ALLARD ENGINEERING

civil engineering land surveying land planning

Tentative Parcel Map No. 19603
Agua Mansa Industrial Park

Preliminary Drainage Report

January 11, 2016

Prepared For:

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Discussion

Introduction

The Agua Mansa Industrial Project comprises an area of approximately 30 acres in the Unincorporated San Bernardino County. The project comprises of both an Industrial Warehouse and Commercial Building. The site lies North of El Rivino Road between Agua Mansa Road and Halbrook Lane.

Purpose

The purpose of this Drainage Report is to determine storm water runoff for the site and reduce the runoff to 90% of the pre-developed flow so that no downstream drainage facilities will be affected as a result of the development. In addition, offsite flows will be quantified so that they can be picked up and safely conveyed through the site by a storm drain.

Criteria

The criteria utilized for hydrologic analysis is the San Bernardino County Hydrology Manual. Civil Cad and Civild computer software were utilized to perform computations.

Findings

Onsite the water runoff flows in a Northeast direction to a drainage inlet located within the proposed development. The inlet ties into an existing masterplan storm drain adjacent to the Federal Express Building.

Offsite, there is water tributary which enters the site at the East end of Del Mesa Drive. In total 64.8 Acres are tributary offsite which account for approximately 104 CFS of runoff. The runoff flows through the site through an existing earthen swale and flows to the drain inlet located onsite. This water is known to cause ponding and dirt debris to the existing road.

The proposed development comprises of two detention/infiltration basins and onsite storm drain, catch basins and inlets to route the water to the proposed detention basins. In addition, a catch basin is proposed to pickup offsite water. The water is routed to the existing drain inlet onsite. Also 5 infiltration trenches will be built for WQMP purposes. Therefore in addition of the two proposed detention/infiltration basins the 5 infiltration trenches will capture and infiltrate a volume larger than the 2 year storm 24 hour duration which it will substantially decrease the volume and the peak runoff on the developed condition. The detention basin calculation will not include the effect of the infiltration trenches of the developed condition storm water runoff.

In total the onsite pre-developed condition, with AMC II produces 46.0 CFS, and the proposed developed site, with AMC III produces 75.7 CFS during the 100 year storm event, not considering the effect of the two detention basins proposed for the developed site.

The results showing next include the effect of the reduction of the flows due to the two detention basins

						After detention basin routing		
	Pre-developed condition		Developed condition			Developed condition		
Storm	Flow	90% flow	Area 1	Area 2	Total (*)	Area 1	Area 2	Total
year	cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs
100	46	41.4	35.62	41.2	75.7	15.3	17.3	32.6

(*) After conffluence

The reduction of the flow rate is lower the 90% pre-developed reduction required by the San Bernardino County Hydrology Manual. The reduced flow from the existing to proposed condition will ensure no downstream facilities will be affected.

Included in this report are hydraulic calculations and exhibits which further illustrate these findings. Upon final engineering, pipe and inlet structures will be sized, and the 2, 5 and 10 year storm event will be routed

Hydrology Reference Material

General Info
Homepage
Current Projects
FAQ
Glossary

Precipitation Frequency (PF)
PF Data Server
- PF in GIS Format
- PF Maps
- Temporal Distr.
- Time Series Data
- PFDS Perform.

PF Documents

Probable Maximum Precipitation (PMP)
PMP Documents

Miscellaneous
Publications
AEP Storm Analysis
Record Precipitation

Contact Us
Inquiries
List-server

USA.gov

NOAA ATLAS 14 POINT PRECIPITATION FREQUENCY ESTIMATES: CA

DATA DESCRIPTION

Data type: precipitation depth | Units: english | Time series type: partial duration

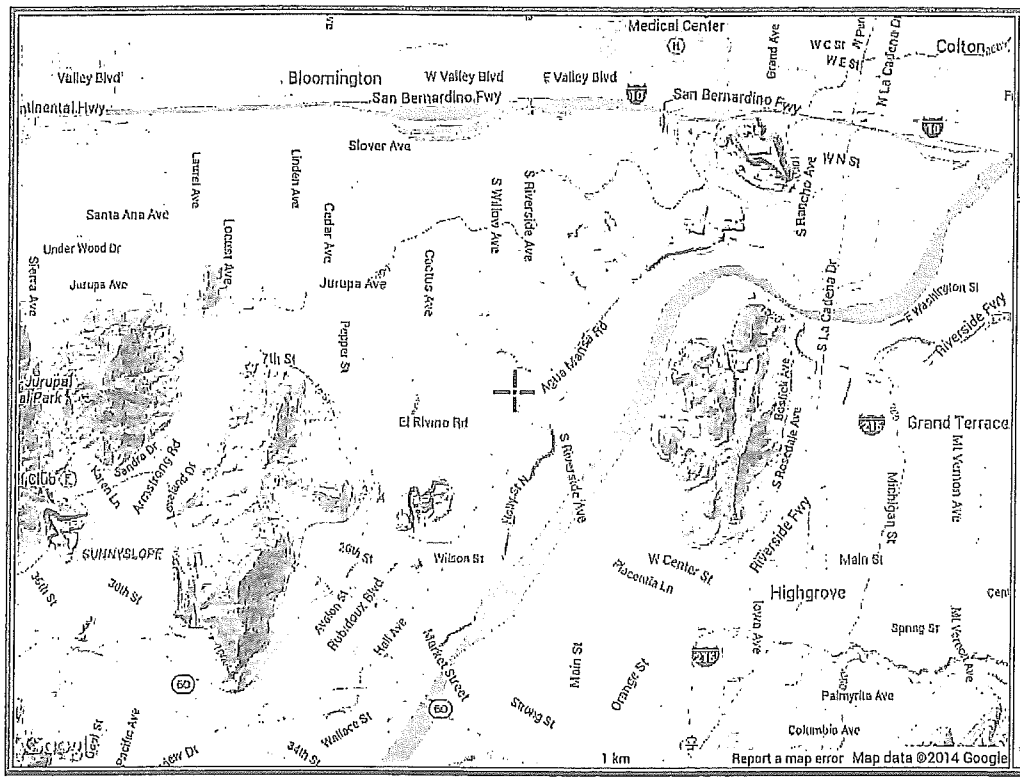
SELECT LOCATION

1. Manually:

a) Enter location (decimal degrees, use "-" for S and W): latitude: longitude: submit

b) Select station (click here for a list of stations used in frequency analysis for CA): select station

2. Use map:



a) Select location (move crosshair or double click)

b) Click on station icon

(☐ show stations on map)

LOCATION INFORMATION:
Name: Rialto, California, US*
Latitude: 34.0371°
Longitude: -117.3721°
Elevation: 896 ft*

* source: Google Maps

POINT PRECIPITATION FREQUENCY (PF) ESTIMATES

WITH 90% CONFIDENCE INTERVALS AND SUPPLEMENTARY INFORMATION
NOAA Atlas 14, Volume 6, Version 2

PF tabular | PF graphical | Supplementary information | Print Page

PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.099 (0.083-0.120)	0.128 (0.107-0.155)	0.166 (0.138-0.202)	0.198 (0.163-0.243)	0.242 (0.192-0.307)	0.276 (0.215-0.358)	0.311 (0.236-0.414)	0.348 (0.256-0.477)	0.399 (0.282-0.571)	0.440 (0.300-0.653)
10-min	0.142 (0.119-0.172)	0.184 (0.153-0.223)	0.238 (0.198-0.290)	0.284 (0.234-0.348)	0.346 (0.275-0.440)	0.395 (0.307-0.513)	0.446 (0.338-0.593)	0.499 (0.367-0.684)	0.572 (0.404-0.819)	0.631 (0.430-0.935)
15-min	0.172 (0.143-0.209)	0.222 (0.185-0.269)	0.288 (0.239-0.351)	0.343 (0.282-0.421)	0.419 (0.333-0.532)	0.478 (0.372-0.620)	0.539 (0.409-0.718)	0.603 (0.444-0.827)	0.692 (0.489-0.990)	0.763 (0.520-1.13)
30-min	0.258 (0.215-0.313)	0.333 (0.277-0.404)	0.432 (0.359-0.526)	0.515 (0.424-0.632)	0.628 (0.499-0.798)	0.717 (0.558-0.931)	0.808 (0.613-1.08)	0.905 (0.667-1.24)	1.04 (0.733-1.49)	1.14 (0.780-1.70)
60-min	0.377 (0.314-0.457)	0.486 (0.405-0.590)	0.632 (0.524-0.769)	0.752 (0.619-0.923)	0.917 (0.730-1.17)	1.05 (0.815-1.36)	1.18 (0.896-1.57)	1.32 (0.974-1.81)	1.52 (1.07-2.17)	1.67 (1.14-2.48)
2-hr	0.547 (0.456-0.662)	0.698 (0.581-0.847)	0.897 (0.745-1.09)	1.06 (0.873-1.30)	1.28 (1.02-1.63)	1.46 (1.13-1.89)	1.63 (1.24-2.17)	1.82 (1.34-2.49)	2.07 (1.46-2.96)	2.27 (1.55-3.37)
3-hr	0.674 (0.562-0.817)	0.858 (0.715-1.04)	1.10 (0.913-1.34)	1.30 (1.07-1.59)	1.57 (1.25-1.99)	1.77 (1.38-2.30)	1.98 (1.50-2.64)	2.20 (1.62-3.02)	2.50 (1.77-3.58)	2.74 (1.87-4.06)
6-hr	0.941 (0.784-1.14)	1.20 (0.998-1.45)	1.53 (1.27-1.87)	1.81 (1.49-2.22)	2.18 (1.73-2.77)	2.46 (1.92-3.19)	2.75 (2.09-3.66)	3.05 (2.25-4.18)	3.45 (2.44-4.94)	3.77 (2.57-5.59)

12-hr	1.25 (1.04-1.51)	1.60 (1.33-1.94)	2.05 (1.70-2.50)	2.42 (1.99-2.97)	2.92 (2.32-3.71)	3.30 (2.57-4.29)	3.69 (2.80-4.91)	4.09 (3.01-5.60)	4.63 (3.27-6.62)	5.04 (3.44-7.48)
24-hr	1.66 (1.47-1.91)	2.15 (1.90-2.48)	2.78 (2.45-3.22)	3.30 (2.88-3.85)	3.99 (3.38-4.81)	4.53 (3.76-5.57)	5.07 (4.10-6.38)	5.62 (4.43-7.28)	6.37 (4.82-8.59)	6.95 (5.08-9.69)
2-day	2.01 (1.78-2.32)	2.65 (2.35-3.06)	3.49 (3.08-4.04)	4.17 (3.65-4.87)	5.10 (4.32-6.15)	5.82 (4.82-7.15)	6.54 (5.30-8.24)	7.29 (5.75-9.44)	8.31 (6.29-11.2)	9.10 (6.66-12.7)
3-day	2.15 (1.91-2.48)	2.88 (2.55-3.33)	3.84 (3.39-4.45)	4.63 (4.05-5.40)	5.71 (4.83-6.88)	6.54 (5.43-8.04)	7.39 (5.99-9.31)	8.28 (6.52-10.7)	9.48 (7.18-12.8)	10.4 (7.63-14.5)
4-day	2.31 (2.05-2.67)	3.13 (2.77-3.62)	4.21 (3.71-4.87)	5.10 (4.46-5.95)	6.31 (5.35-7.61)	7.26 (6.02-8.93)	8.23 (6.67-10.4)	9.24 (7.28-12.0)	10.6 (8.04-14.3)	11.7 (8.57-16.3)
7-day	2.65 (2.35-3.06)	3.64 (3.22-4.20)	4.94 (4.36-5.72)	6.02 (5.26-7.02)	7.50 (6.35-9.04)	8.65 (7.18-10.6)	9.84 (7.97-12.4)	11.1 (8.74-14.4)	12.8 (9.69-17.3)	14.2 (10.4-19.7)
10-day	2.87 (2.54-3.31)	3.98 (3.52-4.59)	5.43 (4.79-6.29)	6.64 (5.81-7.74)	8.30 (7.03-10.0)	9.60 (7.97-11.8)	10.9 (8.87-13.8)	12.4 (9.74-16.0)	14.3 (10.8-19.3)	15.8 (11.6-22.1)
20-day	3.49 (3.09-4.02)	4.87 (4.31-5.62)	6.71 (5.92-7.77)	8.24 (7.21-9.62)	10.4 (8.79-12.5)	12.1 (10.0-14.8)	13.8 (11.2-17.4)	15.6 (12.3-20.2)	18.2 (13.8-24.6)	20.3 (14.8-28.3)
30-day	4.15 (3.67-4.78)	5.78 (5.11-6.67)	7.97 (7.03-9.23)	9.80 (8.58-11.4)	12.4 (10.5-14.9)	14.4 (11.9-17.7)	16.5 (13.4-20.8)	18.8 (14.8-24.3)	21.9 (16.6-29.6)	24.5 (17.9-34.2)
45-day	4.98 (4.41-5.74)	6.87 (6.08-7.93)	9.43 (8.32-10.9)	11.6 (10.1-13.5)	14.6 (12.4-17.6)	17.0 (14.1-20.9)	19.6 (15.8-24.6)	22.3 (17.6-28.8)	26.1 (19.8-35.2)	29.3 (21.4-40.8)
60-day	5.83 (5.16-6.72)	7.95 (7.03-9.17)	10.8 (9.54-12.5)	13.2 (11.6-15.5)	16.7 (14.1-20.1)	19.4 (16.1-23.9)	22.3 (18.1-28.1)	25.5 (20.1-33.0)	29.9 (22.6-40.3)	33.5 (24.5-46.8)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Estimates from the table in csv format: precipitation frequency estimates ▼ Submit

Main Link Categories:
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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
Office of Hydrologic Development
1325 East West Highway
Silver Spring, MD 20910
Page Author: HDSC webmaster
Page last modified: August 27, 2014

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Rational Methods Hydrology

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 07/23/15

AGUA MANSA PROJECT
PRE DEVELOPED CONDITION
100 YEAR STORM

Program License Serial Number 6019

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.180 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

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Process from Point/Station 10.000 to Point/Station 20.000
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 67.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.578(In/Hr)
Initial subarea data:
Initial area flow distance = 560.000(Ft.)
Top (of initial area) elevation = 935.700(Ft.)
Bottom (of initial area) elevation = 931.500(Ft.)
Difference in elevation = 4.200(Ft.)
Slope = 0.00750 s(%)= 0.75
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 17.556 min.
Rainfall intensity = 2.467(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.689
Subarea runoff = 5.099(CFS)
Total initial stream area = 3.000(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.578(In/Hr)

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Process from Point/Station       20.000 to Point/Station       30.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.315(Ft.), Average velocity =   3.675(Ft/s)
      ******* Irregular Channel Data ***********
----------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1              0.00              1.00
      2             25.00              0.00
      3             50.00              1.00
Manning's 'N' friction factor =   0.025
----------------------------------------------------------------------
Sub-Channel flow  =      9.143(CFS)
  '     '    flow top width =     15.772(Ft.)
  '     '    velocity=    3.675(Ft/s)
  '     '    area =      2.488(Sq.Ft)
  '     '    Froude number =     1.631

Upstream point elevation =   931.500(Ft.)
Downstream point elevation =   905.000(Ft.)
Flow length =   590.000(Ft.)
Travel time  =    2.68 min.
Time of concentration =   20.23 min.
Depth of flow =   0.315(Ft.)
Average velocity =   3.675(Ft/s)
Total irregular channel flow =     9.143(CFS)
Irregular channel normal depth above invert elev. =   0.315(Ft.)
Average velocity of channel(s) =   3.675(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 78.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.404(In/Hr)
Rainfall intensity =      2.265(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.714
Subarea runoff =      8.003(CFS) for    5.100(Ac.)
Total runoff =     13.102(CFS)
Effective area this stream =        8.10(Ac.)
Total Study Area (Main Stream No. 1) =        8.10(Ac.)
Area averaged Fm value =    0.468(In/Hr)
Depth of flow =   0.361(Ft.), Average velocity =   4.021(Ft/s)


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Process from Point/Station       30.000 to Point/Station       30.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
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Stream flow area =      8.100(Ac.)
Runoff from this stream =     13.102(CFS)
Time of concentration =   20.23 min.
Rainfall intensity =     2.265(In/Hr)
Area averaged loss rate (Fm) =    0.4683(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000


