS) =    6.85

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =    0.09  FLOW VELOCITY(FEET/SEC.) =    3.31
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    150.00 =    1100.01 FEET.

*****
FLOW PROCESS FROM NODE      200.00 TO NODE      205.00 IS CODE =  21
-----
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=====
*USER SPECIFIED(SUBAREA):
MEADOW POOR COVER RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =    0
INITIAL SUBAREA FLOW-LENGTH(FEET) =    100.00
UPSTREAM ELEVATION(FEET) =    691.00
DOWNSTREAM ELEVATION(FEET) =    687.00
ELEVATION DIFFERENCE(FEET) =    4.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) =    9.072
  2 YEAR RAINFALL INTENSITY(INCH/HOUR) =    2.332
SUBAREA RUNOFF(CFS) =    0.06
TOTAL AREA(ACRES) =    0.09  TOTAL RUNOFF(CFS) =    0.06

*****
FLOW PROCESS FROM NODE      205.00 TO NODE      205.00 IS CODE =  81
-----
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
  2 YEAR RAINFALL INTENSITY(INCH/HOUR) =    2.332
*USER SPECIFIED(SUBAREA):
MEADOW POOR COVER RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =    0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3000
SUBAREA AREA(ACRES) =    0.65  SUBAREA RUNOFF(CFS) =    0.45
TOTAL AREA(ACRES) =    0.7  TOTAL RUNOFF(CFS) =    0.52 ✓
TC(MIN.) =    9.07

*****
FLOW PROCESS FROM NODE      205.00 TO NODE      210.00 IS CODE =  51

```

```

-----
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 687.00 DOWNSTREAM(FEET) = 677.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 0.01 CHANNEL SLOPE = *****
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 20.000
MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 0.50
CHANNEL FLOW THRU SUBAREA(CFS) = 0.52
FLOW VELOCITY(FEET/SEC.) = 64.55 FLOW DEPTH(FEET) = 0.02
TRAVEL TIME(MIN.) = 0.00 Tc(MIN.) = 9.07
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 210.00 = 100.01 FEET.

*****
FLOW PROCESS FROM NODE 300.00 TO NODE 305.00 IS CODE = 21
-----
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=====
*USER SPECIFIED(SUBAREA):
MEADOW POOR COVER RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
UPSTREAM ELEVATION(FEET) = 691.00
DOWNSTREAM ELEVATION(FEET) = 688.00
ELEVATION DIFFERENCE(FEET) = 3.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 9.985
2 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.193
SUBAREA RUNOFF(CFS) = 0.06
TOTAL AREA(ACRES) = 0.09 TOTAL RUNOFF(CFS) = 0.06

*****
FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 81
-----
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
2 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.193
*USER SPECIFIED(SUBAREA):
MEADOW POOR COVER RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3000
SUBAREA AREA(ACRES) = 4.40 SUBAREA RUNOFF(CFS) = 2.89
TOTAL AREA(ACRES) = 4.5 TOTAL RUNOFF(CFS) = 2.95
TC(MIN.) = 9.98

*****
FLOW PROCESS FROM NODE 305.00 TO NODE 310.00 IS CODE = 51
-----
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 688.00 DOWNSTREAM(FEET) = 656.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 0.01 CHANNEL SLOPE = *****
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 30.000
MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 0.50
CHANNEL FLOW THRU SUBAREA(CFS) = 2.95✓
FLOW VELOCITY(FEET/SEC.) = 148.48 FLOW DEPTH(FEET) = 0.03
TRAVEL TIME(MIN.) = 0.00 Tc(MIN.) = 9.98
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 310.00 = 100.01 FEET.