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Process from Point/Station       40.000 to Point/Station       50.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 67.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.578(In/Hr)
Initial subarea data:
Initial area flow distance =   490.000(Ft.)
Top (of initial area) elevation =   940.500(Ft.)
Bottom (of initial area) elevation =   930.000(Ft.)
Difference in elevation =    10.500(Ft.)
Slope =    0.02143  s(%)=       2.14
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.491 min.
Rainfall intensity =      2.889(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.720
Subarea runoff =      3.743(CFS)
Total initial stream area =        1.800(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.578(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       50.000 to Point/Station       30.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.281(Ft.), Average velocity =   2.994(Ft/s)
      ******* Irregular Channel Data ***********
----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1              0.00              1.00
      2             50.00              0.00
      3            100.00              1.00
Manning's 'N' friction factor =   0.025
----------------------------------------------------------------
Sub-Channel flow  =     11.828(CFS)
  '     '    flow top width =     28.110(Ft.)
  '     '    velocity=    2.994(Ft/s)
  '     '    area =      3.951(Sq.Ft)
  '     '    Froude number =     1.407

Upstream point elevation =   930.000(Ft.)
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Downstream point elevation =   905.000(Ft.)
Flow length =   720.000(Ft.)
Travel time  =    4.01 min.
Time of concentration =   17.50 min.
Depth of flow =   0.281(Ft.)
Average velocity =   2.994(Ft/s)
Total irregular channel flow =    11.828(CFS)
Irregular channel normal depth above invert elev. =   0.281(Ft.)
Average velocity of channel(s) =   2.994(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 78.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.404(In/Hr)
Rainfall intensity =      2.472(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.742
Subarea runoff =     16.074(CFS) for    9.000(Ac.)
Total runoff =     19.818(CFS)
Effective area this stream =       10.80(Ac.)
Total Study Area (Main Stream No. 1) =       18.90(Ac.)
Area averaged Fm value =    0.433(In/Hr)
Depth of flow =   0.341(Ft.), Average velocity =   3.406(Ft/s)


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Process from Point/Station       30.000 to Point/Station       30.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     10.800(Ac.)
Runoff from this stream =     19.818(CFS)
Time of concentration =   17.50 min.
Rainfall intensity =     2.472(In/Hr)
Area averaged loss rate (Fm) =    0.4326(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
Summary of stream data:

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


1     13.10     8.100     20.23    0.468      2.265
2     19.82    10.800     17.50    0.433      2.472
Qmax(1) =
         1.000 *    1.000 *    13.102) +
         0.899 *    1.000 *    19.818) + =      30.917
Qmax(2) =
         1.115 *    0.865 *    13.102) +
         1.000 *    1.000 *    19.818) + =      32.449

Total of 2 streams to confluence:
Flow rates before confluence point:
      13.102      19.818
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Maximum flow rates at confluence using above data:
       30.917       32.449
Area of streams before confluence:
        8.100       10.800
Effective area values after confluence:
       18.900       17.806
Results of confluence:
Total flow rate =     32.449(CFS)
Time of concentration =    17.499 min.
Effective stream area after confluence =     17.806(Ac.)
Study area average Pervious fraction(Ap) =  1.000
Study area average soil loss rate(Fm) =    0.448(In/Hr)
Study area total (this main stream) =      18.90(Ac.)


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Process from Point/Station       30.000 to Point/Station       30.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     17.806(Ac.)
Runoff from this stream =     32.449(CFS)
Time of concentration =   17.50 min.
Rainfall intensity =     2.472(In/Hr)
Area averaged loss rate (Fm) =    0.4479(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000


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Process from Point/Station       60.000 to Point/Station       70.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 67.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.578(In/Hr)
Initial subarea data:
Initial area flow distance =   350.000(Ft.)
Top (of initial area) elevation =   932.400(Ft.)
Bottom (of initial area) elevation =   926.600(Ft.)
Difference in elevation =     5.800(Ft.)
Slope =    0.01657  s(%)=       1.66
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.414 min.
Rainfall intensity =      3.037(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.729
Subarea runoff =      3.319(CFS)
Total initial stream area =        1.500(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.578(In/Hr)


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Process from Point/Station       70.000 to Point/Station       30.000
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**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
_____________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.330(Ft.), Average velocity =   2.376(Ft/s)
      ******* Irregular Channel Data ***********
-------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1              0.00              0.75
      2             30.00              0.00
      3             60.00              1.50
Manning's 'N' friction factor =   0.025
-------------------------------------------------------------------
Sub-Channel flow  =      7.740(CFS)
  '     '    flow top width =     19.772(Ft.)
  '     '    velocity=    2.376(Ft/s)
  '     '    area =      3.258(Sq.Ft)
  '     '    Froude number =     1.032

Upstream point elevation =   926.600(Ft.)
Downstream point elevation =   905.000(Ft.)
Flow length =  1220.000(Ft.)
Travel time  =    8.56 min.
Time of concentration =   20.97 min.
Depth of flow =   0.330(Ft.)
Average velocity =   2.376(Ft/s)
Total irregular channel flow =     7.740(CFS)
Irregular channel normal depth above invert elev. =   0.330(Ft.)
Average velocity of channel(s) =   2.376(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 67.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.578(In/Hr)
Rainfall intensity =      2.217(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.665
Subarea runoff =      8.775(CFS) for    6.700(Ac.)
Total runoff =     12.094(CFS)
Effective area this stream =        8.20(Ac.)
Total Study Area (Main Stream No. 1) =       27.10(Ac.)
Area averaged Fm value =    0.578(In/Hr)
Depth of flow =   0.390(Ft.), Average velocity =   2.656(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       30.000 to Point/Station       30.000
**** CONFLUENCE OF MINOR STREAMS ****
_____________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      8.200(Ac.)
Runoff from this stream =     12.094(CFS)
Time of concentration =   20.97 min.
Rainfall intensity =     2.217(In/Hr)
```

```
Area averaged loss rate (Fm) =    0.5783(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
Summary of stream data:

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


1     32.45    17.806     17.50    0.448      2.472
2     12.09     8.200     20.97    0.578      2.217
Qmax(1) =
         1.000 *    1.000 *    32.449) +
         1.155 *    0.834 *    12.094) + =      44.107
Qmax(2) =
         0.874 *    1.000 *    32.449) +
         1.000 *    1.000 *    12.094) + =      40.465

Total of 2 streams to confluence:
Flow rates before confluence point:
      32.449      12.094
Maximum flow rates at confluence using above data:
       44.107       40.465
Area of streams before confluence:
       17.806        8.200
Effective area values after confluence:
       24.648       26.006
Results of confluence:
Total flow rate =     44.107(CFS)
Time of concentration =    17.499 min.
Effective stream area after confluence =     24.648(Ac.)
Study area average Pervious fraction(Ap) =  1.000
Study area average soil loss rate(Fm) =    0.489(In/Hr)
Study area total (this main stream) =      26.01(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       30.000 to Point/Station      100.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   905.000(Ft.)
Downstream point/station elevation =   895.000(Ft.)
Pipe length  =  1200.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    44.107(CFS)
Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =    44.107(CFS)
Normal flow depth in pipe =   24.80(In.)
Flow top width inside pipe =   28.52(In.)
Critical Depth =   26.43(In.)
Pipe flow velocity =      9.22(Ft/s)
Travel time through pipe =    2.17 min.
Time of concentration (TC) =    19.67 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      100.000 to Point/Station      100.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
```

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 67.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.578(In/Hr)
Time of concentration = 19.67 min.
Rainfall intensity = 2.304(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area,(total area with modified rational method)(Q=KCIA) is C = 0.704
Subarea runoff = 1.903(CFS) for 3.700(Ac.)
Total runoff = 46.011(CFS)
Effective area this stream = 28.35(Ac.)
Total Study Area (Main Stream No. 1) = 30.80(Ac.)
Area averaged Fm value = 0.501(In/Hr)
End of computations, Total Study Area = 30.80 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number = 72.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 01/09/16

AGUA MANSA PROJECT
100 YEAR STORM
DEVELOPED CONDITION
AMC III

Program License Serial Number 6019

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.180 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 3

++
Process from Point/Station 10.000 to Point/Station 20.000
**** INITIAL AREA EVALUATION ****

MOBILE HOME PARK subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 56.00
Adjusted SCS curve number for AMC 3 = 75.80
Pervious ratio(Ap) = 0.2500 Max loss rate(Fm)= 0.110(In/Hr)
Initial subarea data:
Initial area flow distance = 300.000(Ft.)
Top (of initial area) elevation = 933.400(Ft.)
Bottom (of initial area) elevation = 932.000(Ft.)
Difference in elevation = 1.400(Ft.)
Slope = 0.00467 s(%)= 0.47
TC = k(0.336)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 9.625 min.
Rainfall intensity = 3.538(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.872
Subarea runoff = 7.404(CFS)
Total initial stream area = 2.400(Ac.)
Pervious area fraction = 0.250
Initial area Fm value = 0.110(In/Hr)

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Process from Point/Station       20.000 to Point/Station       25.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
____________________________________________________________________
Upstream point/station elevation =   926.000(Ft.)
Downstream point/station elevation =   925.000(Ft.)
Pipe length  =   737.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.404(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =     7.404(CFS)
Normal flow depth in pipe =   17.63(In.)
Flow top width inside pipe =   21.20(In.)
Critical Depth =   11.61(In.)
Pipe flow velocity =      3.00(Ft/s)
Travel time through pipe =    4.10 min.
Time of concentration (TC) =    13.72 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       25.000 to Point/Station       25.000
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      2.400(Ac.)
Runoff from this stream =      7.404(CFS)
Time of concentration =   13.72 min.
Rainfall intensity =     2.860(In/Hr)
Area averaged loss rate (Fm) =    0.1100(In/Hr)
Area averaged Pervious ratio (Ap) = 0.2500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       20.000 to Point/Station       30.000
**** INITIAL AREA EVALUATION ****
____________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 56.00
Adjusted SCS curve number for AMC 3 = 75.80
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.044(In/Hr)
Initial subarea data:
Initial area flow distance =   687.000(Ft.)
Top (of initial area) elevation =   932.000(Ft.)
Bottom (of initial area) elevation =   927.400(Ft.)
Difference in elevation =     4.600(Ft.)
Slope =    0.00670  s(%)=       0.67
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.285 min.
Rainfall intensity =      3.216(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.888
Subarea runoff =     20.981(CFS)
Total initial stream area =        7.350(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.044(In/Hr)
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Process from Point/Station       30.000 to Point/Station       25.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   925.400(Ft.)
Downstream point/station elevation =   925.000(Ft.)
Pipe length  =   150.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    20.981(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    20.981(CFS)
Normal flow depth in pipe =   24.33(In.)
Flow top width inside pipe =   23.49(In.)
Critical Depth =   18.68(In.)
Pipe flow velocity =      4.92(Ft/s)
Travel time through pipe =    0.51 min.
Time of concentration (TC) =    11.79 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       25.000 to Point/Station       25.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      7.350(Ac.)
Runoff from this stream =     20.981(CFS)
Time of concentration =   11.79 min.
Rainfall intensity =     3.132(In/Hr)
Area averaged loss rate (Fm) =    0.0440(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

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


1      7.40     2.400     13.72    0.110      2.860
2     20.98     7.350     11.79    0.044      3.132
Qmax(1) =
         1.000 *    1.000 *     7.404) +
         0.912 *    1.000 *    20.981) + =      26.535
Qmax(2) =
         1.099 *    0.859 *     7.404) +
         1.000 *    1.000 *    20.981) + =      27.974

Total of 2 streams to confluence:
Flow rates before confluence point:
       7.404      20.981
Maximum flow rates at confluence using above data:
       26.535       27.974
Area of streams before confluence:
        2.400        7.350
Effective area values after confluence:
        9.750        9.412
Results of confluence:
Total flow rate =     27.974(CFS)
Time of concentration =    11.793 min.
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```
Effective stream area after confluence =      9.412(Ac.)
Study area average Pervious fraction(Ap) =  0.137
Study area average soil loss rate(Fm) =    0.060(In/Hr)
Study area total (this main stream) =       9.75(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       25.000 to Point/Station       25.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      9.412(Ac.)
Runoff from this stream =     27.974(CFS)
Time of concentration =   11.79 min.
Rainfall intensity =     3.132(In/Hr)
Area averaged loss rate (Fm) =    0.0602(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1369


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Process from Point/Station       40.000 to Point/Station       50.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 56.00
Adjusted SCS curve number for AMC 3 = 75.80
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.044(In/Hr)
Initial subarea data:
Initial area flow distance =   312.000(Ft.)
Top (of initial area) elevation =   929.500(Ft.)
Bottom (of initial area) elevation =   927.400(Ft.)
Difference in elevation =     2.100(Ft.)
Slope =    0.00673  s(%)=       0.67
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.221 min.
Rainfall intensity =      3.889(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.890
Subarea runoff =      6.921(CFS)
Total initial stream area =        2.000(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.044(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       50.000 to Point/Station       25.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   925.400(Ft.)
Downstream point/station elevation =   925.000(Ft.)
Pipe length  =   150.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.921(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     6.921(CFS)
```

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Normal flow depth in pipe =   14.81(In.)
Flow top width inside pipe =   19.15(In.)
Critical Depth =   11.66(In.)
Pipe flow velocity =      3.82(Ft/s)
Travel time through pipe =    0.66 min.
Time of concentration (TC) =     8.88 min.


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Process from Point/Station       25.000 to Point/Station       25.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.000(Ac.)
Runoff from this stream =      6.921(CFS)
Time of concentration =    8.88 min.
Rainfall intensity =     3.714(In/Hr)
Area averaged loss rate (Fm) =    0.0440(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

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


1     27.97     9.412     11.79    0.060      3.132
2      6.92     2.000      8.88    0.044      3.714
Qmax(1) =
         1.000 *    1.000 *    27.974) +
         0.841 *    1.000 *     6.921) + =      33.797
Qmax(2) =
         1.190 *    0.753 *    27.974) +
         1.000 *    1.000 *     6.921) + =      31.966

Total of 2 streams to confluence:
Flow rates before confluence point:
      27.974       6.921
Maximum flow rates at confluence using above data:
       33.797       31.966
Area of streams before confluence:
        9.412        2.000
Effective area values after confluence:
       11.412        9.084
Results of confluence:
Total flow rate =     33.797(CFS)
Time of concentration =    11.793 min.
Effective stream area after confluence =     11.412(Ac.)
Study area average Pervious fraction(Ap) =  0.130
Study area average soil loss rate(Fm) =    0.057(In/Hr)
Study area total (this main stream) =      11.41(Ac.)


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Process from Point/Station       25.000 to Point/Station       25.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
UNDEVELOPED (poor cover) subarea
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Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 78.00
Adjusted SCS curve number for AMC 3 = 92.80
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.140(In/Hr)
Time of concentration =    11.79 min.
Rainfall intensity =      3.132(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.881
Subarea runoff =      1.820(CFS) for    1.500(Ac.)
Total runoff =     35.617(CFS)
Effective area this stream =       12.91(Ac.)
Total Study Area (Main Stream No. 1) =       13.25(Ac.)
Area averaged Fm value =    0.067(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       25.000 to Point/Station       70.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   925.000(Ft.)
Downstream point/station elevation =   915.000(Ft.)
Pipe length  =   700.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    35.617(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    35.617(CFS)
Normal flow depth in pipe =   21.28(In.)
Flow top width inside pipe =   22.06(In.)
Critical Depth =   24.28(In.)
Pipe flow velocity =     10.60(Ft/s)
Travel time through pipe =    1.10 min.
Time of concentration (TC) =    12.89 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       70.000 to Point/Station       70.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     12.912(Ac.)
Runoff from this stream =     35.617(CFS)
Time of concentration =   12.89 min.
Rainfall intensity =     2.969(In/Hr)
Area averaged loss rate (Fm) =    0.0670(In/Hr)
Area averaged Pervious ratio (Ap) = 0.2315
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       80.000 to Point/Station       90.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
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Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 56.00
Adjusted SCS curve number for AMC 3 = 75.80
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.044(In/Hr)
Initial subarea data:
Initial area flow distance =   792.000(Ft.)
Top (of initial area) elevation =   927.000(Ft.)
Bottom (of initial area) elevation =   919.700(Ft.)
Difference in elevation =     7.300(Ft.)
Slope =    0.00922  s(%)=       0.92
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.206 min.
Rainfall intensity =      3.229(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.888
Subarea runoff =      9.804(CFS)
Total initial stream area =        3.420(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.044(In/Hr)


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Process from Point/Station       90.000 to Point/Station       90.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      3.420(Ac.)
Runoff from this stream =      9.804(CFS)
Time of concentration =   11.21 min.
Rainfall intensity =     3.229(In/Hr)
Area averaged loss rate (Fm) =    0.0440(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


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Process from Point/Station      100.000 to Point/Station       90.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 56.00
Adjusted SCS curve number for AMC 3 = 75.80
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.044(In/Hr)
Initial subarea data:
Initial area flow distance =   507.000(Ft.)
Top (of initial area) elevation =   923.400(Ft.)
Bottom (of initial area) elevation =   919.700(Ft.)
Difference in elevation =     3.700(Ft.)
Slope =    0.00730  s(%)=       0.73
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.823 min.
Rainfall intensity =      3.495(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.889
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Subarea runoff =       9.814(CFS)
Total initial stream area =        3.160(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.044(In/Hr)


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Process from Point/Station       90.000 to Point/Station       90.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      3.160(Ac.)
Runoff from this stream =      9.814(CFS)
Time of concentration =    9.82 min.
Rainfall intensity =     3.495(In/Hr)
Area averaged loss rate (Fm) =    0.0440(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

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


1      9.80     3.420     11.21    0.044      3.229
2      9.81     3.160      9.82    0.044      3.495
Qmax(1) =
         1.000 *    1.000 *     9.804) +
         0.923 *    1.000 *     9.814) + =      18.863
Qmax(2) =
         1.083 *    0.877 *     9.804) +
         1.000 *    1.000 *     9.814) + =      19.125

Total of 2 streams to confluence:
Flow rates before confluence point:
       9.804       9.814
Maximum flow rates at confluence using above data:
       18.863       19.125
Area of streams before confluence:
        3.420        3.160
Effective area values after confluence:
        6.580        6.158
Results of confluence:
Total flow rate =     19.125(CFS)
Time of concentration =     9.823 min.
Effective stream area after confluence =      6.158(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.044(In/Hr)
Study area total (this main stream) =       6.58(Ac.)


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Process from Point/Station       90.000 to Point/Station      110.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   918.000(Ft.)
Downstream point/station elevation =   917.000(Ft.)
Pipe length  =  1227.00(Ft.)   Manning's N = 0.013
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No. of pipes = 1  Required pipe flow  =    19.125(CFS)
Nearest computed pipe diameter  =     39.00(In.)
Calculated individual pipe flow  =    19.125(CFS)
Normal flow depth in pipe =   26.67(In.)
Flow top width inside pipe =   36.27(In.)
Critical Depth =   16.42(In.)
Pipe flow velocity =      3.17(Ft/s)
Travel time through pipe =    6.46 min.
Time of concentration (TC) =    16.28 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      110.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      6.158(Ac.)
Runoff from this stream =     19.125(CFS)
Time of concentration =   16.28 min.
Rainfall intensity =     2.581(In/Hr)
Area averaged loss rate (Fm) =    0.0440(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


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Process from Point/Station      120.000 to Point/Station      130.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.079(In/Hr)
Initial subarea data:
Initial area flow distance =   554.000(Ft.)
Top (of initial area) elevation =   929.400(Ft.)
Bottom (of initial area) elevation =   927.300(Ft.)
Difference in elevation =     2.100(Ft.)
Slope =    0.00379  s(%)=       0.38
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.602 min.
Rainfall intensity =      3.163(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.878
Subarea runoff =     24.426(CFS)
Total initial stream area =        8.800(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.079(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      130.000 to Point/Station      110.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   925.300(Ft.)
```

```
Downstream point/station elevation =   917.000(Ft.)
Pipe length  =    25.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    24.426(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =    24.426(CFS)
Normal flow depth in pipe =    8.86(In.)
Flow top width inside pipe =   14.75(In.)
Critical depth could not be calculated.
Pipe flow velocity =     32.35(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    11.61 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      110.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      8.800(Ac.)
Runoff from this stream =     24.426(CFS)
Time of concentration =   11.61 min.
Rainfall intensity =     3.161(In/Hr)
Area averaged loss rate (Fm) =    0.0785(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

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


1     19.13     6.158     16.28    0.044      2.581
2     24.43     8.800     11.61    0.079      3.161
Qmax(1) =
         1.000 *    1.000 *    19.125) +
         0.812 *    1.000 *    24.426) + =      38.955
Qmax(2) =
         1.229 *    0.713 *    19.125) +
         1.000 *    1.000 *    24.426) + =      41.187

Total of 2 streams to confluence:
Flow rates before confluence point:
      19.125      24.426
Maximum flow rates at confluence using above data:
       38.955       41.187
Area of streams before confluence:
        6.158        8.800
Effective area values after confluence:
       14.958       13.192
Results of confluence:
Total flow rate =     41.187(CFS)
Time of concentration =    11.615 min.
Effective stream area after confluence =     13.192(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.064(In/Hr)
Study area total (this main stream) =      14.96(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      110.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 67.00
Adjusted SCS curve number for AMC 3 = 84.60
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.290(In/Hr)
The area added to the existing stream causes a
a lower flow rate of Q =     39.862(CFS)
therefore the upstream flow rate of Q =     41.187(CFS) is being used
Time of concentration =    11.61 min.
Rainfall intensity =      3.161(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.876
Subarea runoff =      0.000(CFS) for    1.200(Ac.)
Total runoff =     41.187(CFS)
Effective area this stream =       14.39(Ac.)
Total Study Area (Main Stream No. 2) =       29.83(Ac.)
Area averaged Fm value =    0.083(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station       70.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   916.000(Ft.)
Downstream point/station elevation =   915.000(Ft.)
Pipe length  =   133.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    41.187(CFS)
Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =    41.187(CFS)
Normal flow depth in pipe =   24.42(In.)
Flow top width inside pipe =   28.95(In.)
Critical Depth =   25.60(In.)
Pipe flow velocity =      8.73(Ft/s)
Travel time through pipe =    0.25 min.
Time of concentration (TC) =    11.87 min.


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Process from Point/Station       70.000 to Point/Station       70.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     14.392(Ac.)
Runoff from this stream =     41.187(CFS)
Time of concentration =   11.87 min.
Rainfall intensity =     3.120(In/Hr)
Area averaged loss rate (Fm) =    0.0831(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1750
Summary of stream data:
```

```
Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)    (Ac.)       (min) (In/Hr)     (In/Hr)


1     35.62    12.912     12.89    0.067      2.969
2     41.19    14.392     11.87    0.083      3.120
Qmax(1) =
         1.000 *    1.000 *    35.617) +
         0.950 *    1.000 *    41.187) + =      74.753
Qmax(2) =
         1.052 *    0.921 *    35.617) +
         1.000 *    1.000 *    41.187) + =      75.682

Total of 2 main streams to confluence:
Flow rates before confluence point:
      36.617      42.187
Maximum flow rates at confluence using above data:
       74.753       75.682
Area of streams before confluence:
       12.912       14.392
Effective area values after confluence:
       27.305       26.279


Results of confluence:
Total flow rate =     75.682(CFS)
Time of concentration =    11.869 min.
Effective stream area after confluence  =     26.279(Ac.)
Study area average Pervious fraction(Ap) =  0.202
Study area average soil loss rate(Fm) =    0.075(In/Hr)
Study area total =      27.30(Ac.)


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Process from Point/Station       70.000 to Point/Station       71.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   915.000(Ft.)
Downstream point/station elevation =   895.000(Ft.)
Pipe length  =  2180.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    75.682(CFS)
Nearest computed pipe diameter  =     39.00(In.)
Calculated individual pipe flow  =    75.682(CFS)
Normal flow depth in pipe =   30.56(In.)
Flow top width inside pipe =   32.12(In.)
Critical Depth =   32.97(In.)
Pipe flow velocity =     10.85(Ft/s)
Travel time through pipe =    3.35 min.
Time of concentration (TC) =    15.22 min.


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Process from Point/Station       74.000 to Point/Station       76.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
COMMERCIAL subarea type
```

```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 56.00
Adjusted SCS curve number for AMC 3 = 75.80
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.044(In/Hr)
Initial subarea data:
Initial area flow distance =   630.000(Ft.)
Top (of initial area) elevation =   926.000(Ft.)
Bottom (of initial area) elevation =   905.000(Ft.)
Difference in elevation =    21.000(Ft.)
Slope =    0.03333  s(%)=       3.33
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.907 min.
Rainfall intensity =      3.981(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.890
Subarea runoff =      8.857(CFS)
Total initial stream area =        2.500(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.044(In/Hr)
End of computations, Total Study Area =           32.33 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.186
Area averaged SCS curve number =  50.9
```

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 12/12/14

AGUA MANSA PROJECT
OFF SITE HYDROLOGY
100 YEAR STORM

Program License Serial Number 5028

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.180 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

++
Process from Point/Station 15.000 to Point/Station 35.000
**** INITIAL AREA EVALUATION ****

RESIDENTIAL(2 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 56.00
Pervious ratio(Ap) = 0.7000 Max loss rate(Fm)= 0.514(In/Hr)
Initial subarea data:
Initial area flow distance = 655.000(Ft.)
Top (of initial area) elevation = 953.000(Ft.)
Bottom (of initial area) elevation = 939.000(Ft.)
Difference in elevation = 14.000(Ft.)
Slope = 0.02137 s(%)= 2.14
TC = k(0.438)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.647 min.
Rainfall intensity = 3.003(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.746
Subarea runoff = 13.219(CFS)
Total initial stream area = 5.900(Ac.)
Pervious area fraction = 0.700
Initial area Fm value = 0.514(In/Hr)

++
Process from Point/Station 35.000 to Point/Station 35.000

```
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      5.900(Ac.)
Runoff from this stream =     13.219(CFS)
Time of concentration =   12.65 min.
Rainfall intensity =     3.003(In/Hr)
Area averaged loss rate (Fm) =    0.5138(In/Hr)
Area averaged Pervious ratio (Ap) = 0.7000


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Process from Point/Station       25.000 to Point/Station       35.000
**** INITIAL AREA EVALUATION ****
____________________________________________________________________
RESIDENTIAL(2 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 56.00
Pervious ratio(Ap) = 0.7000     Max loss rate(Fm)=     0.514(In/Hr)
Initial subarea data:
Initial area flow distance =   510.000(Ft.)
Top (of initial area) elevation =   946.000(Ft.)
Bottom (of initial area) elevation =   939.000(Ft.)
Difference in elevation =     7.000(Ft.)
Slope =    0.01373  s(%)=       1.37
TC = k(0.438)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.502 min.
Rainfall intensity =      3.024(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.747
Subarea runoff =      8.359(CFS)
Total initial stream area =        3.700(Ac.)
Pervious area fraction = 0.700
Initial area Fm value =    0.514(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       35.000 to Point/Station       35.000
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      3.700(Ac.)
Runoff from this stream =      8.359(CFS)
Time of concentration =   12.50 min.
Rainfall intensity =     3.024(In/Hr)
Area averaged loss rate (Fm) =    0.5138(In/Hr)
Area averaged Pervious ratio (Ap) = 0.7000
Summary of stream data:

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


1     13.22     5.900     12.65    0.514      3.003
2      8.36     3.700     12.50    0.514      3.024
```

```
Qmax(1) =
         1.000 *    1.000 *    13.219) +
         0.992 *    1.000 *     8.359) + =      21.508
Qmax(2) =
         1.008 *    0.989 *    13.219) +
         1.000 *    1.000 *     8.359) + =      21.536

Total of 2 streams to confluence:
Flow rates before confluence point:
      13.219       8.359
Maximum flow rates at confluence using above data:
       21.508       21.536
Area of streams before confluence:
        5.900        3.700
Effective area values after confluence:
        9.600        9.533
Results of confluence:
Total flow rate =     21.536(CFS)
Time of concentration =    12.502 min.
Effective stream area after confluence =      9.533(Ac.)
Study area average Pervious fraction(Ap) =  0.700
Study area average soil loss rate(Fm) =    0.514(In/Hr)
Study area total (this main stream) =       9.60(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       35.000 to Point/Station       40.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   939.000(Ft.)
End of street segment elevation =   937.000(Ft.)
Length of street segment  =   600.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =   8.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  18.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     23.175(CFS)
Depth of flow =   0.583(Ft.), Average velocity =   2.210(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    3.33(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   2.21(Ft/s)
Travel time =    4.53 min.     TC =   17.03  min.
 Adding area flow to street
RESIDENTIAL(2 dwl/acre)
Decimal fraction soil group A = 0.000
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```
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 56.00
Pervious ratio(Ap) = 0.7000     Max loss rate(Fm)=     0.514(In/Hr)
Rainfall intensity =      2.512(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.716
Subarea runoff =      3.165(CFS) for    4.200(Ac.)
Total runoff =     24.700(CFS)
Effective area this stream =       13.73(Ac.)
Total Study Area (Main Stream No. 1) =       13.80(Ac.)
Area averaged Fm value =    0.514(In/Hr)
Street flow at end of street =     24.700(CFS)
Half street flow at end of street =     12.350(CFS)
Depth of flow =   0.595(Ft.), Average velocity =   2.248(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    3.80(Ft.)
Flow width (from curb towards crown)=  18.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       40.000 to Point/Station       40.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     13.733(Ac.)
Runoff from this stream =     24.700(CFS)
Time of concentration =   17.03 min.
Rainfall intensity =     2.512(In/Hr)
Area averaged loss rate (Fm) =    0.5138(In/Hr)
Area averaged Pervious ratio (Ap) = 0.7000
Program is now starting with Main Stream No. 2


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Process from Point/Station       10.000 to Point/Station       30.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 56.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.073(In/Hr)
Initial subarea data:
Initial area flow distance =   930.000(Ft.)
Top (of initial area) elevation =   959.000(Ft.)
Bottom (of initial area) elevation =   942.000(Ft.)
Difference in elevation =    17.000(Ft.)
Slope =    0.01828  s(%)=       1.83
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.420 min.
Rainfall intensity =      3.373(In/Hr) for a   100.0 year storm
```

```
Effective runoff coefficient used for area (Q=KCIA) is C = 0.880
Subarea runoff =       3.861(CFS)
Total initial stream area =        1.300(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.073(In/Hr)


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Process from Point/Station       30.000 to Point/Station       30.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      1.300(Ac.)
Runoff from this stream =      3.861(CFS)
Time of concentration =   10.42 min.
Rainfall intensity =     3.373(In/Hr)
Area averaged loss rate (Fm) =    0.0734(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       20.000 to Point/Station       30.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 56.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.073(In/Hr)
Initial subarea data:
Initial area flow distance =   350.000(Ft.)
Top (of initial area) elevation =   955.000(Ft.)
Bottom (of initial area) elevation =   942.000(Ft.)
Difference in elevation =    13.000(Ft.)
Slope =    0.03714  s(%)=       3.71
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.117 min.
Rainfall intensity =      4.644(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.886
Subarea runoff =      1.645(CFS)
Total initial stream area =        0.400(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.073(In/Hr)


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Process from Point/Station       30.000 to Point/Station       30.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.400(Ac.)
Runoff from this stream =      1.645(CFS)
Time of concentration =    6.12 min.
Rainfall intensity =     4.644(In/Hr)
Area averaged loss rate (Fm) =    0.0734(In/Hr)
```

```
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

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


1       3.86     1.300     10.42    0.073      3.373
2       1.65     0.400      6.12    0.073      4.644
Qmax(1) =
         1.000 *    1.000 *     3.861) +
         0.722 *    1.000 *     1.645) + =       5.049
Qmax(2) =
         1.385 *    0.587 *     3.861) +
         1.000 *    1.000 *     1.645) + =       4.784

Total of 2 streams to confluence:
Flow rates before confluence point:
       3.861       1.645
Maximum flow rates at confluence using above data:
        5.049        4.784
Area of streams before confluence:
        1.300        0.400
Effective area values after confluence:
        1.700        1.163
Results of confluence:
Total flow rate =      5.049(CFS)
Time of concentration =    10.420 min.
Effective stream area after confluence =      1.700(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.073(In/Hr)
Study area total (this main stream) =       1.70(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       30.000 to Point/Station       40.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------
Top of street segment elevation =   942.000(Ft.)
End of street segment elevation =   937.000(Ft.)
Length of street segment  =   820.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =   8.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  18.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =    11.545(CFS)
Depth of flow =   0.438(Ft.), Average velocity =   2.270(Ft/s)
Streetflow hydraulics at midpoint of street travel:
```

```
Halfstreet flow width =  15.543(Ft.)
Flow velocity =   2.27(Ft/s)
Travel time =    6.02 min.     TC =   16.44  min.
 Adding area flow to street
RESIDENTIAL(2 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 56.00
Pervious ratio(Ap) = 0.7000     Max loss rate(Fm)=     0.514(In/Hr)
Rainfall intensity =      2.566(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.748
Subarea runoff =     12.801(CFS) for    7.600(Ac.)
Total runoff =     17.850(CFS)
Effective area this stream =        9.30(Ac.)
Total Study Area (Main Stream No. 2) =       23.10(Ac.)
Area averaged Fm value =    0.433(In/Hr)
Street flow at end of street =     17.850(CFS)
Half street flow at end of street =      8.925(CFS)
Depth of flow =   0.494(Ft.), Average velocity =   2.549(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  18.000(Ft.)