*****

```


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

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

*USER SPECIFIED(SUBAREA):

NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .6000

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 80.00

UPSTREAM ELEVATION(FEET) = 670.70

DOWNSTREAM ELEVATION(FEET) = 668.50

ELEVATION DIFFERENCE(FEET) = 2.20

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.746

2 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.131

SUBAREA RUNOFF(CFS) = 0.09

TOTAL AREA(ACRES) = 0.05 TOTAL RUNOFF(CFS) = 0.09

FLOW PROCESS FROM NODE 405.00 TO NODE 405.00 IS CODE = 81

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

2 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.131

*USER SPECIFIED(SUBAREA):

NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .6000

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

AREA-AVERAGE RUNOFF COEFFICIENT = 0.6000

SUBAREA AREA(ACRES) = 0.45 SUBAREA RUNOFF(CFS) = 0.85

TOTAL AREA(ACRES) = 0.5 TOTAL RUNOFF(CFS) = 0.94

TC(MIN.) = 5.75

FLOW PROCESS FROM NODE 405.00 TO NODE 405.00 IS CODE = 81

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

2 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.131

*USER SPECIFIED(SUBAREA):

NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .6000

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

AREA-AVERAGE RUNOFF COEFFICIENT = 0.6000

SUBAREA AREA(ACRES) = 0.50 SUBAREA RUNOFF(CFS) = 0.94

TOTAL AREA(ACRES) = 1.0 TOTAL RUNOFF(CFS) = 1.88

TC(MIN.) = 5.75

FLOW PROCESS FROM NODE 405.00 TO NODE 410.00 IS CODE = 61

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

>>>>(STANDARD CURB SECTION USED)<<<<

UPSTREAM ELEVATION(FEET) = 668.00 DOWNSTREAM ELEVATION(FEET) = 660.00

STREET LENGTH(FEET) = 0.01 CURB HEIGHT(INCHES) = 6.0

STREET HALFWIDTH(FEET) = 40.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 10.00

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(curb-to-curb) = 0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.89
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.16
HALFSTREET FLOOD WIDTH(FEET) = 1.50
AVERAGE FLOW VELOCITY(FEET/SEC.) = 533.45
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 83.35
STREET FLOW TRAVEL TIME(MIN.) = 0.00 Tc(MIN.) = 5.75
2 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.131
*USER SPECIFIED(SUBAREA):
NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .6000
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.600
SUBAREA AREA(ACRES) = 0.01 SUBAREA RUNOFF(CFS) = 0.02
TOTAL AREA(ACRES) = 1.0 PEAK FLOW RATE(CFS) = 1.90

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.16 HALFSTREET FLOOD WIDTH(FEET) = 1.50
FLOW VELOCITY(FEET/SEC.) = ***** DEPTH*VELOCITY(FT*FT/SEC.) = 83.35
LONGEST FLOWPATH FROM NODE 400.00 TO NODE 410.00 = 80.01 FEET.

FLOW PROCESS FROM NODE 500.00 TO NODE 505.00 IS CODE = 21

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

=====

*USER SPECIFIED(SUBAREA):
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 100.00
UPSTREAM ELEVATION(FEET) = 702.00
DOWNSTREAM ELEVATION(FEET) = 695.00
ELEVATION DIFFERENCE(FEET) = 7.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.117
2 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.008
SUBAREA RUNOFF(CFS) = 0.20
TOTAL AREA(ACRES) = 0.15 TOTAL RUNOFF(CFS) = 0.20

FLOW PROCESS FROM NODE 505.00 TO NODE 510.00 IS CODE = 51

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

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 695.00 DOWNSTREAM(FEET) = 689.50
CHANNEL LENGTH THRU SUBAREA(FEET) = 65.00 CHANNEL SLOPE = 0.0846
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 20.000
MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 0.50
2 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.820
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
S.C.S. CURVE NUMBER (AMC II) = 0
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 0.25
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 1.68
AVERAGE FLOW DEPTH(FEET) = 0.09 TRAVEL TIME(MIN.) = 0.64
Tc(MIN.) = 6.76
SUBAREA AREA(ACRES) = 0.08 SUBAREA RUNOFF(CFS) = 0.10
AREA-AVERAGE RUNOFF COEFFICIENT = 0.450

TOTAL AREA (ACRES) = 0.2 PEAK FLOW RATE (CFS) = 0.29

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH (FEET) = 0.09 FLOW VELOCITY (FEET/SEC.) = 1.86

LONGEST FLOWPATH FROM NODE 500.00 TO NODE 510.00 = 165.00 FEET.

=====

END OF STUDY SUMMARY:

TOTAL AREA (ACRES) = 0.2 TC (MIN.) = 6.76

PEAK FLOW RATE (CFS) = 0.29

=====

END OF RATIONAL METHOD ANALYSIS

APPENDIX 6

PIPE CALCULATIONS

Exist 48-inch pipe under Ridge Hill Rd.txt

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Analysis prepared by:

Stuart Engineering
7525 Metropolitan Drive, Suite 308
San Diego, California 92108
(619) 296-1010 se@stuartengineering.com

TIME/DATE OF STUDY: 14:08 10/28/2014
=====

Problem Descriptions:

Lake Jennings MarketPlace
Existing 48-in CMP south of County Maintained Channel
under Ridge Hill Road

>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<

PIPE DIAMETER(FEET) = 4.000
FLOWDEPTH(FEET) = 3.960
PIPE SLOPE(FEET/FEET) = 0.0220
MANNINGS FRICTION FACTOR = 0.022000
>>>>> NORMAL DEPTH FLOW(CFS) = 131.18
=====

NORMAL-DEPTH FLOW INFORMATION:

NORMAL DEPTH(FEET) = 3.96
FLOW AREA(SQUARE FEET) = 12.55
FLOW TOP-WIDTH(FEET) = 0.796
FLOW PRESSURE + MOMENTUM(POUNDS) = 4196.72
FLOW VELOCITY(FEET/SEC.) = 10.457
FLOW VELOCITY HEAD(FEET) = 1.698
HYDRAULIC DEPTH(FEET) = 15.76
FROUDE NUMBER = 0.464
SPECIFIC ENERGY(FEET) = 5.66
=====

Exist 48-inch pipe north of Ridge Hill Rd Channel.txt

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Analysis prepared by:

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TIME/DATE OF STUDY: 11:13 10/28/2014
=====

Problem Descriptions:

Lake Jennings MarketPlace

Existing 48" Pipe North of Existing County Maintained Channel

>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<

PIPE DIAMETER(FEET) = 4.000
FLOWDEPTH(FEET) = 3.960
PIPE SLOPE(FEET/FEET) = 0.0290
MANNINGS FRICTION FACTOR = 0.022000
>>>> NORMAL DEPTH FLOW(CFS) = 150.61
=====

NORMAL-DEPTH FLOW INFORMATION:

NORMAL DEPTH(FEET) = 3.96
FLOW AREA(SQUARE FEET) = 12.55
FLOW TOP-WIDTH(FEET) = 0.796
FLOW PRESSURE + MOMENTUM(POUNDS) = 5042.52
FLOW VELOCITY(FEET/SEC.) = 12.006
FLOW VELOCITY HEAD(FEET) = 2.238
HYDRAULIC DEPTH(FEET) = 15.76
FROUDE NUMBER = 0.533
SPECIFIC ENERGY(FEET) = 6.20
=====

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Analysis prepared by:

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TIME/DATE OF STUDY: 08:21 02/13/2015
=====

=====

Problem Descriptions:

Lake Jennings Market Place -2015-02-13
0.5 Q2 plus Q100 of DMA 112 and Offsite Q100- Node 135-140
Proposed 36" pipe

>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<

PIPE DIAMETER(FEET) = 3.000
PIPE SLOPE(FEET/FEET) = 0.0100
PIPEFLOW(CFS) = 19.91
MANNINGS FRICTION FACTOR = 0.013000
=====

=====

CRITICAL-DEPTH FLOW INFORMATION:

CRITICAL DEPTH(FEET) = 1.43
CRITICAL FLOW AREA(SQUARE FEET) = 3.329
CRITICAL FLOW TOP-WIDTH(FEET) = 2.997
CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) = 356.48
CRITICAL FLOW VELOCITY(FEET/SEC.) = 5.981
CRITICAL FLOW VELOCITY HEAD(FEET) = 0.56
CRITICAL FLOW HYDRAULIC DEPTH(FEET) = 1.11

CRITICAL FLOW SPECIFIC ENERGY (FEET) = 1.99

=====

NORMAL-DEPTH FLOW INFORMATION:

NORMAL DEPTH (FEET) =	1.12	
FLOW AREA (SQUARE FEET) =	2.42	
FLOW TOP-WIDTH (FEET) =	2.904	
FLOW PRESSURE + MOMENTUM (POUNDS) =		388.43
FLOW VELOCITY (FEET/SEC.) =	8.237	
FLOW VELOCITY HEAD (FEET) =	1.054	
HYDRAULIC DEPTH (FEET) =	0.83	
FROUDE NUMBER =	1.591	
SPECIFIC ENERGY (FEET) =	2.18	

=====

=====

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Analysis prepared by:

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(619) 296-1010 se@stuartengineering.com

TIME/DATE OF STUDY: 08:24 02/13/2015
=====

=====

Problem Descriptions:

Lake Jennings Market Place -2015-02-13
Onsite Q= 0.5 Pre-development Q2 plus Ridge Hill Road
Proposed 36" pipe

>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<

PIPE DIAMETER(FEET) = 3.000
PIPE SLOPE(FEET/FEET) = 0.0100
PIPEFLOW(CFS) = 8.75
MANNINGS FRICTION FACTOR = 0.013000
=====

=====

CRITICAL-DEPTH FLOW INFORMATION:

CRITICAL DEPTH(FEET) = 0.93
CRITICAL FLOW AREA(SQUARE FEET) = 1.876
CRITICAL FLOW TOP-WIDTH(FEET) = 2.778
CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) = 124.62
CRITICAL FLOW VELOCITY(FEET/SEC.) = 4.664
CRITICAL FLOW VELOCITY HEAD(FEET) = 0.34
CRITICAL FLOW HYDRAULIC DEPTH(FEET) = 0.68

CRITICAL FLOW SPECIFIC ENERGY(FEET) = 1.27

=====

NORMAL-DEPTH FLOW INFORMATION:

NORMAL DEPTH(FEET) =	0.73	
FLOW AREA(SQUARE FEET) =	1.34	
FLOW TOP-WIDTH(FEET) =	2.579	
FLOW PRESSURE + MOMENTUM(POUNDS) =		136.29
FLOW VELOCITY(FEET/SEC.) =	6.529	
FLOW VELOCITY HEAD(FEET) =	0.662	
HYDRAULIC DEPTH(FEET) =	0.52	
FROUDE NUMBER =	1.596	
SPECIFIC ENERGY(FEET) =	1.40	

=====

=====

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1402

Analysis prepared by:

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(619) 296-1010 se@stuartengineering.com

TIME/DATE OF STUDY: 08:27 02/13/2015
=====

=====

Problem Descriptions:
Lake Jennings Market Place -2015-02-13
Proposed 18" pipe in Ridge Hill Road- from Olde Highway 80
basins

>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<

PIPE DIAMETER(FEET) = 1.500
PIPE SLOPE(FEET/FEET) = 0.0200
PIPEFLOW(CFS) = 11.16
MANNINGS FRICTION FACTOR = 0.013000

=====

=====

CRITICAL-DEPTH FLOW INFORMATION:

CRITICAL DEPTH(FEET) = 1.28
CRITICAL FLOW AREA(SQUARE FEET) = 1.604
CRITICAL FLOW TOP-WIDTH(FEET) = 1.066
CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) = 209.69
CRITICAL FLOW VELOCITY(FEET/SEC.) = 6.959
CRITICAL FLOW VELOCITY HEAD(FEET) = 0.75

CRITICAL FLOW HYDRAULIC DEPTH (FEET) = 1.50
CRITICAL FLOW SPECIFIC ENERGY (FEET) = 2.03

=====

NORMAL-DEPTH FLOW INFORMATION:

NORMAL DEPTH (FEET) = 0.97
FLOW AREA (SQUARE FEET) = 1.21
FLOW TOP-WIDTH (FEET) = 1.434
FLOW PRESSURE + MOMENTUM (POUNDS) = 231.56
FLOW VELOCITY (FEET/SEC.) = 9.229
FLOW VELOCITY HEAD (FEET) = 1.323
HYDRAULIC DEPTH (FEET) = 0.84
FROUDE NUMBER = 1.771
SPECIFIC ENERGY (FEET) = 2.29

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APPENDIX 7

DETENTION CALCULATIONS- OFFSITE BASINS DRAINING TO EXISTING COUNTY OF SAN DIEGO MAINTAINED CHANNEL

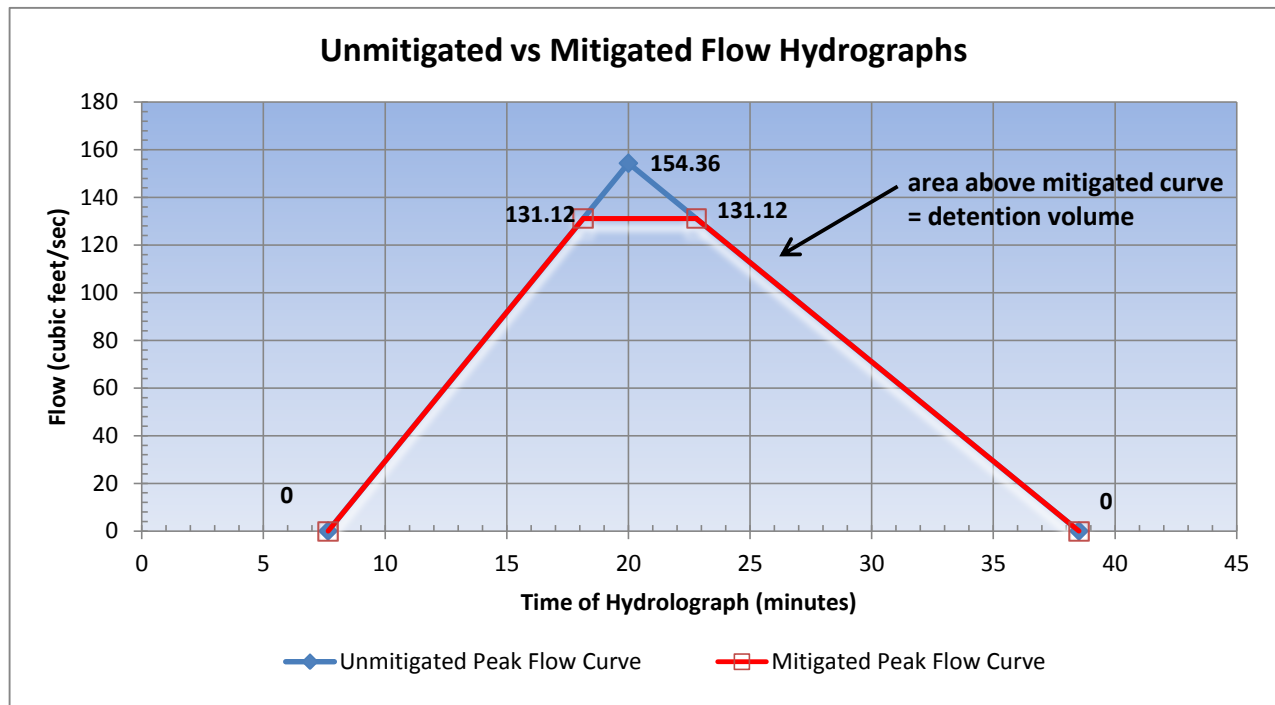
EMDF EXPANSION- DETENTION CALCULATIONS - EXISTING CONDITIONS (EXISTING COUNTY MAINTAINED CHANNEL)

Proposed Drainage

Time of Concentration (minutes)	11.15	from AES
Time of hydrograph beginning (minutes)	7.65	
Time of Hydrograph Peak (minutes)	20.00	
Time of hydrograph end (minutes)	38.52	
Peak flow (cubic feet per second)	154.36	from AES