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Process from Point/Station       40.000 to Point/Station       40.000
**** CONFLUENCE OF MAIN STREAMS ****
----------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      9.300(Ac.)
Runoff from this stream =     17.850(CFS)
Time of concentration =   16.44 min.
Rainfall intensity =     2.566(In/Hr)
Area averaged loss rate (Fm) =    0.4333(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5903
Summary of stream data:

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


1     24.70    13.733     17.03    0.514      2.512
2     17.85     9.300     16.44    0.433      2.566
Qmax(1) =
         1.000 *    1.000 *    24.700) +
         0.975 *    1.000 *    17.850) + =      42.102
Qmax(2) =
         1.027 *    0.965 *    24.700) +
         1.000 *    1.000 *    17.850) + =      42.336

Total of 2 main streams to confluence:
Flow rates before confluence point:
      25.700      18.850
Maximum flow rates at confluence using above data:
```

```
       42.102        42.336
Area of streams before confluence:
       13.733         9.300
Effective area values after confluence:
       23.033        22.558


Results of confluence:
Total flow rate =      42.336(CFS)
Time of concentration =    16.440 min.
Effective stream area after confluence  =     22.558(Ac.)
Study area average Pervious fraction(Ap) =  0.656
Study area average soil loss rate(Fm) =    0.481(In/Hr)
Study area total =      23.03(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       40.000 to Point/Station       50.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------
Top of street segment elevation =   937.000(Ft.)
End of street segment elevation =   935.000(Ft.)
Length of street segment  =   265.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =   8.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  18.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
Manning's N in gutter =  0.0150
Manning's N from gutter to grade break =  0.0150
Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     43.208(CFS)
Depth of flow =   0.624(Ft.), Average velocity =   3.521(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    4.94(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   3.52(Ft/s)
Travel time =    1.25 min.     TC =   17.69  min.
Adding area flow to street
RESIDENTIAL(2 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 56.00
Pervious ratio(Ap) = 0.7000     Max loss rate(Fm)=     0.514(In/Hr)
Rainfall intensity =      2.455(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.723
Subarea runoff =      1.581(CFS) for    2.200(Ac.)
```

```
Total runoff =     43.917(CFS)
Effective area this stream =       24.76(Ac.)
Total Study Area (Main Stream No. 1) =       25.30(Ac.)
Area averaged Fm value =    0.484(In/Hr)
Street flow at end of street =     43.917(CFS)
Half street flow at end of street =     21.959(CFS)
Depth of flow =   0.627(Ft.), Average velocity =   3.536(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    5.07(Ft.)
Flow width (from curb towards crown)=  18.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       50.000 to Point/Station       50.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 56.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.073(In/Hr)
Time of concentration =    17.69 min.
Rainfall intensity =      2.455(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.729
Subarea runoff =      2.358(CFS) for    1.100(Ac.)
Total runoff =     46.275(CFS)
Effective area this stream =       25.86(Ac.)
Total Study Area (Main Stream No. 1) =       26.40(Ac.)
Area averaged Fm value =    0.467(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       50.000 to Point/Station       60.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   935.000(Ft.)
End of street segment elevation =   933.000(Ft.)
Length of street segment  =   210.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =   8.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  18.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     46.326(CFS)
Depth of flow =   0.615(Ft.), Average velocity =   3.906(Ft/s)
```

```
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    4.58(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   3.91(Ft/s)
Travel time =    0.90 min.     TC =   18.59  min.
 Adding area flow to street
RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 56.00
Pervious ratio(Ap) = 0.8000     Max loss rate(Fm)=     0.587(In/Hr)
The area added to the existing stream causes a
a lower flow rate of Q =     46.062(CFS)
therefore the upstream flow rate of Q =     46.275(CFS) is being used
Rainfall intensity =      2.383(In/Hr) for a  100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.722
Subarea runoff =      0.000(CFS) for    0.900(Ac.)
Total runoff =     46.275(CFS)
Effective area this stream =       26.76(Ac.)
Total Study Area (Main Stream No. 1) =       27.30(Ac.)
Area averaged Fm value =    0.471(In/Hr)
Street flow at end of street =     46.275(CFS)
Half street flow at end of street =     23.138(CFS)
Depth of flow =   0.614(Ft.), Average velocity =   3.905(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    4.57(Ft.)
Flow width (from curb towards crown)=  18.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       60.000 to Point/Station       60.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     26.758(Ac.)
Runoff from this stream =     46.275(CFS)
Time of concentration =   18.59 min.
Rainfall intensity =     2.383(In/Hr)
Area averaged loss rate (Fm) =    0.4707(In/Hr)
Area averaged Pervious ratio (Ap) = 0.6414
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      100.000 to Point/Station      110.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
```

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Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 56.00
Pervious ratio(Ap) = 0.8000     Max loss rate(Fm)=     0.587(In/Hr)
Initial subarea data:
Initial area flow distance =   580.000(Ft.)
Top (of initial area) elevation =   950.000(Ft.)
Bottom (of initial area) elevation =   939.000(Ft.)
Difference in elevation =    11.000(Ft.)
Slope =    0.01897  s(%)=       1.90
TC = k(0.469)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.211 min.
Rainfall intensity =      2.926(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.719
Subarea runoff =      6.103(CFS)
Total initial stream area =        2.900(Ac.)
Pervious area fraction = 0.800
Initial area Fm value =    0.587(In/Hr)


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Process from Point/Station      110.000 to Point/Station      110.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 56.00
Pervious ratio(Ap) = 0.8000     Max loss rate(Fm)=     0.587(In/Hr)
Time of concentration =    13.21 min.
Rainfall intensity =      2.926(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.719
Subarea runoff =     17.047(CFS) for    8.100(Ac.)
Total runoff =     23.150(CFS)
Effective area this stream =       11.00(Ac.)
Total Study Area (Main Stream No. 2) =       38.30(Ac.)
Area averaged Fm value =    0.587(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      120.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   939.000(Ft.)
End of street segment elevation =   938.000(Ft.)
Length of street segment  =   370.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =   8.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  18.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
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```
Gutter width =  2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     23.209(CFS)
Depth of flow =   0.603(Ft.), Average velocity =   2.047(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    4.11(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   2.05(Ft/s)
Travel time =    3.01 min.     TC =   16.22  min.
 Adding area flow to street
RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 56.00
Pervious ratio(Ap) = 0.8000     Max loss rate(Fm)=     0.587(In/Hr)
The area added to the existing stream causes a
a lower flow rate of Q =     21.411(CFS)
therefore the upstream flow rate of Q =     23.150(CFS) is being used
Rainfall intensity =      2.586(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.696
Subarea runoff =      0.000(CFS) for    0.900(Ac.)
Total runoff =     23.150(CFS)
Effective area this stream =       11.90(Ac.)
Total Study Area (Main Stream No. 2) =       39.20(Ac.)
Area averaged Fm value =    0.587(In/Hr)
Street flow at end of street =     23.150(CFS)
Half street flow at end of street =     11.575(CFS)
Depth of flow =   0.602(Ft.), Average velocity =   2.046(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    4.09(Ft.)
Flow width (from curb towards crown)=  18.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      120.000 to Point/Station      120.000
**** SUBAREA FLOW ADDITION ****
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```
RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 56.00
Pervious ratio(Ap) = 0.8000     Max loss rate(Fm)=     0.587(In/Hr)
Time of concentration =    16.22 min.
Rainfall intensity =      2.586(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.696
```

```
Subarea runoff =      13.554(CFS) for     8.500(Ac.)
Total runoff =      36.704(CFS)
Effective area this stream =        20.40(Ac.)
Total Study Area (Main Stream No. 2) =        47.70(Ac.)
Area averaged Fm value =     0.587(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       120.000 to Point/Station       60.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   938.000(Ft.)
End of street segment elevation =   933.000(Ft.)
Length of street segment  =   340.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =   8.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  18.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     36.794(CFS)
Depth of flow =   0.536(Ft.), Average velocity =   4.304(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    1.43(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   4.30(Ft/s)
Travel time =    1.32 min.     TC =   17.54  min.
 Adding area flow to street
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 56.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.073(In/Hr)
The area added to the existing stream causes a
a lower flow rate of Q =     35.394(CFS)
therefore the upstream flow rate of Q =     36.704(CFS) is being used
Rainfall intensity =      2.468(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.689
Subarea runoff =      0.000(CFS) for     0.400(Ac.)
Total runoff =      36.704(CFS)
Effective area this stream =        20.80(Ac.)
Total Study Area (Main Stream No. 2) =        48.10(Ac.)
Area averaged Fm value =     0.577(In/Hr)
Street flow at end of street =     36.704(CFS)
Half street flow at end of street =     18.352(CFS)
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```
Depth of flow =   0.535(Ft.), Average velocity =   4.301(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    1.41(Ft.)
Flow width (from curb towards crown)=  18.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       60.000 to Point/Station       60.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
RESIDENTIAL(1 acre lot)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 56.00
Pervious ratio(Ap) = 0.8000     Max loss rate(Fm)=     0.587(In/Hr)
Time of concentration =    17.54 min.
Rainfall intensity =      2.468(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.688
Subarea runoff =     12.401(CFS) for    8.100(Ac.)
Total runoff =     49.105(CFS)
Effective area this stream =       28.90(Ac.)
Total Study Area (Main Stream No. 2) =       56.20(Ac.)
Area averaged Fm value =    0.580(In/Hr)


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Process from Point/Station       60.000 to Point/Station       60.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     28.900(Ac.)
Runoff from this stream =     49.105(CFS)
Time of concentration =   17.54 min.
Rainfall intensity =     2.468(In/Hr)
Area averaged loss rate (Fm) =    0.5800(In/Hr)
Area averaged Pervious ratio (Ap) = 0.7903
Summary of stream data:

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


1      46.28    26.758     18.59    0.471       2.383
2      49.11    28.900     17.54    0.580       2.468
Qmax(1) =
         1.000 *    1.000 *    46.275) +
         0.955 *    1.000 *    49.105) + =      93.181
Qmax(2) =
         1.044 *    0.944 *    46.275) +
         1.000 *    1.000 *    49.105) + =      94.699

Total of 2 main streams to confluence:
```

```
Flow rates before confluence point:
      47.275      50.105
Maximum flow rates at confluence using above data:
       93.181       94.699
Area of streams before confluence:
       26.758       28.900
Effective area values after confluence:
       55.658       54.147


Results of confluence:
Total flow rate =      94.699(CFS)
Time of concentration =    17.541 min.
Effective stream area after confluence  =      54.147(Ac.)
Study area average Pervious fraction(Ap) =  0.719
Study area average soil loss rate(Fm) =    0.527(In/Hr)
Study area total =      55.66(Ac.)


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Process from Point/Station       60.000 to Point/Station       70.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   933.000(Ft.)
End of street segment elevation =   924.000(Ft.)
Length of street segment  =   650.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =   8.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  18.000(Ft.)
Slope from curb to property line (v/hz) =  0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     95.060(CFS)
Depth of flow =   0.729(Ft.), Average velocity =   5.420(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    9.15(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   5.42(Ft/s)
Travel time =    2.00 min.     TC =   19.54  min.
 Adding area flow to street
RESIDENTIAL(2 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 56.00
Pervious ratio(Ap) = 0.7000     Max loss rate(Fm)=     0.514(In/Hr)
Rainfall intensity =      2.313(In/Hr) for a   100.0 year storm
```

```
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.695
Subarea runoff =      0.586(CFS) for    5.100(Ac.)
Total runoff =     95.285(CFS)
Effective area this stream =       59.25(Ac.)
Total Study Area (Main Stream No. 1) =       61.30(Ac.)
Area averaged Fm value =    0.526(In/Hr)
Street flow at end of street =     95.285(CFS)
Half street flow at end of street =     47.642(CFS)
Depth of flow =   0.729(Ft.), Average velocity =   5.423(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    9.17(Ft.)
Flow width (from curb towards crown)=  18.000(Ft.)


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Process from Point/Station       70.000 to Point/Station       70.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
RESIDENTIAL(2 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 56.00
Pervious ratio(Ap) = 0.7000     Max loss rate(Fm)=     0.514(In/Hr)
Time of concentration =    19.54 min.
Rainfall intensity =      2.313(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.696
Subarea runoff =      9.069(CFS) for    5.600(Ac.)
Total runoff =    104.354(CFS)
Effective area this stream =       64.85(Ac.)
Total Study Area (Main Stream No. 1) =       66.90(Ac.)
Area averaged Fm value =    0.525(In/Hr)
End of computations, Total Study Area =           66.90 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.715
Area averaged SCS curve number =  56.0
```

Unit Hydrograph

(Ac.)	Fract	(AMC2)	(AMC3)		Yield Fr
2.99	0.232	50.5	70.5	4.18	0.420
9.92	0.768	98.0	98.0	0.20	0.953

Area-averaged catchment yield fraction, Y = 0.830
Area-averaged low loss fraction, Yb = 0.170
Direct entry of lag time by user
++
Watershed area = 12.91(Ac.)
Catchment Lag time = 0.157 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 53.0110
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.132(In/Hr)
Average low loss rate fraction (Yb) = 0.170 (decimal)
Note: user entry of the Fm value
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.437(In)
Computed peak 30-minute rainfall = 0.894(In)
Specified peak 1-hour rainfall = 1.180(In)
Computed peak 3-hour rainfall = 1.982(In)
Specified peak 6-hour rainfall = 2.750(In)
Specified peak 24-hour rainfall = 5.070(In)

Rainfall depth area reduction factors:
Using a total area of 12.91(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999 Adjusted rainfall = 0.436(In)
30-minute factor = 0.999 Adjusted rainfall = 0.894(In)
1-hour factor = 0.999 Adjusted rainfall = 1.179(In)
3-hour factor = 1.000 Adjusted rainfall = 1.982(In)
6-hour factor = 1.000 Adjusted rainfall = 2.750(In)
24-hour factor = 1.000 Adjusted rainfall = 5.070(In)

U n i t H y d r o g r a p h
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Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 156.13 (CFS))	
1	5.123	7.998
2	33.230	43.884
3	73.372	62.674
4	92.112	29.259
5	97.761	8.820
6	99.048	2.009
7	100.000	1.486

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.4365	0.4365
2	0.5759	0.1395
3	0.6773	0.1014
4	0.7599	0.0826
5	0.8309	0.0709
6	0.8937	0.0629
7	0.9506	0.0568
8	1.0027	0.0522
9	1.0511	0.0484
10	1.0963	0.0452