Existing Drainage through existing 48" pipe under Ridge Hill Road

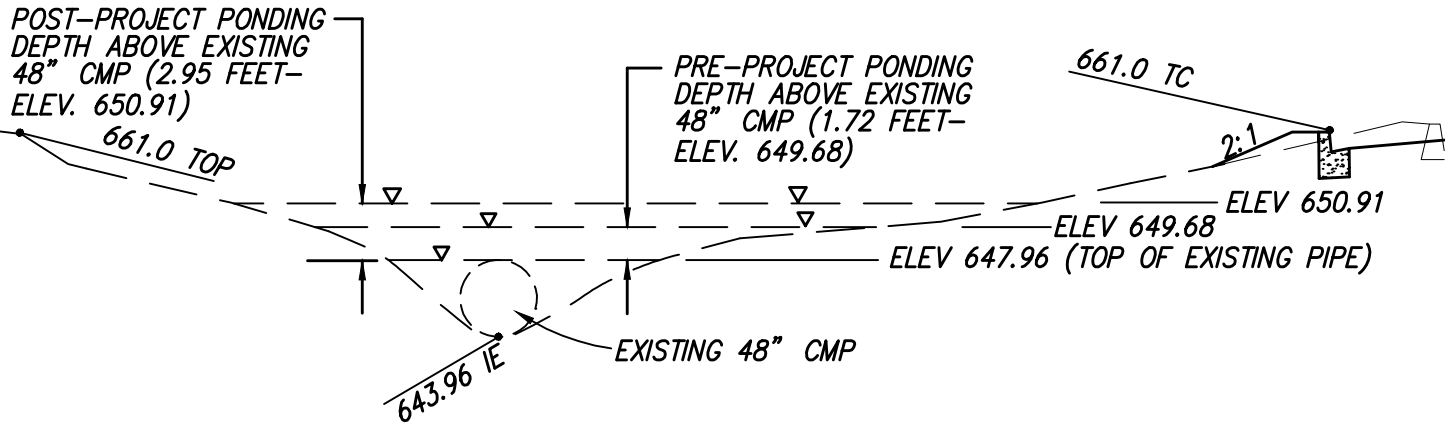
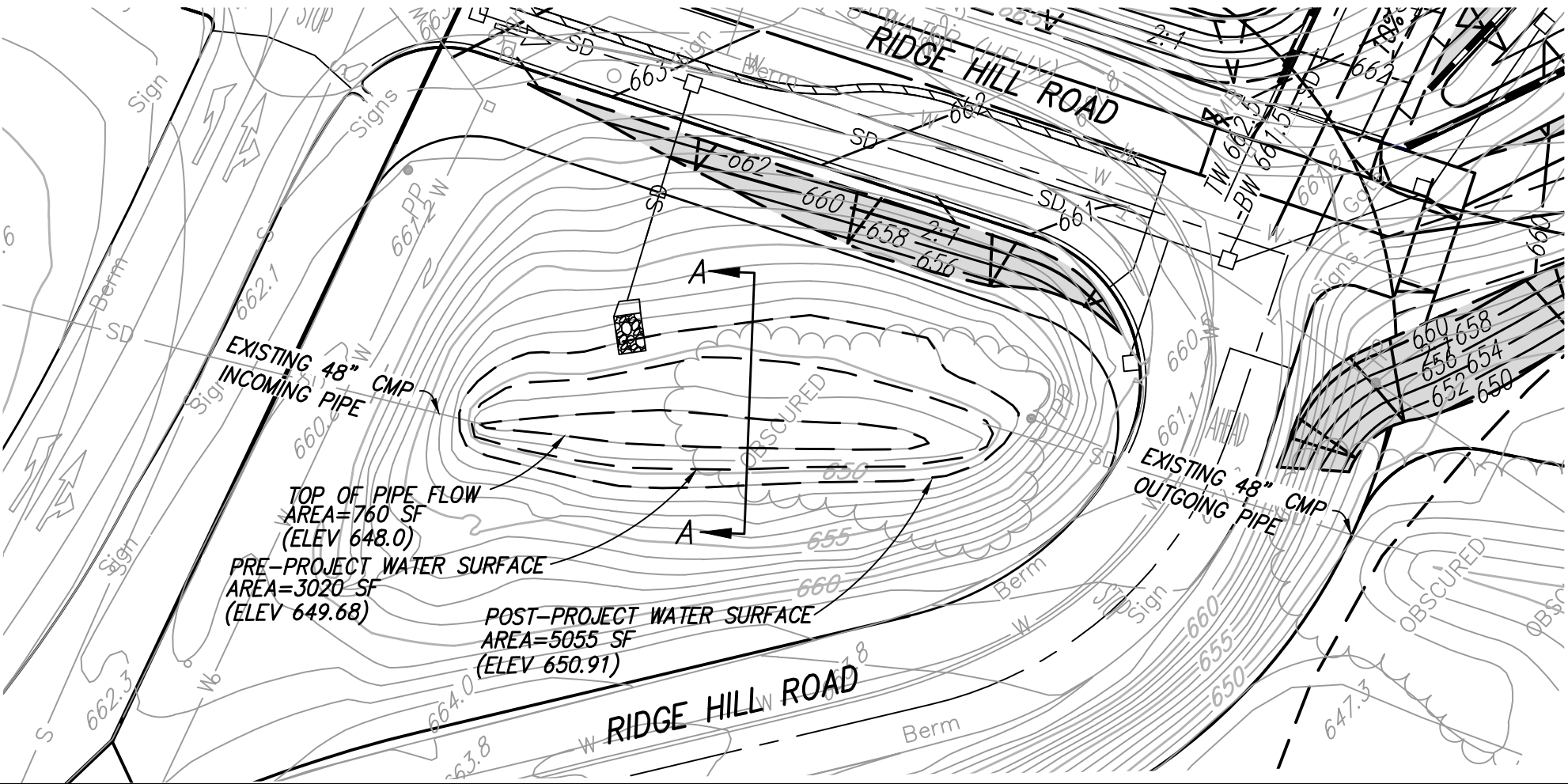
Peak Flow (Cubic feet per second)	131.12	from AES
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Required Detention Volume

Volume (Cubic feet)	3240
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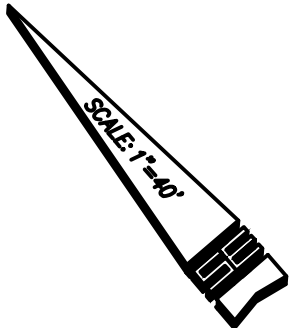
RIDGE HILL ROAD EXIST. COUNTY MAINTAINED CHANNEL FLOW EXHIBIT



SECTION A-A
SCALE: HORIZ AND VERT: 1"=10'

PRE-PROJECT PONDING 100-YEAR VOLUME
 $VOLUME = \frac{(760 + 3020)1.72}{2} = 3250 \text{ CF (1.72' DEPTH)}$
VOLUME REQUIRED: 3240 CF

POST-PROJECT PONDING VOLUME WITH MITIGATED PROJECT FLOW
 $VOLUME = \frac{(760 + 5055)2.95}{2} = 8577 \text{ CF (2.95' DEPTH)}$
VOLUME REQUIRED: 8577 CF



APPENDIX 8

**DETENTION CALCULATIONS- OFFSITE AND ONSITE BASINS DRAINING
TO EXISTING COUNTY OF SAN DIEGO MAINTAINED CHANNEL**

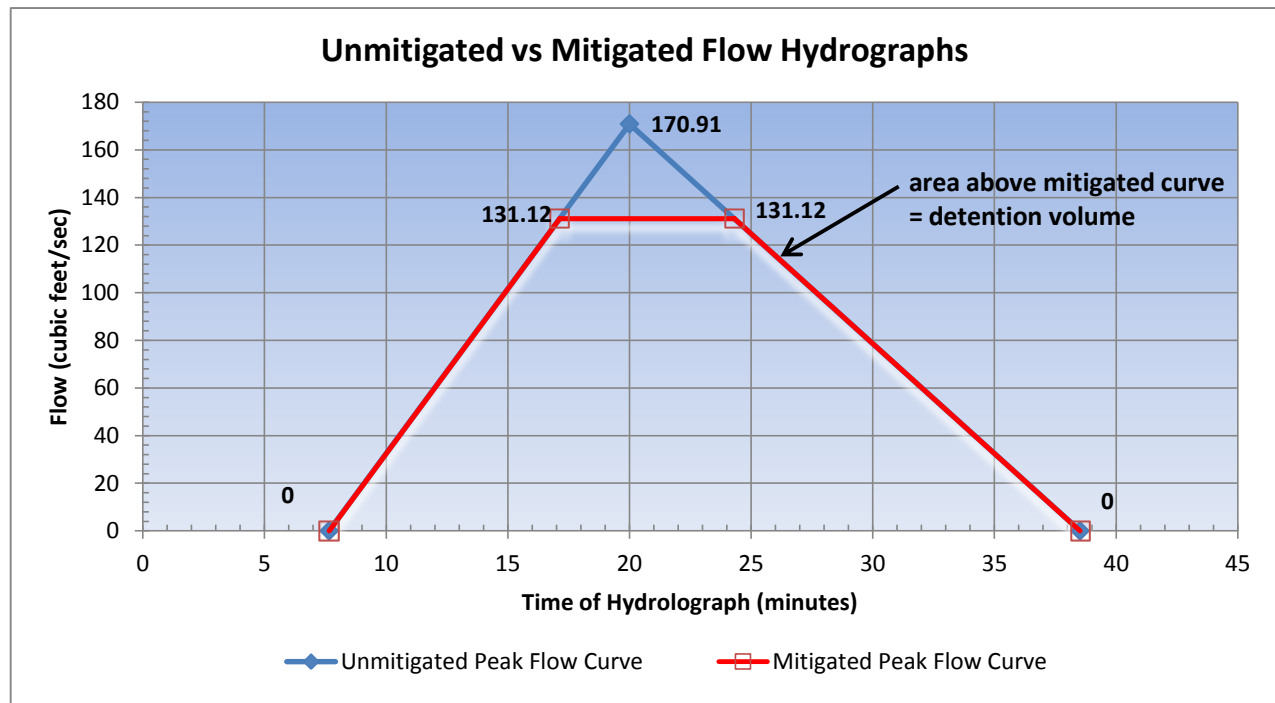
EMDF EXPANSION- DETENTION CALCULATIONS - PROPOSED CONDITIONS (EXISTING COUNTY MAINTAINED CHANNEL)

Proposed Drainage

Time of Concentration (minutes)	11.15	from AES
Time of hydrograph beginning (minutes)	7.65	
Time of Hydrograph Peak (minutes)	20.00	
Time of hydrograph end (minutes)	38.52	
Peak flow (cubic feet per second)	170.91	from AES

Existing Drainage through existing 48" pipe under Ridge Hill Road

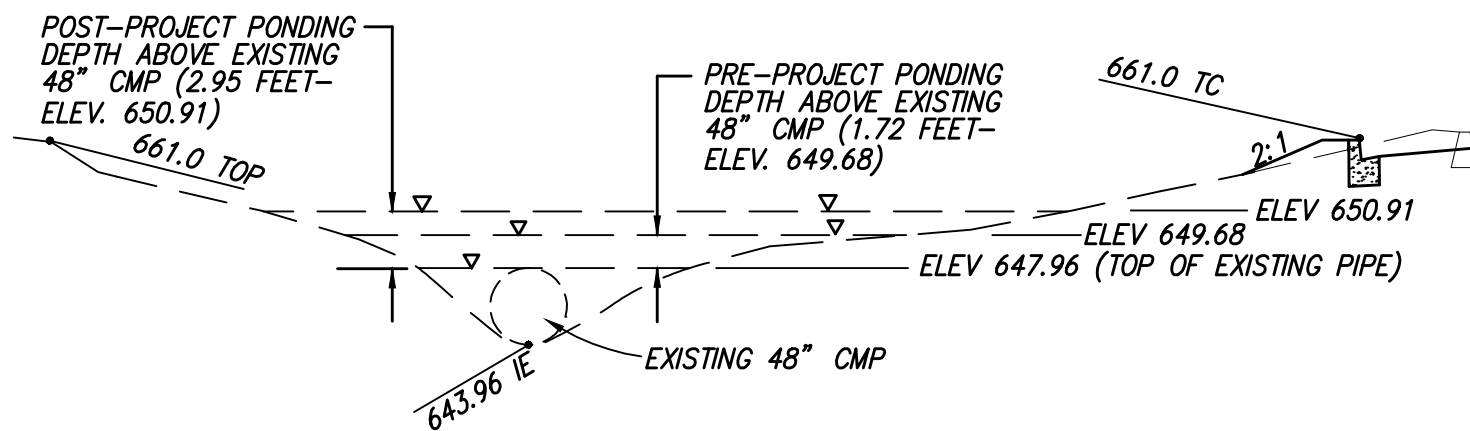
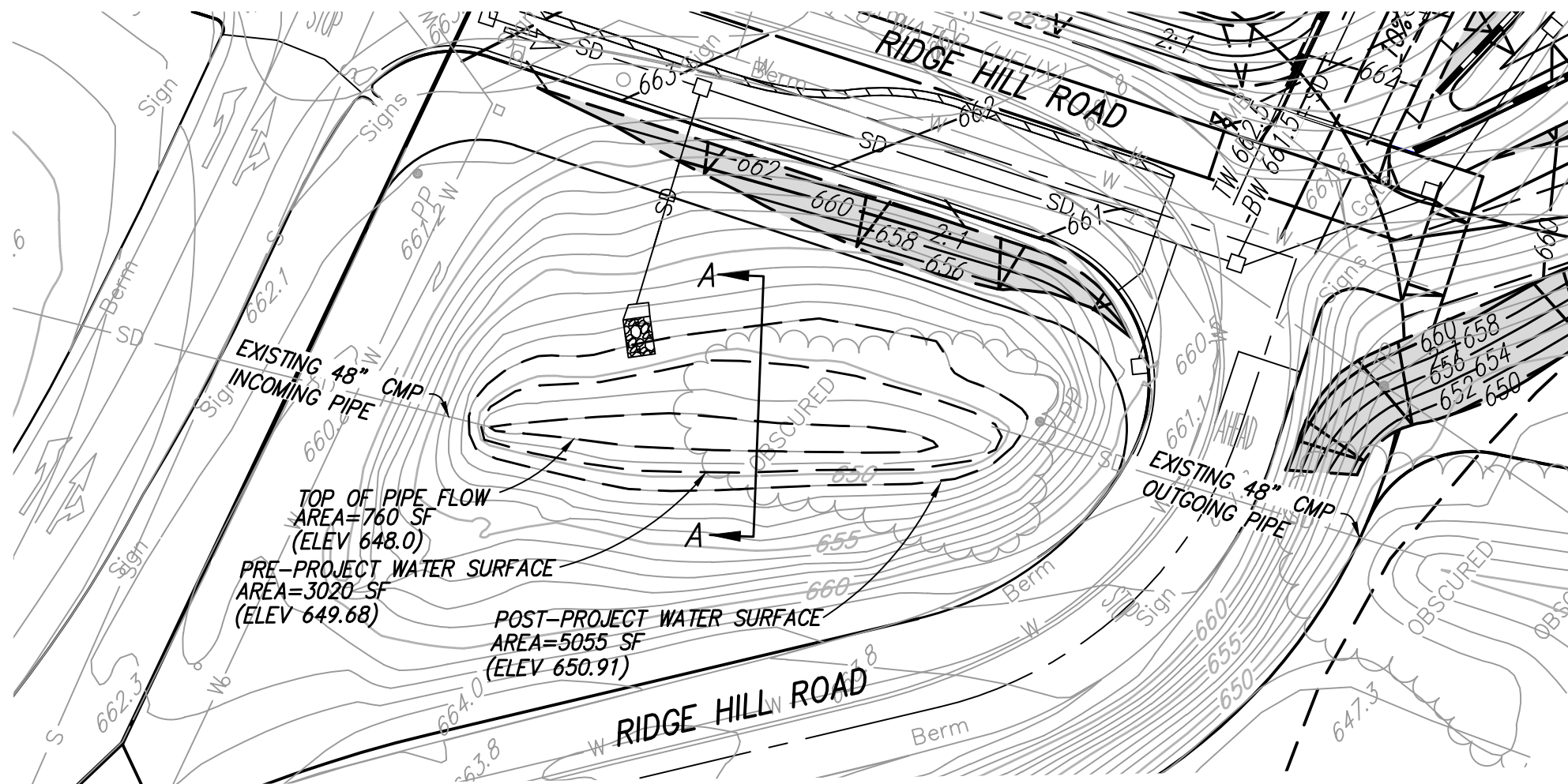
Peak Flow (Cubic feet per second)	131.12	from AES
-----------------------------------	--------	----------



Required Detention Volume

Volume (Cubic feet)	8577
---------------------	------

RIDGE HILL ROAD EXIST. COUNTY MAINTAINED CHANNEL FLOW EXHIBIT



SECTION A-A
SCALE: HORIZ AND VERT: 1"=10'

PRE-PROJECT PONDING 100-YEAR VOLUME

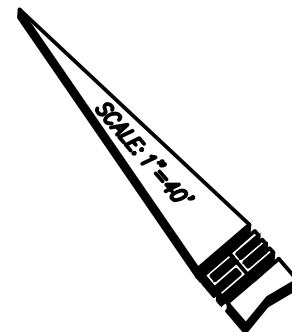
$$VOLUME = \frac{(760 + 3020)1.72}{2} = 3250 \text{ CF (1.72' DEPTH)}$$

VOLUME REQUIRED: 3240 CF

POST-PROJECT PONDING VOLUME WITH MITIGATED PROJECT FLOW

$$VOLUME = \frac{(760 + 5055) 2.95}{2} = 8577 \text{ CF (2.95' DEPTH)}$$

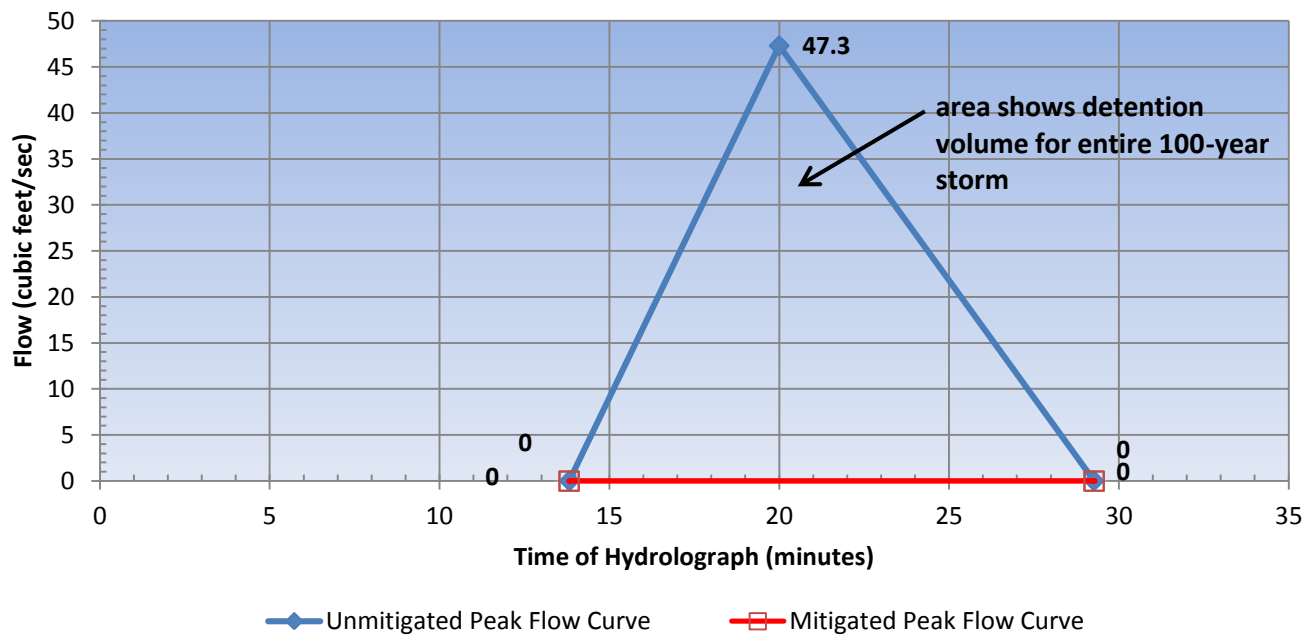
VOLUME REQUIRED: 8577 CF



APPENDIX 9

DETENTION CALCULATIONS- ONSITE (HYDROMODIFICATION)

Unmitigated vs Mitigated Flow Hydrographs



APPENDIX 10

AES 100-YEAR STORM EVENT CALCULATIONS- EXISTING OFFSITE CONDITIONS

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
2003,1985,1981 HYDROLOGY MANUAL

(c) Copyright 1982-2007 Advanced Engineering Software (aes)
Ver. 13.9 Release Date: 04/04/2008 License ID 1402

Analysis prepared by:

Stuart Engineering
7525 Metropolitan Drive, Suite 308
San Diego, California 92108
(619) 296-1010 se@stuartengineering.com

***** DESCRIPTION OF STUDY *****
* LAKE JENNINGS MARKET PLACE OFFSITE DRAINAGE STUDY *
* 100 YEAR 6 HOUR - EXISTING CONDITIONS *
* STUART ENGINEERING JOB NO. 921-13-05 PREPARED BY HUELSMAN *

FILE NAME: 921HYDE.DAT
TIME/DATE OF STUDY: 16:12 10/28/2014

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 10.00
6-HOUR DURATION PRECIPITATION (INCHES) = 1.870
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
NOTE: CONSIDER ALL CONFLUENCE STREAM COMBINATIONS

FOR ALL DOWNSTREAM ANALYSES

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	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0313 0.167	0.0150
2	25.0	10.0	0.020/0.020/0.020	0.50	1.50 0.0313 0.125	0.0130

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.50 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 5.00 TO NODE 10.00 IS CODE = 21

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

=====

RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3600
SOIL CLASSIFICATION IS "C"

S.C.S. CURVE NUMBER (AMC II) = 76
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 432.00
 UPSTREAM ELEVATION(FEET) = 960.00
 DOWNSTREAM ELEVATION(FEET) = 860.00
 ELEVATION DIFFERENCE(FEET) = 100.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.183
 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!
 10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.296
 SUBAREA RUNOFF(CFS) = 1.55
 TOTAL AREA(ACRES) = 1.00 TOTAL RUNOFF(CFS) = 1.55

 FLOW PROCESS FROM NODE 10.00 TO NODE 15.00 IS CODE = 62

>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION # 2 USED)<<<<<

=====
 UPSTREAM ELEVATION(FEET) = 860.00 DOWNSTREAM ELEVATION(FEET) = 810.00
 STREET LENGTH(FEET) = 426.00 CURB HEIGHT(INCHES) = 6.0
 STREET HALFWIDTH(FEET) = 25.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 10.00
 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) = 0.0130
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0130

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 5.05
 STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
 STREET FLOW DEPTH(FEET) = 0.27
 HALFSTREET FLOOD WIDTH(FEET) = 7.38
 AVERAGE FLOW VELOCITY(FT/SEC.) = 7.61
 PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 2.09
 STREET FLOW TRAVEL TIME(MIN.) = 0.93 Tc(MIN.) = 7.12
 10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.924
 RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6900
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 90
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.598
 SUBAREA AREA(ACRES) = 2.60 SUBAREA RUNOFF(CFS) = 7.04
 TOTAL AREA(ACRES) = 3.6 PEAK FLOW RATE(CFS) = 8.45

END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.31 HALFSTREET FLOOD WIDTH(FEET) = 9.33
 FLOW VELOCITY(FT/SEC.) = 8.55 DEPTH*VELOCITY(FT*FT/SEC.) = 2.67
 LONGEST FLOWPATH FROM NODE 5.00 TO NODE 15.00 = 858.00 FEET.

 FLOW PROCESS FROM NODE 15.00 TO NODE 20.00 IS CODE = 62

>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION # 2 USED)<<<<<

=====
 UPSTREAM ELEVATION(FEET) = 810.00 DOWNSTREAM ELEVATION(FEET) = 780.00

STREET LENGTH(FEET) = 632.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 25.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 10.00
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) = 0.0130
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0130

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 17.81
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.43
HALFSTREET FLOOD WIDTH(FEET) = 15.35
AVERAGE FLOW VELOCITY(FEET/SEC.) = 7.20
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 3.12
STREET FLOW TRAVEL TIME(MIN.) = 1.46 Tc(MIN.) = 8.58
10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.478
RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6900
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 90
AREA-AVERAGE RUNOFF COEFFICIENT = 0.661
SUBAREA AREA(ACRES) = 7.80 SUBAREA RUNOFF(CFS) = 18.72
TOTAL AREA(ACRES) = 11.4 PEAK FLOW RATE(CFS) = 26.21

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.48 HALFSTREET FLOOD WIDTH(FEET) = 17.85
FLOW VELOCITY(FEET/SEC.) = 7.93 DEPTH*VELOCITY(FT*FT/SEC.) = 3.83
LONGEST FLOWPATH FROM NODE 5.00 TO NODE 20.00 = 1490.00 FEET.

FLOW PROCESS FROM NODE 20.00 TO NODE 25.00 IS CODE = 62

>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>(STREET TABLE SECTION # 2 USED)<<<<

=====

UPSTREAM ELEVATION(FEET) = 780.00 DOWNSTREAM ELEVATION(FEET) = 725.00
STREET LENGTH(FEET) = 489.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 25.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 10.00
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) = 0.0130
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0130

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 33.40
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.46
HALFSTREET FLOOD WIDTH(FEET) = 16.60
AVERAGE FLOW VELOCITY(FEET/SEC.) = 11.62
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 5.33
STREET FLOW TRAVEL TIME(MIN.) = 0.70 Tc(MIN.) = 9.28
10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.306
RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6900

SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 90
AREA-AVERAGE RUNOFF COEFFICIENT = 0.671
SUBAREA AREA(ACRES) = 6.30 SUBAREA RUNOFF(CFS) = 14.37
TOTAL AREA(ACRES) = 17.7 PEAK FLOW RATE(CFS) = 39.29

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.48 HALFSTREET FLOOD WIDTH(FEET) = 17.70
FLOW VELOCITY(FEET/SEC.) = 12.09 DEPTH*VELOCITY(FT*FT/SEC.) = 5.81
LONGEST FLOWPATH FROM NODE 5.00 TO NODE 25.00 = 1979.00 FEET.

FLOW PROCESS FROM NODE 25.00 TO NODE 25.00 IS CODE = 81

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

=====

10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.306
NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7800
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 93
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6838
SUBAREA AREA(ACRES) = 2.30 SUBAREA RUNOFF(CFS) = 5.93
TOTAL AREA(ACRES) = 20.0 TOTAL RUNOFF(CFS) = 45.22
TC(MIN.) = 9.28

FLOW PROCESS FROM NODE 25.00 TO NODE 25.00 IS CODE = 81

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

=====

10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.306
RESIDENTIAL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 86
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6316
SUBAREA AREA(ACRES) = 33.10 SUBAREA RUNOFF(CFS) = 65.66
TOTAL AREA(ACRES) = 53.1 TOTAL RUNOFF(CFS) = 110.88
TC(MIN.) = 9.28

FLOW PROCESS FROM NODE 25.00 TO NODE 26.00 IS CODE = 51

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

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 707.00 DOWNSTREAM(FEET) = 694.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 263.00 CHANNEL SLOPE = 0.0494
CHANNEL BASE(FEET) = 0.00 "Z" FACTOR = 2.000
MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 5.00
10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.218
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3600
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 76
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 114.18
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 11.09
AVERAGE FLOW DEPTH(FEET) = 2.27 TRAVEL TIME(MIN.) = 0.40
Tc(MIN.) = 9.68
SUBAREA AREA(ACRES) = 5.70 SUBAREA RUNOFF(CFS) = 6.60
AREA-AVERAGE RUNOFF COEFFICIENT = 0.605
TOTAL AREA(ACRES) = 58.8 PEAK FLOW RATE(CFS) = 114.54

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 2.27 FLOW VELOCITY(FEET/SEC.) = 11.13
 LONGEST FLOWPATH FROM NODE 5.00 TO NODE 26.00 = 2242.00 FEET.

 FLOW PROCESS FROM NODE 26.00 TO NODE 30.00 IS CODE = 41

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

=====

ELEVATION DATA: UPSTREAM(FEET) =	694.00	DOWNSTREAM(FEET) =	692.60
FLOW LENGTH(FEET) =	50.00	MANNING'S N =	0.024
DEPTH OF FLOW IN	48.0 INCH PIPE IS	35.7 INCHES	
PIPE-FLOW VELOCITY(FEET/SEC.) =	11.43		
GIVEN PIPE DIAMETER(INCH) =	48.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	114.54		
PIPE TRAVEL TIME(MIN.) =	0.07	Tc(MIN.) =	9.75
LONGEST FLOWPATH FROM NODE	5.00 TO NODE	30.00 =	2292.00 FEET.

 FLOW PROCESS FROM NODE 30.00 TO NODE 30.00 IS CODE = 81