11	1.1389	0.0426
12	1.1793	0.0403
13	1.2248	0.0455
14	1.2684	0.0437
15	1.3105	0.0420
16	1.3511	0.0406
17	1.3903	0.0393
18	1.4284	0.0381
19	1.4654	0.0370
20	1.5014	0.0360
21	1.5364	0.0350
22	1.5705	0.0342
23	1.6039	0.0333
24	1.6365	0.0326
25	1.6684	0.0319
26	1.6996	0.0312
27	1.7302	0.0306
28	1.7602	0.0300
29	1.7896	0.0294
30	1.8185	0.0289
31	1.8469	0.0284
32	1.8749	0.0279
33	1.9023	0.0275
34	1.9294	0.0270
35	1.9560	0.0266
36	1.9822	0.0262
37	2.0080	0.0258
38	2.0335	0.0254
39	2.0586	0.0251
40	2.0833	0.0248
41	2.1078	0.0244
42	2.1319	0.0241
43	2.1557	0.0238
44	2.1793	0.0235
45	2.2025	0.0233
46	2.2255	0.0230
47	2.2482	0.0227
48	2.2707	0.0225
49	2.2929	0.0222
50	2.3149	0.0220
51	2.3366	0.0218
52	2.3581	0.0215
53	2.3795	0.0213
54	2.4006	0.0211
55	2.4214	0.0209
56	2.4421	0.0207
57	2.4626	0.0205
58	2.4829	0.0203
59	2.5031	0.0201
60	2.5230	0.0199
61	2.5428	0.0198
62	2.5624	0.0196
63	2.5818	0.0194
64	2.6011	0.0193
65	2.6202	0.0191
66	2.6392	0.0190
67	2.6580	0.0188
68	2.6767	0.0187
69	2.6952	0.0185
70	2.7135	0.0184
71	2.7318	0.0182
72	2.7499	0.0181
73	2.7667	0.0168

137	3.6526	0.0118
138	3.6644	0.0117
139	3.6761	0.0117
140	3.6877	0.0116
141	3.6993	0.0116
142	3.7109	0.0116
143	3.7224	0.0115
144	3.7339	0.0115
145	3.7453	0.0114
146	3.7567	0.0114
147	3.7680	0.0113
148	3.7793	0.0113
149	3.7905	0.0112
150	3.8017	0.0112
151	3.8129	0.0112
152	3.8240	0.0111
153	3.8351	0.0111
154	3.8461	0.0110
155	3.8571	0.0110
156	3.8681	0.0110
157	3.8790	0.0109
158	3.8899	0.0109
159	3.9008	0.0108
160	3.9116	0.0108
161	3.9223	0.0108
162	3.9331	0.0107
163	3.9438	0.0107
164	3.9544	0.0107
165	3.9650	0.0106
166	3.9756	0.0106
167	3.9862	0.0106
168	3.9967	0.0105
169	4.0072	0.0105
170	4.0176	0.0104
171	4.0280	0.0104
172	4.0384	0.0104
173	4.0488	0.0103
174	4.0591	0.0103
175	4.0693	0.0103
176	4.0796	0.0102
177	4.0898	0.0102
178	4.1000	0.0102
179	4.1101	0.0101
180	4.1203	0.0101
181	4.1303	0.0101
182	4.1404	0.0101
183	4.1504	0.0100
184	4.1604	0.0100
185	4.1704	0.0100
186	4.1803	0.0099
187	4.1902	0.0099
188	4.2001	0.0099
189	4.2099	0.0098
190	4.2197	0.0098
191	4.2295	0.0098
192	4.2393	0.0098
193	4.2490	0.0097
194	4.2587	0.0097
195	4.2684	0.0097
196	4.2780	0.0096
197	4.2877	0.0096
198	4.2972	0.0096
199	4.3068	0.0096

96	0.0114	0.0019	0.0094
97	0.0115	0.0020	0.0095
98	0.0115	0.0020	0.0096
99	0.0116	0.0020	0.0096
100	0.0116	0.0020	0.0097
101	0.0117	0.0020	0.0097
102	0.0118	0.0020	0.0098
103	0.0119	0.0020	0.0099
104	0.0119	0.0020	0.0099
105	0.0120	0.0020	0.0100
106	0.0121	0.0021	0.0100
107	0.0122	0.0021	0.0101
108	0.0122	0.0021	0.0102
109	0.0124	0.0021	0.0103
110	0.0124	0.0021	0.0103
111	0.0125	0.0021	0.0104
112	0.0126	0.0021	0.0104
113	0.0127	0.0022	0.0105
114	0.0128	0.0022	0.0106
115	0.0129	0.0022	0.0107
116	0.0129	0.0022	0.0107
117	0.0131	0.0022	0.0108
118	0.0131	0.0022	0.0109
119	0.0133	0.0023	0.0110
120	0.0133	0.0023	0.0111
121	0.0135	0.0023	0.0112
122	0.0135	0.0023	0.0112
123	0.0137	0.0023	0.0114
124	0.0138	0.0023	0.0114
125	0.0139	0.0024	0.0115
126	0.0140	0.0024	0.0116
127	0.0141	0.0024	0.0117
128	0.0142	0.0024	0.0118
129	0.0144	0.0024	0.0119
130	0.0145	0.0025	0.0120
131	0.0147	0.0025	0.0122
132	0.0147	0.0025	0.0122
133	0.0149	0.0025	0.0124
134	0.0150	0.0026	0.0125
135	0.0152	0.0026	0.0126
136	0.0153	0.0026	0.0127
137	0.0155	0.0026	0.0129
138	0.0156	0.0027	0.0130
139	0.0158	0.0027	0.0131
140	0.0159	0.0027	0.0132
141	0.0162	0.0028	0.0134
142	0.0163	0.0028	0.0135
143	0.0165	0.0028	0.0137
144	0.0167	0.0028	0.0138
145	0.0181	0.0031	0.0150
146	0.0182	0.0031	0.0151
147	0.0185	0.0032	0.0154
148	0.0187	0.0032	0.0155
149	0.0190	0.0032	0.0157
150	0.0191	0.0033	0.0159
151	0.0194	0.0033	0.0161
152	0.0196	0.0033	0.0163
153	0.0199	0.0034	0.0166
154	0.0201	0.0034	0.0167
155	0.0205	0.0035	0.0170
156	0.0207	0.0035	0.0172
157	0.0211	0.0036	0.0175
158	0.0213	0.0036	0.0177

159	0.0218	0.0037	0.0180
160	0.0220	0.0037	0.0182
161	0.0225	0.0038	0.0186
162	0.0227	0.0039	0.0189
163	0.0233	0.0040	0.0193
164	0.0235	0.0040	0.0195
165	0.0241	0.0041	0.0200
166	0.0244	0.0042	0.0203
167	0.0251	0.0043	0.0208
168	0.0254	0.0043	0.0211
169	0.0262	0.0045	0.0218
170	0.0266	0.0045	0.0221
171	0.0275	0.0047	0.0228
172	0.0279	0.0048	0.0232
173	0.0289	0.0049	0.0240
174	0.0294	0.0050	0.0244
175	0.0306	0.0052	0.0254
176	0.0312	0.0053	0.0259
177	0.0326	0.0055	0.0270
178	0.0333	0.0057	0.0277
179	0.0350	0.0060	0.0291
180	0.0360	0.0061	0.0298
181	0.0381	0.0065	0.0316
182	0.0393	0.0067	0.0326
183	0.0420	0.0072	0.0349
184	0.0437	0.0074	0.0362
185	0.0403	0.0069	0.0335
186	0.0426	0.0073	0.0354
187	0.0484	0.0082	0.0401
188	0.0522	0.0089	0.0433
189	0.0629	0.0107	0.0522
190	0.0709	0.0110	0.0600
191	0.1014	0.0110	0.0904
192	0.1395	0.0110	0.1285
193	0.4365	0.0110	0.4255
194	0.0826	0.0110	0.0716
195	0.0568	0.0097	0.0472
196	0.0452	0.0077	0.0375
197	0.0455	0.0077	0.0377
198	0.0406	0.0069	0.0337
199	0.0370	0.0063	0.0307
200	0.0342	0.0058	0.0283
201	0.0319	0.0054	0.0265
202	0.0300	0.0051	0.0249
203	0.0284	0.0048	0.0236
204	0.0270	0.0046	0.0224
205	0.0258	0.0044	0.0214
206	0.0248	0.0042	0.0205
207	0.0238	0.0041	0.0198
208	0.0230	0.0039	0.0191
209	0.0222	0.0038	0.0184
210	0.0215	0.0037	0.0179
211	0.0209	0.0036	0.0173
212	0.0203	0.0035	0.0169
213	0.0198	0.0034	0.0164
214	0.0193	0.0033	0.0160
215	0.0188	0.0032	0.0156
216	0.0184	0.0031	0.0152
217	0.0168	0.0029	0.0139
218	0.0164	0.0028	0.0136
219	0.0161	0.0027	0.0133
220	0.0157	0.0027	0.0130
221	0.0154	0.0026	0.0128

222	0.0151	0.0026	0.0125
223	0.0148	0.0025	0.0123
224	0.0146	0.0025	0.0121
225	0.0143	0.0024	0.0119
226	0.0141	0.0024	0.0117
227	0.0138	0.0024	0.0115
228	0.0136	0.0023	0.0113
229	0.0134	0.0023	0.0111
230	0.0132	0.0022	0.0110
231	0.0130	0.0022	0.0108
232	0.0128	0.0022	0.0106
233	0.0126	0.0022	0.0105
234	0.0125	0.0021	0.0103
235	0.0123	0.0021	0.0102
236	0.0121	0.0021	0.0101
237	0.0120	0.0020	0.0099
238	0.0118	0.0020	0.0098
239	0.0117	0.0020	0.0097
240	0.0116	0.0020	0.0096
241	0.0114	0.0019	0.0095
242	0.0113	0.0019	0.0094
243	0.0112	0.0019	0.0093
244	0.0110	0.0019	0.0092
245	0.0109	0.0019	0.0091
246	0.0108	0.0018	0.0090
247	0.0107	0.0018	0.0089
248	0.0106	0.0018	0.0088
249	0.0105	0.0018	0.0087
250	0.0104	0.0018	0.0086
251	0.0103	0.0017	0.0085
252	0.0102	0.0017	0.0084
253	0.0101	0.0017	0.0084
254	0.0100	0.0017	0.0083
255	0.0099	0.0017	0.0082
256	0.0098	0.0017	0.0081
257	0.0097	0.0017	0.0081
258	0.0096	0.0016	0.0080
259	0.0096	0.0016	0.0079
260	0.0095	0.0016	0.0079
261	0.0094	0.0016	0.0078
262	0.0093	0.0016	0.0077
263	0.0093	0.0016	0.0077
264	0.0092	0.0016	0.0076
265	0.0091	0.0016	0.0076
266	0.0090	0.0015	0.0075
267	0.0090	0.0015	0.0074
268	0.0089	0.0015	0.0074
269	0.0088	0.0015	0.0073
270	0.0088	0.0015	0.0073
271	0.0087	0.0015	0.0072
272	0.0087	0.0015	0.0072
273	0.0086	0.0015	0.0071
274	0.0085	0.0015	0.0071
275	0.0085	0.0014	0.0070
276	0.0084	0.0014	0.0070
277	0.0084	0.0014	0.0069
278	0.0083	0.0014	0.0069
279	0.0083	0.0014	0.0068
280	0.0082	0.0014	0.0068
281	0.0081	0.0014	0.0068
282	0.0081	0.0014	0.0067
283	0.0080	0.0014	0.0067
284	0.0080	0.0014	0.0066

285	0.0079	0.0014	0.0066
286	0.0079	0.0013	0.0066
287	0.0079	0.0013	0.0065
288	0.0078	0.0013	0.0065

Total soil rain loss = 0.78(In)
Total effective rainfall = 4.29(In)
Peak flow rate in flood hydrograph = 34.94(CFS)

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

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	10.0	20.0	30.0	40.0
0+ 5	0.0004	0.05	Q	|	|	|	|
0+10	0.0027	0.33	Q	|	|	|	|
0+15	0.0078	0.74	Q	|	|	|	|
0+20	0.0142	0.93	Q	|	|	|	|
0+25	0.0210	0.99	Q	|	|	|	|
0+30	0.0279	1.01	VQ	|	|	|	|
0+35	0.0349	1.02	VQ	|	|	|	|
0+40	0.0420	1.02	VQ	|	|	|	|
0+45	0.0490	1.03	VQ	|	|	|	|
0+50	0.0561	1.03	VQ	|	|	|	|
0+55	0.0632	1.03	VQ	|	|	|	|
1+ 0	0.0703	1.03	VQ	|	|	|	|
1+ 5	0.0775	1.04	VQ	|	|	|	|
1+10	0.0847	1.04	VQ	|	|	|	|
1+15	0.0918	1.04	VQ	|	|	|	|
1+20	0.0991	1.05	VQ	|	|	|	|
1+25	0.1063	1.05	VQ	|	|	|	|
1+30	0.1136	1.05	VQ	|	|	|	|
1+35	0.1208	1.06	|Q	|	|	|	|
1+40	0.1281	1.06	|Q	|	|	|	|
1+45	0.1355	1.06	|Q	|	|	|	|
1+50	0.1428	1.07	|Q	|	|	|	|
1+55	0.1502	1.07	|Q	|	|	|	|
2+ 0	0.1576	1.07	|Q	|	|	|	|
2+ 5	0.1650	1.08	|Q	|	|	|	|
2+10	0.1725	1.08	|Q	|	|	|	|
2+15	0.1799	1.09	|Q	|	|	|	|
2+20	0.1874	1.09	|Q	|	|	|	|
2+25	0.1950	1.09	|Q	|	|	|	|
2+30	0.2025	1.10	|Q	|	|	|	|
2+35	0.2101	1.10	|Q	|	|	|	|
2+40	0.2177	1.10	|Q	|	|	|	|
2+45	0.2253	1.11	|Q	|	|	|	|
2+50	0.2330	1.11	|QV	|	|	|	|
2+55	0.2406	1.12	|QV	|	|	|	|
3+ 0	0.2483	1.12	|QV	|	|	|	|
3+ 5	0.2561	1.12	|QV	|	|	|	|
3+10	0.2638	1.13	|QV	|	|	|	|
3+15	0.2716	1.13	|QV	|	|	|	|
3+20	0.2794	1.14	|QV	|	|	|	|
3+25	0.2873	1.14	|QV	|	|	|	|
3+30	0.2952	1.14	|QV	|	|	|	|
3+35	0.3031	1.15	|QV	|	|	|	|
3+40	0.3110	1.15	|QV	|	|	|	|

3+45	0.3190	1.16	|QV	|	|	|
3+50	0.3270	1.16	|QV	|	|	|
3+55	0.3350	1.16	|QV	|	|	|
4+ 0	0.3430	1.17	|QV	|	|	|
4+ 5	0.3511	1.17	|Q V	|	|	|
4+10	0.3592	1.18	|Q V	|	|	|
4+15	0.3674	1.18	|Q V	|	|	|
4+20	0.3755	1.19	|Q V	|	|	|
4+25	0.3838	1.19	|Q V	|	|	|
4+30	0.3920	1.20	|Q V	|	|	|
4+35	0.4003	1.20	|Q V	|	|	|
4+40	0.4086	1.21	|Q V	|	|	|
4+45	0.4169	1.21	|Q V	|	|	|
4+50	0.4253	1.22	|Q V	|	|	|
4+55	0.4337	1.22	|Q V	|	|	|
5+ 0	0.4422	1.23	|Q V	|	|	|
5+ 5	0.4506	1.23	|Q V	|	|	|
5+10	0.4592	1.24	|Q V	|	|	|
5+15	0.4677	1.24	|Q V	|	|	|
5+20	0.4763	1.25	|Q V	|	|	|
5+25	0.4849	1.25	|Q V	|	|	|
5+30	0.4936	1.26	|Q V	|	|	|
5+35	0.5023	1.26	|Q V	|	|	|
5+40	0.5110	1.27	|Q V	|	|	|
5+45	0.5198	1.27	|Q V	|	|	|
5+50	0.5286	1.28	|Q V	|	|	|
5+55	0.5375	1.29	|Q V	|	|	|
6+ 0	0.5464	1.29	|Q V	|	|	|
6+ 5	0.5553	1.30	|Q V	|	|	|
6+10	0.5643	1.30	|Q V	|	|	|
6+15	0.5733	1.31	|Q V	|	|	|
6+20	0.5824	1.32	|Q V	|	|	|
6+25	0.5915	1.32	|Q V	|	|	|
6+30	0.6006	1.33	|Q V	|	|	|
6+35	0.6098	1.33	|Q V	|	|	|
6+40	0.6191	1.34	|Q V	|	|	|
6+45	0.6283	1.35	|Q V	|	|	|
6+50	0.6377	1.35	|Q V	|	|	|
6+55	0.6470	1.36	|Q V	|	|	|
7+ 0	0.6565	1.37	|Q V	|	|	|
7+ 5	0.6659	1.38	|Q V	|	|	|
7+10	0.6755	1.38	|Q V	|	|	|
7+15	0.6850	1.39	|Q V	|	|	|
7+20	0.6946	1.40	|Q V	|	|	|
7+25	0.7043	1.40	|Q V	|	|	|
7+30	0.7140	1.41	|Q V	|	|	|
7+35	0.7238	1.42	|Q V	|	|	|
7+40	0.7336	1.43	|Q V	|	|	|
7+45	0.7435	1.43	|Q V	|	|	|
7+50	0.7534	1.44	|Q V	|	|	|
7+55	0.7634	1.45	|Q V	|	|	|
8+ 0	0.7735	1.46	|Q V	|	|	|
8+ 5	0.7836	1.47	|Q V	|	|	|
8+10	0.7937	1.48	|Q V	|	|	|
8+15	0.8040	1.48	|Q V	|	|	|
8+20	0.8142	1.49	|Q V	|	|	|
8+25	0.8246	1.50	|Q V	|	|	|
8+30	0.8350	1.51	|Q V	|	|	|
8+35	0.8455	1.52	|Q V	|	|	|
8+40	0.8560	1.53	|Q V	|	|	|
8+45	0.8666	1.54	|Q V	|	|	|
8+50	0.8773	1.55	|Q V	|	|	|
8+55	0.8880	1.56	|Q V	|	|	|

9+ 0	0.8988	1.57	|Q	V |	|	|	|
9+ 5	0.9097	1.58	|Q	V |	|	|	|
9+10	0.9206	1.59	|Q	V |	|	|	|
9+15	0.9316	1.60	|Q	V |	|	|	|
9+20	0.9427	1.61	|Q	V |	|	|	|
9+25	0.9539	1.62	|Q	V |	|	|	|
9+30	0.9651	1.63	|Q	V |	|	|	|
9+35	0.9764	1.64	|Q	V |	|	|	|
9+40	0.9878	1.66	|Q	V |	|	|	|
9+45	0.9993	1.67	|Q	V |	|	|	|
9+50	1.0109	1.68	|Q	V |	|	|	|
9+55	1.0225	1.69	|Q	V |	|	|	|
10+ 0	1.0342	1.70	|Q	V |	|	|	|
10+ 5	1.0461	1.72	|Q	V|	|	|	|
10+10	1.0580	1.73	|Q	V|	|	|	|
10+15	1.0700	1.74	|Q	V|	|	|	|
10+20	1.0821	1.76	|Q	V|	|	|	|
10+25	1.0943	1.77	|Q	V|	|	|	|
10+30	1.1066	1.79	|Q	V|	|	|	|
10+35	1.1190	1.80	|Q	V|	|	|	|
10+40	1.1315	1.82	|Q	V|	|	|	|
10+45	1.1441	1.83	|Q	V|	|	|	|
10+50	1.1568	1.85	|Q	V	|	|	|
10+55	1.1696	1.86	|Q	V	|	|	|
11+ 0	1.1826	1.88	|Q	V	|	|	|
11+ 5	1.1956	1.90	|Q	V	|	|	|
11+10	1.2088	1.91	|Q	V	|	|	|
11+15	1.2221	1.93	|Q	V	|	|	|
11+20	1.2355	1.95	|Q	V	|	|	|
11+25	1.2491	1.97	|Q	V	|	|	|
11+30	1.2628	1.99	|Q	V	|	|	|
11+35	1.2766	2.01	| Q	|V	|	|	|
11+40	1.2906	2.03	| Q	|V	|	|	|
11+45	1.3047	2.05	| Q	|V	|	|	|
11+50	1.3189	2.07	| Q	|V	|	|	|
11+55	1.3333	2.09	| Q	|V	|	|	|
12+ 0	1.3479	2.12	| Q	|V	|	|	|
12+ 5	1.3627	2.15	| Q	|V	|	|	|
12+10	1.3779	2.21	| Q	|V	|	|	|
12+15	1.3938	2.30	| Q	| V	|	|	|
12+20	1.4100	2.36	| Q	| V	|	|	|
12+25	1.4265	2.39	| Q	| V	|	|	|
12+30	1.4432	2.42	| Q	| V	|	|	|
12+35	1.4601	2.45	| Q	| V	|	|	|
12+40	1.4772	2.48	| Q	| V	|	|	|
12+45	1.4945	2.51	| Q	| V	|	|	|
12+50	1.5120	2.55	| Q	| V	|	|	|
12+55	1.5298	2.58	| Q	| V	|	|	|
13+ 0	1.5478	2.61	| Q	| V	|	|	|
13+ 5	1.5660	2.65	| Q	| V	|	|	|
13+10	1.5845	2.69	| Q	| V	|	|	|
13+15	1.6033	2.73	| Q	| V	|	|	|
13+20	1.6224	2.77	| Q	| V	|	|	|
13+25	1.6418	2.81	| Q	| V	|	|	|
13+30	1.6614	2.86	| Q	| V	|	|	|
13+35	1.6814	2.90	| Q	| V	|	|	|
13+40	1.7018	2.95	| Q	| V	|	|	|
13+45	1.7225	3.01	| Q	| V	|	|	|
13+50	1.7436	3.06	| Q	| V	|	|	|
13+55	1.7650	3.12	| Q	| V	|	|	|
14+ 0	1.7869	3.18	| Q	| V	|	|	|
14+ 5	1.8093	3.24	| Q	| V	|	|	|
14+10	1.8321	3.31	| Q	| V	|	|	|

14+15	1.8554	3.39	
14+20	1.8793	3.46	
14+25	1.9037	3.55	
14+30	1.9288	3.64	
14+35	1.9545	3.73	
14+40	1.9809	3.84	
14+45	2.0081	3.95	
14+50	2.0362	4.07	
14+55	2.0651	4.21	
15+ 0	2.0951	4.36	
15+ 5	2.1263	4.52	
15+10	2.1587	4.70	
15+15	2.1925	4.91	
15+20	2.2280	5.15	
15+25	2.2651	5.38	
15+30	2.3025	5.44	
15+35	2.3401	5.45	
15+40	2.3796	5.74	
15+45	2.4229	6.29	
15+50	2.4717	7.09	
15+55	2.5293	8.37	
16+ 0	2.6037	10.80	
16+ 5	2.7213	17.07	
16+10	2.9323	30.64	
16+15	3.1730	34.94	
16+20	3.3156	20.71	
16+25	3.3924	11.15	
16+30	3.4429	7.34	
16+35	3.4869	6.38	
16+40	3.5235	5.32	
16+45	3.5569	4.84	
16+50	3.5876	4.46	
16+55	3.6163	4.16	
17+ 0	3.6432	3.91	
17+ 5	3.6687	3.70	
17+10	3.6929	3.51	
17+15	3.7160	3.36	
17+20	3.7381	3.22	
17+25	3.7594	3.09	
17+30	3.7800	2.98	
17+35	3.7998	2.88	
17+40	3.8191	2.79	
17+45	3.8377	2.71	
17+50	3.8559	2.63	
17+55	3.8735	2.56	
18+ 0	3.8908	2.50	
18+ 5	3.9075	2.43	
18+10	3.9236	2.33	
18+15	3.9388	2.22	
18+20	3.9536	2.14	
18+25	3.9679	2.09	
18+30	3.9820	2.04	
18+35	3.9957	2.00	
18+40	4.0092	1.96	
18+45	4.0225	1.92	
18+50	4.0355	1.89	
18+55	4.0483	1.85	
19+ 0	4.0608	1.82	
19+ 5	4.0732	1.79	
19+10	4.0853	1.76	
19+15	4.0973	1.74	
19+20	4.1091	1.71	
19+25	4.1207	1.69	

```
19+30        4.1321       1.66  |Q        |         |         |    V    |
19+35        4.1434       1.64  |Q        |         |         |    V    |
19+40        4.1545       1.62  |Q        |         |         |    V    |
19+45        4.1655       1.59  |Q        |         |         |     V   |
19+50        4.1763       1.57  |Q        |         |         |     V   |
19+55        4.1870       1.55  |Q        |         |         |     V   |
20+ 0        4.1976       1.53  |Q        |         |         |     V   |
20+ 5        4.2080       1.52  |Q        |         |         |     V   |
20+10        4.2183       1.50  |Q        |         |         |     V   |
20+15        4.2285       1.48  |Q        |         |         |     V   |
20+20        4.2386       1.46  |Q        |         |         |     V   |
20+25        4.2486       1.45  |Q        |         |         |     V   |
20+30        4.2584       1.43  |Q        |         |         |     V   |
20+35        4.2682       1.42  |Q        |         |         |     V   |
20+40        4.2778       1.40  |Q        |         |         |      V  |
20+45        4.2874       1.39  |Q        |         |         |      V  |
20+50        4.2968       1.37  |Q        |         |         |      V  |
20+55        4.3062       1.36  |Q        |         |         |      V  |
21+ 0        4.3154       1.34  |Q        |         |         |      V  |
21+ 5        4.3246       1.33  |Q        |         |         |      V  |
21+10        4.3337       1.32  |Q        |         |         |      V  |
21+15        4.3427       1.31  |Q        |         |         |      V  |
21+20        4.3516       1.29  |Q        |         |         |      V  |
21+25        4.3604       1.28  |Q        |         |         |      V  |
21+30        4.3692       1.27  |Q        |         |         |      V  |
21+35        4.3779       1.26  |Q        |         |         |      V  |
21+40        4.3865       1.25  |Q        |         |         |       V |
21+45        4.3950       1.24  |Q        |         |         |       V |
21+50        4.4035       1.23  |Q        |         |         |       V |
21+55        4.4119       1.22  |Q        |         |         |       V |
22+ 0        4.4202       1.21  |Q        |         |         |       V |
22+ 5        4.4284       1.20  |Q        |         |         |       V |
22+10        4.4366       1.19  |Q        |         |         |       V |
22+15        4.4448       1.18  |Q        |         |         |       V |
22+20        4.4528       1.17  |Q        |         |         |       V |
22+25        4.4608       1.16  |Q        |         |         |       V |
22+30        4.4688       1.15  |Q        |         |         |       V |
22+35        4.4767       1.15  |Q        |         |         |       V |
22+40        4.4845       1.14  |Q        |         |         |       V |
22+45        4.4923       1.13  |Q        |         |         |       V |
22+50        4.5000       1.12  |Q        |         |         |       V |
22+55        4.5077       1.11  |Q        |         |         |        V|
23+ 0        4.5153       1.11  |Q        |         |         |        V|
23+ 5        4.5228       1.10  |Q        |         |         |        V|
23+10        4.5304       1.09  |Q        |         |         |        V|
23+15        4.5378       1.08  |Q        |         |         |        V|
23+20        4.5452       1.08  |Q        |         |         |        V|
23+25        4.5526       1.07  |Q        |         |         |        V|
23+30        4.5599       1.06  |Q        |         |         |        V|
23+35        4.5672       1.06  |Q        |         |         |        V|
23+40        4.5744       1.05  |Q        |         |         |        V|
23+45        4.5816       1.04  |Q        |         |         |        V|
23+50        4.5887       1.04  |Q        |         |         |        V|
23+55        4.5958       1.03  |Q        |         |         |        V|
24+ 0        4.6029       1.02  |Q        |         |         |        V|
-------------------------------------------------------------------------
```

DRAINAGE AREA 2

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

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004, Version 7.0

Study date 12/05/14

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San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 5028

AGUA MANSA PROJECT
100 YEAR STORM
DEVELOPED CONDITION
DRAINAGE AREA 2

Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 100		
16.92	1	1.18
Rainfall data for year 100		
16.92	6	2.75
Rainfall data for year 100		
16.92	24	5.07

++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	SCS curve NO.(AMC 3)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
50.5	70.5	16.92	1.000	0.525	0.165	0.087

Area-averaged adjusted loss rate Fm (In/Hr) = 0.087

********* Area-Averaged low loss rate fraction, Yb **********

Area	Area	SCS CN	SCS CN	S	Pervious

(Ac.)	Fract	(AMC2)	(AMC3)		Yield Fr
2.79	0.165	50.5	70.5	4.18	0.420
14.13	0.835	98.0	98.0	0.20	0.953

Area-averaged catchment yield fraction, Y = 0.865
Area-averaged low loss fraction, Yb = 0.135
Direct entry of lag time by user
++
Watershed area = 16.92(Ac.)
Catchment Lag time = 0.155 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 53.8329
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.130(In/Hr)
Average low loss rate fraction (Yb) = 0.135 (decimal)
Note: user entry of the Fm value
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.437(In)
Computed peak 30-minute rainfall = 0.894(In)
Specified peak 1-hour rainfall = 1.180(In)
Computed peak 3-hour rainfall = 1.982(In)
Specified peak 6-hour rainfall = 2.750(In)
Specified peak 24-hour rainfall = 5.070(In)

Rainfall depth area reduction factors:
Using a total area of 16.92(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999	Adjusted rainfall =	0.436(In)
30-minute factor = 0.999	Adjusted rainfall =	0.894(In)
1-hour factor = 0.999	Adjusted rainfall =	1.179(In)
3-hour factor = 1.000	Adjusted rainfall =	1.982(In)
6-hour factor = 1.000	Adjusted rainfall =	2.750(In)
24-hour factor = 1.000	Adjusted rainfall =	5.070(In)

U n i t H y d r o g r a p h
++

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 204.63 (CFS))	
1	5.278	10.801
2	34.177	59.134
3	74.562	82.639
4	92.589	36.888
5	97.915	10.898
6	99.129	2.485
7	100.000	1.781

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.4364	0.4364
2	0.5758	0.1394
3	0.6772	0.1014
4	0.7598	0.0826
5	0.8307	0.0709
6	0.8936	0.0628
7	0.9504	0.0568
8	1.0025	0.0521
9	1.0509	0.0484
10	1.0961	0.0452

11	1.1387	0.0426
12	1.1791	0.0403
13	1.2245	0.0455
14	1.2682	0.0437
15	1.3103	0.0421
16	1.3509	0.0406
17	1.3902	0.0393
18	1.4282	0.0381
19	1.4652	0.0370
20	1.5012	0.0360
21	1.5362	0.0350
22	1.5704	0.0342
23	1.6038	0.0334
24	1.6364	0.0326
25	1.6682	0.0319
26	1.6995	0.0312
27	1.7301	0.0306
28	1.7601	0.0300
29	1.7895	0.0294
30	1.8184	0.0289
31	1.8469	0.0284
32	1.8748	0.0279
33	1.9023	0.0275
34	1.9293	0.0270
35	1.9559	0.0266
36	1.9822	0.0262
37	2.0080	0.0258
38	2.0334	0.0255
39	2.0585	0.0251
40	2.0833	0.0248
41	2.1077	0.0244
42	2.1319	0.0241
43	2.1557	0.0238
44	2.1792	0.0235
45	2.2025	0.0233
46	2.2254	0.0230
47	2.2482	0.0227
48	2.2706	0.0225
49	2.2928	0.0222
50	2.3148	0.0220
51	2.3366	0.0218
52	2.3581	0.0215
53	2.3794	0.0213
54	2.4005	0.0211
55	2.4214	0.0209
56	2.4421	0.0207
57	2.4626	0.0205
58	2.4829	0.0203
59	2.5030	0.0201
60	2.5230	0.0199
61	2.5428	0.0198
62	2.5624	0.0196
63	2.5818	0.0194
64	2.6011	0.0193
65	2.6202	0.0191
66	2.6391	0.0190
67	2.6580	0.0188
68	2.6766	0.0187
69	2.6951	0.0185
70	2.7135	0.0184
71	2.7318	0.0182
72	2.7499	0.0181
73	2.7666	0.0168