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

=====

10 YEAR RAINFALL INTENSITY(INCH/HOUR) =	3.203
RESIDENTAIL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT =	.6000
SOIL CLASSIFICATION IS "C"	
S.C.S. CURVE NUMBER (AMC II) =	86
AREA-AVERAGE RUNOFF COEFFICIENT =	0.6046
SUBAREA AREA(ACRES) =	9.10
SUBAREA RUNOFF(CFS) =	17.49
TOTAL AREA(ACRES) =	67.9
TOTAL RUNOFF(CFS) =	131.48
TC(MIN.) =	9.75

 FLOW PROCESS FROM NODE 30.00 TO NODE 30.00 IS CODE = 81

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

=====

10 YEAR RAINFALL INTENSITY(INCH/HOUR) =	3.203
NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT =	.7800
SOIL CLASSIFICATION IS "C"	
S.C.S. CURVE NUMBER (AMC II) =	93
AREA-AVERAGE RUNOFF COEFFICIENT =	0.6063
SUBAREA AREA(ACRES) =	0.70
SUBAREA RUNOFF(CFS) =	1.75
TOTAL AREA(ACRES) =	68.6
TOTAL RUNOFF(CFS) =	133.23
TC(MIN.) =	9.75

 FLOW PROCESS FROM NODE 30.00 TO NODE 35.00 IS CODE = 41

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

=====

ELEVATION DATA: UPSTREAM(FEET) =	692.60	DOWNSTREAM(FEET) =	689.00
FLOW LENGTH(FEET) =	120.00	MANNING'S N =	0.024
ASSUME FULL-FLOWING PIPELINE			
PIPE-FLOW VELOCITY(FEET/SEC.) =	10.45		
(PIPE FLOW VELOCITY CORRESPONDING TO FULL PIPE CAPACITY FLOW)			
GIVEN PIPE DIAMETER(INCH) =	48.00	NUMBER OF PIPES =	1

PIPE-FLOW(CFS) = 133.23
PIPE TRAVEL TIME(MIN.) = 0.19 Tc(MIN.) = 9.94
LONGEST FLOWPATH FROM NODE 5.00 TO NODE 35.00 = 2412.00 FEET.

FLOW PROCESS FROM NODE 35.00 TO NODE 35.00 IS CODE = 81

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

=====

10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.163
NEIGHBORHOOD COMMERCIAL RUNOFF COEFFICIENT = .7800
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 93
AREA-AVERAGE RUNOFF COEFFICIENT = 0.6091
SUBAREA AREA(ACRES) = 1.10 SUBAREA RUNOFF(CFS) = 2.71
TOTAL AREA(ACRES) = 69.7 TOTAL RUNOFF(CFS) = 134.28
Tc(MIN.) = 9.94

FLOW PROCESS FROM NODE 35.00 TO NODE 36.00 IS CODE = 51

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

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

=====

ELEVATION DATA: UPSTREAM(Feet) = 689.00 DOWNSTREAM(Feet) = 682.50
CHANNEL LENGTH THRU SUBAREA(Feet) = 213.00 CHANNEL SLOPE = 0.0305
CHANNEL BASE(Feet) = 20.00 "Z" FACTOR = 4.000
MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(Feet) = 8.00
10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.062
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3600
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 76
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 135.33
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(Feet/Sec.) = 6.95
AVERAGE FLOW DEPTH(Feet) = 0.83 TRAVEL TIME(MIN.) = 0.51
Tc(MIN.) = 10.45
SUBAREA AREA(ACRES) = 1.90 SUBAREA RUNOFF(CFS) = 2.09
AREA-AVERAGE RUNOFF COEFFICIENT = 0.602
TOTAL AREA(ACRES) = 71.6 PEAK FLOW RATE(CFS) = 134.28

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(Feet) = 0.83 FLOW VELOCITY(Feet/Sec.) = 6.95
LONGEST FLOWPATH FROM NODE 5.00 TO NODE 36.00 = 2625.00 FEET.

FLOW PROCESS FROM NODE 36.00 TO NODE 40.00 IS CODE = 41

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

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

=====

ELEVATION DATA: UPSTREAM(Feet) = 682.50 DOWNSTREAM(Feet) = 680.60
FLOW LENGTH(Feet) = 125.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 31.8 INCHES
PIPE-FLOW VELOCITY(Feet/Sec.) = 15.18
GIVEN PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 134.28
PIPE TRAVEL TIME(MIN.) = 0.14 Tc(MIN.) = 10.59
LONGEST FLOWPATH FROM NODE 5.00 TO NODE 40.00 = 2750.00 FEET.

FLOW PROCESS FROM NODE 40.00 TO NODE 40.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<

START OF NEW INITIAL TOC

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

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

RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3600

SOIL CLASSIFICATION IS "C"

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

INITIAL SUBAREA FLOW-LENGTH(FEET) = 589.00

UPSTREAM ELEVATION(FEET) = 880.00

DOWNSTREAM ELEVATION(FEET) = 770.00

ELEVATION DIFFERENCE(FEET) = 110.00

SUBAREA OVERLAND TIME OF FLOW(MIN.) = 6.183

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!

10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.296

SUBAREA RUNOFF(CFS) = 10.67

TOTAL AREA(ACRES) = 6.90 TOTAL RUNOFF(CFS) = 10.67

FLOW PROCESS FROM NODE 105.00 TO NODE 105.00 IS CODE = 81

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

10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.296

RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .7800

SOIL CLASSIFICATION IS "C"

S.C.S. CURVE NUMBER (AMC II) = 93

AREA-AVERAGE RUNOFF COEFFICIENT = 0.3884

SUBAREA AREA(ACRES) = 0.50 SUBAREA RUNOFF(CFS) = 1.68

TOTAL AREA(ACRES) = 7.4 TOTAL RUNOFF(CFS) = 12.35

TC(MIN.) = 6.18

FLOW PROCESS FROM NODE 105.00 TO NODE 110.00 IS CODE = 41

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

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

ELEVATION DATA: UPSTREAM(FEET) = 770.00 DOWNSTREAM(FEET) = 720.00

FLOW LENGTH(FEET) = 127.00 MANNING'S N = 0.024

DEPTH OF FLOW IN 24.0 INCH PIPE IS 6.6 INCHES

PIPE-FLOW VELOCITY(FEET/SEC.) = 17.62

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

PIPE-FLOW(CFS) = 12.35

PIPE TRAVEL TIME(MIN.) = 0.12 Tc(MIN.) = 6.30

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 110.00 = 716.00 FEET.

```

*****
FLOW PROCESS FROM NODE      110.00 TO NODE      110.00 IS CODE =  81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.243
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3600
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) =  76
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3823
SUBAREA AREA(ACRES) =      2.00 SUBAREA RUNOFF(CFS) =      3.06
TOTAL AREA(ACRES) =      9.4  TOTAL RUNOFF(CFS) =      15.25
TC(MIN.) =      6.30

*****
FLOW PROCESS FROM NODE      110.00 TO NODE      115.00 IS CODE =  41
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) =  720.00  DOWNSTREAM(FEET) =  701.30
FLOW LENGTH(FEET) =  495.00  MANNING'S N =  0.024
DEPTH OF FLOW IN  24.0 INCH PIPE IS  14.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  7.88
GIVEN PIPE DIAMETER(INCH) =  24.00  NUMBER OF PIPES =  1
PIPE-FLOW(CFS) =      15.25
PIPE TRAVEL TIME(MIN.) =  1.05  Tc(MIN.) =  7.35
LONGEST FLOWPATH FROM NODE      100.00 TO NODE      115.00 =  1211.00 FEET.

*****
FLOW PROCESS FROM NODE      115.00 TO NODE      115.00 IS CODE =  81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.843
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3600
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) =  76
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3762
SUBAREA AREA(ACRES) =      3.60 SUBAREA RUNOFF(CFS) =      4.98
TOTAL AREA(ACRES) =      13.0  TOTAL RUNOFF(CFS) =      18.79
TC(MIN.) =      7.35

*****
FLOW PROCESS FROM NODE      115.00 TO NODE      115.00 IS CODE =  81
-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.843
RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .7800
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) =  93
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4023
SUBAREA AREA(ACRES) =      0.90 SUBAREA RUNOFF(CFS) =      2.70
TOTAL AREA(ACRES) =      13.9  TOTAL RUNOFF(CFS) =      21.49
TC(MIN.) =      7.35

*****
FLOW PROCESS FROM NODE      115.00 TO NODE      115.00 IS CODE =  81

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-----
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.843
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3600
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 76
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3954
SUBAREA AREA(ACRES) = 2.70 SUBAREA RUNOFF(CFS) = 3.74
TOTAL AREA(ACRES) = 16.6 TOTAL RUNOFF(CFS) = 25.23
TC(MIN.) = 7.35

*****
FLOW PROCESS FROM NODE 115.00 TO NODE 120.00 IS CODE = 51
-----

>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<
>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 701.30 DOWNSTREAM(FEET) = 697.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 295.00 CHANNEL SLOPE = 0.0146
CHANNEL BASE(FEET) = 12.00 "Z" FACTOR = 6.000
MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 2.00
10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.421
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3600
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 76
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 26.27
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.39
AVERAGE FLOW DEPTH(FEET) = 0.51 TRAVEL TIME(MIN.) = 1.45
Tc(MIN.) = 8.80
SUBAREA AREA(ACRES) = 1.70 SUBAREA RUNOFF(CFS) = 2.09
AREA-AVERAGE RUNOFF COEFFICIENT = 0.392
TOTAL AREA(ACRES) = 18.3 PEAK FLOW RATE(CFS) = 25.23

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.50 FLOW VELOCITY(FEET/SEC.) = 3.36
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 120.00 = 1506.00 FEET.

*****
FLOW PROCESS FROM NODE 120.00 TO NODE 120.00 IS CODE = 81
-----

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<
=====
10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.421
RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .7800
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 93
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4024
SUBAREA AREA(ACRES) = 0.50 SUBAREA RUNOFF(CFS) = 1.33
TOTAL AREA(ACRES) = 18.8 TOTAL RUNOFF(CFS) = 25.89
TC(MIN.) = 8.80

*****
FLOW PROCESS FROM NODE 120.00 TO NODE 125.00 IS CODE = 41
-----

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 697.00 DOWNSTREAM(FEET) = 680.00
FLOW LENGTH(FEET) = 115.00 MANNING'S N = 0.024

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DEPTH OF FLOW IN 30.0 INCH PIPE IS 11.5 INCHES
 PIPE-FLOW VELOCITY (FEET/SEC.) = 14.97
 GIVEN PIPE DIAMETER (INCH) = 30.00 NUMBER OF PIPES = 1
 PIPE-FLOW (CFS) = 25.89
 PIPE TRAVEL TIME (MIN.) = 0.13 Tc (MIN.) = 8.93
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 125.00 = 1621.00 FEET.

 FLOW PROCESS FROM NODE 40.00 TO NODE 125.00 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	25.89	8.93	3.390	18.80

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 125.00 = 1621.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	134.28	10.59	3.037	71.60

LONGEST FLOWPATH FROM NODE 5.00 TO NODE 125.00 = 2750.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	139.12	8.93	3.390
2	157.47	10.59	3.037

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE (CFS) = 157.47 Tc (MIN.) = 10.59
 TOTAL AREA (ACRES) = 90.4

 FLOW PROCESS FROM NODE 40.00 TO NODE 45.00 IS CODE = 51

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

ELEVATION DATA: UPSTREAM (FEET) = 680.60 DOWNSTREAM (FEET) = 676.60
 CHANNEL LENGTH THRU SUBAREA (FEET) = 225.00 CHANNEL SLOPE = 0.0178
 CHANNEL BASE (FEET) = 5.00 "Z" FACTOR = 6.000
 MANNING'S FACTOR = 0.030 MAXIMUM DEPTH (FEET) = 8.00
 10 YEAR RAINFALL INTENSITY (INCH/HOUR) = 2.935
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3600
 SOIL CLASSIFICATION IS "C"
 S.C.S. CURVE NUMBER (AMC II) = 76
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW (CFS) = 158.16
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY (FEET/SEC.) = 6.52
 AVERAGE FLOW DEPTH (FEET) = 1.64 TRAVEL TIME (MIN.) = 0.58
 Tc (MIN.) = 11.16
 SUBAREA AREA (ACRES) = 1.30 SUBAREA RUNOFF (CFS) = 1.37
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.558
 TOTAL AREA (ACRES) = 91.7 PEAK FLOW RATE (CFS) = 157.47

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH (FEET) = 1.64 FLOW VELOCITY (FEET/SEC.) = 6.49
 LONGEST FLOWPATH FROM NODE 5.00 TO NODE 45.00 = 2975.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)
1	166.38	9.52
2	157.47	11.17

NEW PEAK FLOW DATA ARE:

PEAK FLOW RATE(CFS) = 166.38 Tc(MIN.) = 9.52

FLOW PROCESS FROM NODE 45.00 TO NODE 50.00 IS CODE = 41

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

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

ELEVATION DATA: UPSTREAM(FEET) = 676.60 DOWNSTREAM(FEET) = 670.10

FLOW LENGTH(FEET) = 110.00 MANNING'S N = 0.024

ASSUME FULL-FLOWING PIPELINE

PIPE-FLOW VELOCITY(FEET/SEC.) = 14.05

(PIPE FLOW VELOCITY CORRESPONDING TO FULL PIPE CAPACITY FLOW)

GIVEN PIPE DIAMETER(INCH) = 45.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 166.38

PIPE TRAVEL TIME(MIN.) = 0.13 Tc(MIN.) = 9.65

LONGEST FLOWPATH FROM NODE 5.00 TO NODE 50.00 = 3085.00 FEET.