74	2.7833	0.0167
75	2.7998	0.0165
76	2.8163	0.0164
77	2.8325	0.0163
78	2.8487	0.0162
79	2.8648	0.0161
80	2.8807	0.0159
81	2.8966	0.0158
82	2.9123	0.0157
83	2.9279	0.0156
84	2.9434	0.0155
85	2.9588	0.0154
86	2.9742	0.0153
87	2.9894	0.0152
88	3.0045	0.0151
89	3.0195	0.0150
90	3.0344	0.0149
91	3.0493	0.0148
92	3.0640	0.0147
93	3.0787	0.0147
94	3.0932	0.0146
95	3.1077	0.0145
96	3.1221	0.0144
97	3.1364	0.0143
98	3.1506	0.0142
99	3.1648	0.0141
100	3.1788	0.0141
101	3.1928	0.0140
102	3.2067	0.0139
103	3.2206	0.0138
104	3.2343	0.0138
105	3.2480	0.0137
106	3.2616	0.0136
107	3.2752	0.0135
108	3.2887	0.0135
109	3.3021	0.0134
110	3.3154	0.0133
111	3.3287	0.0133
112	3.3419	0.0132
113	3.3550	0.0131
114	3.3681	0.0131
115	3.3811	0.0130
116	3.3940	0.0129
117	3.4069	0.0129
118	3.4197	0.0128
119	3.4325	0.0128
120	3.4452	0.0127
121	3.4578	0.0126
122	3.4704	0.0126
123	3.4829	0.0125
124	3.4954	0.0125
125	3.5078	0.0124
126	3.5202	0.0124
127	3.5325	0.0123
128	3.5447	0.0122
129	3.5569	0.0122
130	3.5690	0.0121
131	3.5811	0.0121
132	3.5932	0.0120
133	3.6052	0.0120
134	3.6171	0.0119
135	3.6290	0.0119
136	3.6408	0.0118

137	3.6526	0.0118
138	3.6644	0.0117
139	3.6760	0.0117
140	3.6877	0.0116
141	3.6993	0.0116
142	3.7109	0.0116
143	3.7224	0.0115
144	3.7338	0.0115
145	3.7452	0.0114
146	3.7566	0.0114
147	3.7680	0.0113
148	3.7792	0.0113
149	3.7905	0.0112
150	3.8017	0.0112
151	3.8129	0.0112
152	3.8240	0.0111
153	3.8351	0.0111
154	3.8461	0.0110
155	3.8571	0.0110
156	3.8681	0.0110
157	3.8790	0.0109
158	3.8899	0.0109
159	3.9007	0.0108
160	3.9115	0.0108
161	3.9223	0.0108
162	3.9330	0.0107
163	3.9437	0.0107
164	3.9544	0.0107
165	3.9650	0.0106
166	3.9756	0.0106
167	3.9862	0.0106
168	3.9967	0.0105
169	4.0071	0.0105
170	4.0176	0.0104
171	4.0280	0.0104
172	4.0384	0.0104
173	4.0487	0.0103
174	4.0590	0.0103
175	4.0693	0.0103
176	4.0796	0.0102
177	4.0898	0.0102
178	4.1000	0.0102
179	4.1101	0.0101
180	4.1202	0.0101
181	4.1303	0.0101
182	4.1404	0.0101
183	4.1504	0.0100
184	4.1604	0.0100
185	4.1703	0.0100
186	4.1803	0.0099
187	4.1902	0.0099
188	4.2001	0.0099
189	4.2099	0.0098
190	4.2197	0.0098
191	4.2295	0.0098
192	4.2393	0.0098
193	4.2490	0.0097
194	4.2587	0.0097
195	4.2684	0.0097
196	4.2780	0.0096
197	4.2876	0.0096
198	4.2972	0.0096
199	4.3068	0.0096

200	4.3163	0.0095
201	4.3258	0.0095
202	4.3353	0.0095
203	4.3448	0.0095
204	4.3542	0.0094
205	4.3636	0.0094
206	4.3730	0.0094
207	4.3823	0.0094
208	4.3917	0.0093
209	4.4010	0.0093
210	4.4103	0.0093
211	4.4195	0.0093
212	4.4287	0.0092
213	4.4380	0.0092
214	4.4471	0.0092
215	4.4563	0.0092
216	4.4654	0.0091
217	4.4745	0.0091
218	4.4836	0.0091
219	4.4927	0.0091
220	4.5017	0.0090
221	4.5108	0.0090
222	4.5198	0.0090
223	4.5287	0.0090
224	4.5377	0.0090
225	4.5466	0.0089
226	4.5555	0.0089
227	4.5644	0.0089
228	4.5733	0.0089
229	4.5821	0.0088
230	4.5909	0.0088
231	4.5997	0.0088
232	4.6085	0.0088
233	4.6172	0.0088
234	4.6260	0.0087
235	4.6347	0.0087
236	4.6434	0.0087
237	4.6521	0.0087
238	4.6607	0.0087
239	4.6693	0.0086
240	4.6780	0.0086
241	4.6865	0.0086
242	4.6951	0.0086
243	4.7037	0.0086
244	4.7122	0.0085
245	4.7207	0.0085
246	4.7292	0.0085
247	4.7377	0.0085
248	4.7461	0.0085
249	4.7546	0.0084
250	4.7630	0.0084
251	4.7714	0.0084
252	4.7798	0.0084
253	4.7881	0.0084
254	4.7965	0.0083
255	4.8048	0.0083
256	4.8131	0.0083
257	4.8214	0.0083
258	4.8297	0.0083
259	4.8379	0.0083
260	4.8461	0.0082
261	4.8544	0.0082
262	4.8626	0.0082

263	4.8707	0.0082
264	4.8789	0.0082
265	4.8871	0.0081
266	4.8952	0.0081
267	4.9033	0.0081
268	4.9114	0.0081
269	4.9195	0.0081
270	4.9275	0.0081
271	4.9356	0.0080
272	4.9436	0.0080
273	4.9516	0.0080
274	4.9596	0.0080
275	4.9676	0.0080
276	4.9756	0.0080
277	4.9835	0.0079
278	4.9914	0.0079
279	4.9994	0.0079
280	5.0073	0.0079
281	5.0151	0.0079
282	5.0230	0.0079
283	5.0309	0.0079
284	5.0387	0.0078
285	5.0465	0.0078
286	5.0543	0.0078
287	5.0621	0.0078
288	5.0699	0.0078

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0078	0.0010	0.0067
2	0.0078	0.0010	0.0067
3	0.0078	0.0011	0.0068
4	0.0078	0.0011	0.0068
5	0.0079	0.0011	0.0068
6	0.0079	0.0011	0.0068
7	0.0079	0.0011	0.0068
8	0.0079	0.0011	0.0069
9	0.0080	0.0011	0.0069
10	0.0080	0.0011	0.0069
11	0.0080	0.0011	0.0069
12	0.0080	0.0011	0.0069
13	0.0081	0.0011	0.0070
14	0.0081	0.0011	0.0070
15	0.0081	0.0011	0.0070
16	0.0081	0.0011	0.0070
17	0.0082	0.0011	0.0071
18	0.0082	0.0011	0.0071
19	0.0082	0.0011	0.0071
20	0.0082	0.0011	0.0071
21	0.0083	0.0011	0.0072
22	0.0083	0.0011	0.0072
23	0.0083	0.0011	0.0072
24	0.0083	0.0011	0.0072
25	0.0084	0.0011	0.0073
26	0.0084	0.0011	0.0073
27	0.0084	0.0011	0.0073
28	0.0085	0.0011	0.0073
29	0.0085	0.0011	0.0073
30	0.0085	0.0011	0.0074
31	0.0086	0.0012	0.0074
32	0.0086	0.0012	0.0074

33	0.0086	0.0012	0.0075
34	0.0086	0.0012	0.0075
35	0.0087	0.0012	0.0075
36	0.0087	0.0012	0.0075
37	0.0087	0.0012	0.0076
38	0.0088	0.0012	0.0076
39	0.0088	0.0012	0.0076
40	0.0088	0.0012	0.0076
41	0.0089	0.0012	0.0077
42	0.0089	0.0012	0.0077
43	0.0089	0.0012	0.0077
44	0.0090	0.0012	0.0077
45	0.0090	0.0012	0.0078
46	0.0090	0.0012	0.0078
47	0.0091	0.0012	0.0078
48	0.0091	0.0012	0.0079
49	0.0091	0.0012	0.0079
50	0.0092	0.0012	0.0079
51	0.0092	0.0012	0.0080
52	0.0092	0.0012	0.0080
53	0.0093	0.0013	0.0080
54	0.0093	0.0013	0.0081
55	0.0094	0.0013	0.0081
56	0.0094	0.0013	0.0081
57	0.0094	0.0013	0.0082
58	0.0095	0.0013	0.0082
59	0.0095	0.0013	0.0082
60	0.0095	0.0013	0.0083
61	0.0096	0.0013	0.0083
62	0.0096	0.0013	0.0083
63	0.0097	0.0013	0.0084
64	0.0097	0.0013	0.0084
65	0.0098	0.0013	0.0084
66	0.0098	0.0013	0.0085
67	0.0098	0.0013	0.0085
68	0.0099	0.0013	0.0085
69	0.0099	0.0013	0.0086
70	0.0100	0.0013	0.0086
71	0.0100	0.0014	0.0087
72	0.0101	0.0014	0.0087
73	0.0101	0.0014	0.0088
74	0.0101	0.0014	0.0088
75	0.0102	0.0014	0.0088
76	0.0102	0.0014	0.0089
77	0.0103	0.0014	0.0089
78	0.0103	0.0014	0.0090
79	0.0104	0.0014	0.0090
80	0.0104	0.0014	0.0090
81	0.0105	0.0014	0.0091
82	0.0106	0.0014	0.0091
83	0.0106	0.0014	0.0092
84	0.0107	0.0014	0.0092
85	0.0107	0.0014	0.0093
86	0.0108	0.0015	0.0093
87	0.0108	0.0015	0.0094
88	0.0109	0.0015	0.0094
89	0.0110	0.0015	0.0095
90	0.0110	0.0015	0.0095
91	0.0111	0.0015	0.0096
92	0.0111	0.0015	0.0096
93	0.0112	0.0015	0.0097
94	0.0112	0.0015	0.0097
95	0.0113	0.0015	0.0098

96	0.0114	0.0015	0.0098
97	0.0115	0.0015	0.0099
98	0.0115	0.0016	0.0100
99	0.0116	0.0016	0.0100
100	0.0116	0.0016	0.0101
101	0.0117	0.0016	0.0102
102	0.0118	0.0016	0.0102
103	0.0119	0.0016	0.0103
104	0.0119	0.0016	0.0103
105	0.0120	0.0016	0.0104
106	0.0121	0.0016	0.0105
107	0.0122	0.0016	0.0106
108	0.0122	0.0017	0.0106
109	0.0124	0.0017	0.0107
110	0.0124	0.0017	0.0107
111	0.0125	0.0017	0.0108
112	0.0126	0.0017	0.0109
113	0.0127	0.0017	0.0110
114	0.0128	0.0017	0.0110
115	0.0129	0.0017	0.0111
116	0.0129	0.0017	0.0112
117	0.0131	0.0018	0.0113
118	0.0131	0.0018	0.0114
119	0.0133	0.0018	0.0115
120	0.0133	0.0018	0.0115
121	0.0135	0.0018	0.0117
122	0.0135	0.0018	0.0117
123	0.0137	0.0018	0.0118
124	0.0138	0.0019	0.0119
125	0.0139	0.0019	0.0120
126	0.0140	0.0019	0.0121
127	0.0141	0.0019	0.0122
128	0.0142	0.0019	0.0123
129	0.0144	0.0019	0.0125
130	0.0145	0.0020	0.0125
131	0.0147	0.0020	0.0127
132	0.0147	0.0020	0.0128
133	0.0149	0.0020	0.0129
134	0.0150	0.0020	0.0130
135	0.0152	0.0020	0.0132
136	0.0153	0.0021	0.0132
137	0.0155	0.0021	0.0134
138	0.0156	0.0021	0.0135
139	0.0158	0.0021	0.0137
140	0.0159	0.0021	0.0138
141	0.0162	0.0022	0.0140
142	0.0163	0.0022	0.0141
143	0.0165	0.0022	0.0143
144	0.0167	0.0022	0.0144
145	0.0181	0.0024	0.0157
146	0.0182	0.0025	0.0158
147	0.0185	0.0025	0.0160
148	0.0187	0.0025	0.0161
149	0.0190	0.0026	0.0164
150	0.0191	0.0026	0.0165
151	0.0194	0.0026	0.0168
152	0.0196	0.0026	0.0170
153	0.0199	0.0027	0.0173
154	0.0201	0.0027	0.0174
155	0.0205	0.0028	0.0177
156	0.0207	0.0028	0.0179
157	0.0211	0.0028	0.0183
158	0.0213	0.0029	0.0184

159	0.0218	0.0029	0.0188
160	0.0220	0.0030	0.0190
161	0.0225	0.0030	0.0194
162	0.0227	0.0031	0.0197
163	0.0233	0.0031	0.0201
164	0.0235	0.0032	0.0204
165	0.0241	0.0033	0.0209
166	0.0244	0.0033	0.0211
167	0.0251	0.0034	0.0217
168	0.0255	0.0034	0.0220
169	0.0262	0.0035	0.0227
170	0.0266	0.0036	0.0230
171	0.0275	0.0037	0.0238
172	0.0279	0.0038	0.0242
173	0.0289	0.0039	0.0250
174	0.0294	0.0040	0.0255
175	0.0306	0.0041	0.0265
176	0.0312	0.0042	0.0270
177	0.0326	0.0044	0.0282
178	0.0334	0.0045	0.0289
179	0.0350	0.0047	0.0303
180	0.0360	0.0048	0.0311
181	0.0381	0.0051	0.0330
182	0.0393	0.0053	0.0340
183	0.0421	0.0057	0.0364
184	0.0437	0.0059	0.0378
185	0.0403	0.0054	0.0349
186	0.0426	0.0057	0.0369
187	0.0484	0.0065	0.0418
188	0.0521	0.0070	0.0451
189	0.0628	0.0085	0.0544
190	0.0709	0.0096	0.0614
191	0.1014	0.0108	0.0906
192	0.1394	0.0108	0.1286
193	0.4364	0.0108	0.4255
194	0.0826	0.0108	0.0718
195	0.0568	0.0077	0.0492
196	0.0452	0.0061	0.0391
197	0.0455	0.0061	0.0394
198	0.0406	0.0055	0.0351
199	0.0370	0.0050	0.0320
200	0.0342	0.0046	0.0296
201	0.0319	0.0043	0.0276
202	0.0300	0.0040	0.0260
203	0.0284	0.0038	0.0246
204	0.0270	0.0036	0.0234
205	0.0258	0.0035	0.0223
206	0.0248	0.0033	0.0214
207	0.0238	0.0032	0.0206
208	0.0230	0.0031	0.0199
209	0.0222	0.0030	0.0192
210	0.0215	0.0029	0.0186
211	0.0209	0.0028	0.0181
212	0.0203	0.0027	0.0176
213	0.0198	0.0027	0.0171
214	0.0193	0.0026	0.0167
215	0.0188	0.0025	0.0163
216	0.0184	0.0025	0.0159
217	0.0168	0.0023	0.0145
218	0.0164	0.0022	0.0142
219	0.0161	0.0022	0.0139
220	0.0157	0.0021	0.0136
221	0.0154	0.0021	0.0133

222	0.0151	0.0020	0.0131
223	0.0148	0.0020	0.0128
224	0.0146	0.0020	0.0126
225	0.0143	0.0019	0.0124
226	0.0141	0.0019	0.0122
227	0.0138	0.0019	0.0120
228	0.0136	0.0018	0.0118
229	0.0134	0.0018	0.0116
230	0.0132	0.0018	0.0114
231	0.0130	0.0018	0.0113
232	0.0128	0.0017	0.0111
233	0.0126	0.0017	0.0109
234	0.0125	0.0017	0.0108
235	0.0123	0.0017	0.0106
236	0.0121	0.0016	0.0105
237	0.0120	0.0016	0.0104
238	0.0118	0.0016	0.0102
239	0.0117	0.0016	0.0101
240	0.0116	0.0016	0.0100
241	0.0114	0.0015	0.0099
242	0.0113	0.0015	0.0098
243	0.0112	0.0015	0.0097
244	0.0110	0.0015	0.0096
245	0.0109	0.0015	0.0095
246	0.0108	0.0015	0.0094
247	0.0107	0.0014	0.0093
248	0.0106	0.0014	0.0092
249	0.0105	0.0014	0.0091
250	0.0104	0.0014	0.0090
251	0.0103	0.0014	0.0089
252	0.0102	0.0014	0.0088
253	0.0101	0.0014	0.0087
254	0.0100	0.0013	0.0086
255	0.0099	0.0013	0.0086
256	0.0098	0.0013	0.0085
257	0.0097	0.0013	0.0084
258	0.0096	0.0013	0.0083
259	0.0096	0.0013	0.0083
260	0.0095	0.0013	0.0082
261	0.0094	0.0013	0.0081
262	0.0093	0.0013	0.0081
263	0.0093	0.0012	0.0080
264	0.0092	0.0012	0.0079
265	0.0091	0.0012	0.0079
266	0.0090	0.0012	0.0078
267	0.0090	0.0012	0.0078
268	0.0089	0.0012	0.0077
269	0.0088	0.0012	0.0076
270	0.0088	0.0012	0.0076
271	0.0087	0.0012	0.0075
272	0.0087	0.0012	0.0075
273	0.0086	0.0012	0.0074
274	0.0085	0.0011	0.0074
275	0.0085	0.0011	0.0073
276	0.0084	0.0011	0.0073
277	0.0084	0.0011	0.0072
278	0.0083	0.0011	0.0072
279	0.0083	0.0011	0.0071
280	0.0082	0.0011	0.0071
281	0.0081	0.0011	0.0070
282	0.0081	0.0011	0.0070
283	0.0080	0.0011	0.0070
284	0.0080	0.0011	0.0069