FLOW PROCESS FROM NODE 50.00 TO NODE 50.00 IS CODE = 81

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

10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.223

RESIDENTAIL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .7800

SOIL CLASSIFICATION IS "C"

S.C.S. CURVE NUMBER (AMC II) = 93

AREA-AVERAGE RUNOFF COEFFICIENT = 0.5664

SUBAREA AREA(ACRES) = 3.60 SUBAREA RUNOFF(CFS) = 9.05

TOTAL AREA(ACRES) = 95.3 TOTAL RUNOFF(CFS) = 173.98

TC(MIN.) = 9.65

FLOW PROCESS FROM NODE 50.00 TO NODE 50.00 IS CODE = 81

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

10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.223

RESIDENTAIL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .7800

SOIL CLASSIFICATION IS "C"

S.C.S. CURVE NUMBER (AMC II) = 93

AREA-AVERAGE RUNOFF COEFFICIENT = 0.5675

SUBAREA AREA(ACRES) = 0.50 SUBAREA RUNOFF(CFS) = 1.26

TOTAL AREA(ACRES) = 95.8 TOTAL RUNOFF(CFS) = 175.23

TC(MIN.) = 9.65

FLOW PROCESS FROM NODE 50.00 TO NODE 50.00 IS CODE = 81

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

10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.223

RESIDENTAIL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .7800

SOIL CLASSIFICATION IS "C"

S.C.S. CURVE NUMBER (AMC II) = 93
AREA-AVERAGE RUNOFF COEFFICIENT = 0.5708
SUBAREA AREA(ACRES) = 1.50 SUBAREA RUNOFF(CFS) = 3.77
TOTAL AREA(ACRES) = 97.3 TOTAL RUNOFF(CFS) = 179.01
TC(MIN.) = 9.65

FLOW PROCESS FROM NODE 50.00 TO NODE 50.00 IS CODE = 81

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

=====

10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.223
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3600
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 76
AREA-AVERAGE RUNOFF COEFFICIENT = 0.5695
SUBAREA AREA(ACRES) = 0.60 SUBAREA RUNOFF(CFS) = 0.70
TOTAL AREA(ACRES) = 97.9 TOTAL RUNOFF(CFS) = 179.70
TC(MIN.) = 9.65

FLOW PROCESS FROM NODE 50.00 TO NODE 55.00 IS CODE = 41

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

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 670.10 DOWNSTREAM(FEET) = 655.00
FLOW LENGTH(FEET) = 250.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 48.0 INCH PIPE IS 24.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 27.68
GIVEN PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 179.70
PIPE TRAVEL TIME(MIN.) = 0.15 Tc(MIN.) = 9.80
LONGEST FLOWPATH FROM NODE 5.00 TO NODE 55.00 = 3335.00 FEET.

FLOW PROCESS FROM NODE 55.00 TO NODE 55.00 IS CODE = 81

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

=====

10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.191
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3600
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 76
AREA-AVERAGE RUNOFF COEFFICIENT = 0.5674
SUBAREA AREA(ACRES) = 1.00 SUBAREA RUNOFF(CFS) = 1.15
TOTAL AREA(ACRES) = 98.9 TOTAL RUNOFF(CFS) = 179.70
TC(MIN.) = 9.80
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 55.00 TO NODE 55.00 IS CODE = 81

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

=====

10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.191
RESIDENTIAL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .7800
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 93
AREA-AVERAGE RUNOFF COEFFICIENT = 0.5687

SUBAREA AREA(ACRES) = 0.60 SUBAREA RUNOFF(CFS) = 1.49
TOTAL AREA(ACRES) = 99.5 TOTAL RUNOFF(CFS) = 180.56
TC(MIN.) = 9.80

FLOW PROCESS FROM NODE 55.00 TO NODE 55.00 IS CODE = 81

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

=====

10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.191
RESIDENTAIL (43. DU/AC OR LESS) RUNOFF COEFFICIENT = .7800
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 93
AREA-AVERAGE RUNOFF COEFFICIENT = 0.5724
SUBAREA AREA(ACRES) = 1.80 SUBAREA RUNOFF(CFS) = 4.48
TOTAL AREA(ACRES) = 101.3 TOTAL RUNOFF(CFS) = 185.04
TC(MIN.) = 9.80

FLOW PROCESS FROM NODE 55.00 TO NODE 55.00 IS CODE = 81

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

=====

10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.191
RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6900
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 90
AREA-AVERAGE RUNOFF COEFFICIENT = 0.5802
SUBAREA AREA(ACRES) = 7.20 SUBAREA RUNOFF(CFS) = 15.85
TOTAL AREA(ACRES) = 108.5 TOTAL RUNOFF(CFS) = 200.89
TC(MIN.) = 9.80

FLOW PROCESS FROM NODE 55.00 TO NODE 60.00 IS CODE = 51

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

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 655.00 DOWNSTREAM(FEET) = 654.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 150.00 CHANNEL SLOPE = 0.0067
CHANNEL BASE(FEET) = 15.00 "Z" FACTOR = 10.000
MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 8.00
10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.071
RESIDENTAIL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 86
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 203.29
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.16
AVERAGE FLOW DEPTH(FEET) = 1.58 TRAVEL TIME(MIN.) = 0.60
Tc(MIN.) = 10.41
SUBAREA AREA(ACRES) = 2.60 SUBAREA RUNOFF(CFS) = 4.79
AREA-AVERAGE RUNOFF COEFFICIENT = 0.581
TOTAL AREA(ACRES) = 111.1 PEAK FLOW RATE(CFS) = 200.89

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 1.57 FLOW VELOCITY(FEET/SEC.) = 4.15
LONGEST FLOWPATH FROM NODE 5.00 TO NODE 60.00 = 3485.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)
------------------	-----------------	--------------

1 200.89 10.41
2 181.75 12.07

NEW PEAK FLOW DATA ARE:

PEAK FLOW RATE(CFS) = 200.89 Tc(MIN.) = 10.41

FLOW PROCESS FROM NODE 60.00 TO NODE 60.00 IS CODE = 81

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

=====

10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.071
RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6900
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 90
AREA-AVERAGE RUNOFF COEFFICIENT = 0.5820
SUBAREA AREA(ACRES) = 1.30 SUBAREA RUNOFF(CFS) = 2.75
TOTAL AREA(ACRES) = 112.4 TOTAL RUNOFF(CFS) = 200.89
TC(MIN.) = 10.41
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 60.00 TO NODE 65.00 IS CODE = 41

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 654.00 DOWNSTREAM(FEET) = 650.00
FLOW LENGTH(FEET) = 190.00 MANNING'S N = 0.024
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.55
(PIPE FLOW VELOCITY CORRESPONDING TO FULL PIPE CAPACITY FLOW)
GIVEN PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 200.89
PIPE TRAVEL TIME(MIN.) = 0.70 Tc(MIN.) = 11.10
LONGEST FLOWPATH FROM NODE 5.00 TO NODE 65.00 = 3675.00 FEET.

FLOW PROCESS FROM NODE 65.00 TO NODE 70.00 IS CODE = 51

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 650.00 DOWNSTREAM(FEET) = 648.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 135.00 CHANNEL SLOPE = 0.0148
CHANNEL BASE(FEET) = 10.00 "Z" FACTOR = 5.000
MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 13.00
10 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.888
RESIDENTAIL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
SOIL CLASSIFICATION IS "C"
S.C.S. CURVE NUMBER (AMC II) = 86
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 202.80
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.59
AVERAGE FLOW DEPTH(FEET) = 1.68 TRAVEL TIME(MIN.) = 0.34
Tc(MIN.) = 11.44
SUBAREA AREA(ACRES) = 2.20 SUBAREA RUNOFF(CFS) = 3.81
AREA-AVERAGE RUNOFF COEFFICIENT = 0.582
TOTAL AREA(ACRES) = 114.6 PEAK FLOW RATE(CFS) = 200.89

END OF SUBAREA CHANNEL FLOW HYDRAULICS:

DEPTH(FEET) = 1.67 FLOW VELOCITY(FEET/SEC.) = 6.57

LONGEST FLOWPATH FROM NODE 5.00 TO NODE 70.00 = 3810.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)
1	200.89	11.44
2	182.56	13.12

NEW PEAK FLOW DATA ARE:

PEAK FLOW RATE(CFS) = 200.89 Tc(MIN.) = 11.44

FLOW PROCESS FROM NODE 70.00 TO NODE 75.00 IS CODE = 41

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

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 648.00 DOWNSTREAM(FEET) = 645.00

FLOW LENGTH(FEET) = 120.00 MANNING'S N = 0.024

ASSUME FULL-FLOWING PIPELINE

PIPE-FLOW VELOCITY(FEET/SEC.) = 9.54

(PIPE FLOW VELOCITY CORRESPONDING TO FULL PIPE CAPACITY FLOW)

GIVEN PIPE DIAMETER(INCH) = 48.00 NUMBER OF PIPES = 1

PIPE-FLOW(CFS) = 200.89

PIPE TRAVEL TIME(MIN.) = 0.21 Tc(MIN.) = 11.65

LONGEST FLOWPATH FROM NODE 5.00 TO NODE 75.00 = 3930.00 FEET.

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 114.6 TC(MIN.) = 11.65

PEAK FLOW RATE(CFS) = 200.89

*** PEAK FLOW RATE TABLE ***

	Q(CFS)	Tc(MIN.)
1	200.89	11.65
2	182.56	13.32

=====

END OF RATIONAL METHOD ANALYSIS