285	0.0079	0.0011	0.0069
286	0.0079	0.0011	0.0068
287	0.0079	0.0011	0.0068
288	0.0078	0.0011	0.0068

Total soil rain loss = 0.62(In)
Total effective rainfall = 4.45(In)
Peak flow rate in flood hydrograph = 45.92(CFS)

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

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	12.5	25.0	37.5	50.0
0+ 5	0.0005	0.07	Q	|	|	|	|
0+10	0.0037	0.47	Q	|	|	|	|
0+15	0.0108	1.03	Q	|	|	|	|
0+20	0.0196	1.28	VQ	|	|	|	|
0+25	0.0290	1.36	VQ	|	|	|	|
0+30	0.0384	1.38	VQ	|	|	|	|
0+35	0.0480	1.39	VQ	|	|	|	|
0+40	0.0577	1.40	VQ	|	|	|	|
0+45	0.0673	1.40	VQ	|	|	|	|
0+50	0.0770	1.41	VQ	|	|	|	|
0+55	0.0867	1.41	VQ	|	|	|	|
1+ 0	0.0964	1.41	VQ	|	|	|	|
1+ 5	0.1062	1.42	VQ	|	|	|	|
1+10	0.1160	1.42	VQ	|	|	|	|
1+15	0.1258	1.43	VQ	|	|	|	|
1+20	0.1357	1.43	VQ	|	|	|	|
1+25	0.1456	1.44	VQ	|	|	|	|
1+30	0.1555	1.44	VQ	|	|	|	|
1+35	0.1654	1.44	|Q	|	|	|	|
1+40	0.1754	1.45	|Q	|	|	|	|
1+45	0.1854	1.45	|Q	|	|	|	|
1+50	0.1955	1.46	|Q	|	|	|	|
1+55	0.2056	1.46	|Q	|	|	|	|
2+ 0	0.2157	1.47	|Q	|	|	|	|
2+ 5	0.2258	1.47	|Q	|	|	|	|
2+10	0.2360	1.48	|Q	|	|	|	|
2+15	0.2462	1.48	|Q	|	|	|	|
2+20	0.2565	1.49	|Q	|	|	|	|
2+25	0.2667	1.49	|Q	|	|	|	|
2+30	0.2771	1.50	|Q	|	|	|	|
2+35	0.2874	1.50	|Q	|	|	|	|
2+40	0.2978	1.51	|Q	|	|	|	|
2+45	0.3082	1.51	|Q	|	|	|	|
2+50	0.3187	1.52	|QV	|	|	|	|
2+55	0.3292	1.52	|QV	|	|	|	|
3+ 0	0.3397	1.53	|QV	|	|	|	|
3+ 5	0.3503	1.53	|QV	|	|	|	|
3+10	0.3609	1.54	|QV	|	|	|	|
3+15	0.3715	1.55	|QV	|	|	|	|
3+20	0.3822	1.55	|QV	|	|	|	|
3+25	0.3929	1.56	|QV	|	|	|	|
3+30	0.4037	1.56	|QV	|	|	|	|
3+35	0.4145	1.57	|QV	|	|	|	|
3+40	0.4253	1.57	|QV	|	|	|	|

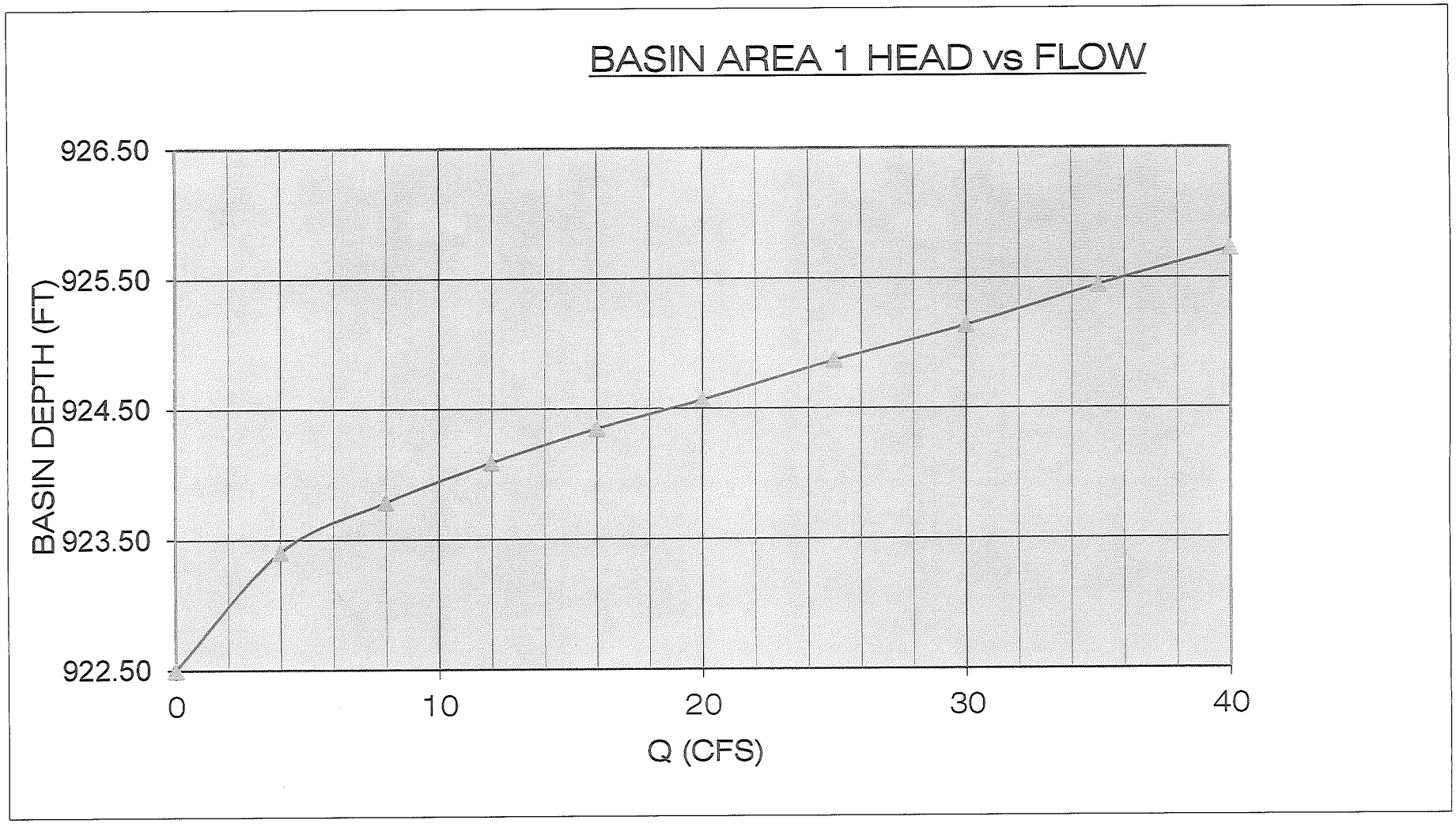
14+15	2.5366	4.63	Q		V			
14+20	2.5693	4.74	Q		V			
14+25	2.6027	4.85	Q		V			
14+30	2.6370	4.98	Q		V			
14+35	2.6722	5.11	Q		V			
14+40	2.7083	5.25	Q		V			
14+45	2.7456	5.41	Q		V			
14+50	2.7839	5.57	Q		V			
14+55	2.8236	5.76	Q		V			
15+ 0	2.8646	5.96	Q		V			
15+ 5	2.9073	6.19	Q		V			
15+10	2.9516	6.44	Q		V			
15+15	2.9979	6.73	Q		V			
15+20	3.0465	7.05	Q		V			
15+25	3.0972	7.36	Q		V			
15+30	3.1484	7.43	Q		V			
15+35	3.1997	7.45	Q		V			
15+40	3.2538	7.86	Q		V			
15+45	3.3131	8.61	Q		V			
15+50	3.3800	9.71	Q		V			
15+55	3.4583	11.38	Q		V			
16+ 0	3.5581	14.48	Q		V			
16+ 5	3.7146	22.73		Q	V			
16+10	3.9955	40.79			V	Q		
16+15	4.3118	45.92			V	Q		
16+20	4.4956	26.69			Q V			
16+25	4.5959	14.57	Q		V			
16+30	4.6636	9.82	Q		V			
16+35	4.7228	8.59	Q		V			
16+40	4.7726	7.24	Q		V			
16+45	4.8181	6.60	Q		V			
16+50	4.8600	6.09	Q		V			
16+55	4.8991	5.68	Q		V			
17+ 0	4.9359	5.33	Q		V			
17+ 5	4.9706	5.05	Q		V			
17+10	5.0036	4.80	Q		V			
17+15	5.0352	4.58	Q		V			
17+20	5.0654	4.39	Q		V			
17+25	5.0945	4.22	Q		V			
17+30	5.1226	4.07	Q		V			
17+35	5.1497	3.94	Q		V			
17+40	5.1759	3.81	Q		V			
17+45	5.2014	3.70	Q		V			
17+50	5.2262	3.60	Q		V			
17+55	5.2503	3.50	Q		V			
18+ 0	5.2738	3.41	Q		V			
18+ 5	5.2967	3.32	Q		V			
18+10	5.3186	3.18	Q		V			
18+15	5.3394	3.03	Q		V			
18+20	5.3596	2.92	Q		V			
18+25	5.3792	2.85	Q		V			
18+30	5.3984	2.79	Q		V			
18+35	5.4172	2.73	Q		V			
18+40	5.4356	2.68	Q		V			
18+45	5.4537	2.63	Q		V			
18+50	5.4714	2.58	Q		V			
18+55	5.4889	2.53	Q		V			
19+ 0	5.5060	2.49	Q		V			
19+ 5	5.5229	2.45	Q		V			
19+10	5.5395	2.41	Q		V			
19+15	5.5558	2.37	Q		V			
19+20	5.5719	2.34	Q		V			
19+25	5.5878	2.30	Q		V			

19+30	5.6034	2.27	|Q	|	|	|	V |
19+35	5.6188	2.24	|Q	|	|	|	V |
19+40	5.6340	2.21	|Q	|	|	|	V |
19+45	5.6490	2.18	|Q	|	|	|	V |
19+50	5.6638	2.15	|Q	|	|	|	V |
19+55	5.6784	2.12	|Q	|	|	|	V |
20+ 0	5.6929	2.10	|Q	|	|	|	V |
20+ 5	5.7071	2.07	|Q	|	|	|	V |
20+10	5.7212	2.05	|Q	|	|	|	V |
20+15	5.7351	2.02	|Q	|	|	|	V |
20+20	5.7489	2.00	|Q	|	|	|	V |
20+25	5.7625	1.98	|Q	|	|	|	V |
20+30	5.7760	1.95	|Q	|	|	|	V |
20+35	5.7893	1.93	|Q	|	|	|	V |
20+40	5.8025	1.91	|Q	|	|	|	V |
20+45	5.8155	1.89	|Q	|	|	|	V |
20+50	5.8284	1.87	|Q	|	|	|	V |
20+55	5.8412	1.86	|Q	|	|	|	V |
21+ 0	5.8538	1.84	|Q	|	|	|	V |
21+ 5	5.8664	1.82	|Q	|	|	|	V |
21+10	5.8788	1.80	|Q	|	|	|	V |
21+15	5.8911	1.79	|Q	|	|	|	V |
21+20	5.9033	1.77	|Q	|	|	|	V |
21+25	5.9153	1.75	|Q	|	|	|	V |
21+30	5.9273	1.74	|Q	|	|	|	V |
21+35	5.9392	1.72	|Q	|	|	|	V |
21+40	5.9509	1.71	|Q	|	|	|	V |
21+45	5.9626	1.69	|Q	|	|	|	V |
21+50	5.9741	1.68	|Q	|	|	|	V |
21+55	5.9856	1.67	|Q	|	|	|	V |
22+ 0	5.9970	1.65	|Q	|	|	|	V |
22+ 5	6.0083	1.64	|Q	|	|	|	V |
22+10	6.0195	1.63	|Q	|	|	|	V |
22+15	6.0306	1.61	|Q	|	|	|	V |
22+20	6.0416	1.60	|Q	|	|	|	V |
22+25	6.0525	1.59	|Q	|	|	|	V |
22+30	6.0634	1.58	|Q	|	|	|	V |
22+35	6.0742	1.57	|Q	|	|	|	V |
22+40	6.0849	1.55	|Q	|	|	|	V |
22+45	6.0955	1.54	|Q	|	|	|	V |
22+50	6.1060	1.53	|Q	|	|	|	V |
22+55	6.1165	1.52	|Q	|	|	|	V|
23+ 0	6.1269	1.51	|Q	|	|	|	V|
23+ 5	6.1373	1.50	|Q	|	|	|	V|
23+10	6.1475	1.49	|Q	|	|	|	V|
23+15	6.1577	1.48	|Q	|	|	|	V|
23+20	6.1678	1.47	|Q	|	|	|	V|
23+25	6.1779	1.46	|Q	|	|	|	V|
23+30	6.1879	1.45	|Q	|	|	|	V|
23+35	6.1978	1.44	|Q	|	|	|	V|
23+40	6.2077	1.43	|Q	|	|	|	V|
23+45	6.2175	1.42	|Q	|	|	|	V|
23+50	6.2273	1.42	|Q	|	|	|	V|
23+55	6.2369	1.41	|Q	|	|	|	V|
24+ 0	6.2466	1.40	|Q	|	|	|	V|

WSPG AND BASIN ROUTING

DRAINAGE AREA 1

BASIN # 1


BASIN AREA 1 HEAD vs FLOW
926.50
925.50
924.50
923.50
922.50
BASIN DEPTH (FT)
0
10
20
30
40
Q (CFS)

BASIN DA1

elevation	area	area	h	Volume	Accumulate vol	
ft	sqft	Ac	ft	Ac-ft	Ac-ft	cf
920	14,084	0.323	0	0	0	-
921	16,357	0.376	1	0.35	0.35	15,221
922	18,795	0.431	2	0.40	0.75	32,797
923	21,398	0.491	3	0.46	1.21	52,893
924	24,164	0.555	4	0.52	1.74	75,674
925	27,095	0.622	5	0.59	2.33	101,304
926	30,190	0.693	6	0.66	2.98	129,946
927	33,450	0.768	7	0.73	3.71	161,766
928	36,873	0.846	8	0.81	4.52	196,928
929	40,461	0.929	9	0.89	5.41	235,595
930	44,176	1.014	10	0.97	6.38	277,913

Routing basin 1			
Invert elevation at 922.5			
elev	**h**	**v**	**q**
FT	**FT**	**Ac-ft**	**cfs**
920	0	0	0
921	1	0.35	0
922	2	0.75	0
922.5	2.5	0.98	0
923.5	3.5	1.48	4.7
924.5	4.5	2.03	18.3
925.5	5.5	2.65	36.2

Basin 1	
24" PIPE	
Q	H
0	922.50
4	923.41
8	923.79
12	924.09
16	924.35
20	924.57
25	924.87
30	925.14
35	925.45
40	925.73

AGUA MANSA PROJECT
DEVELOPED CONDITION
OUTLET PIPE BASIN 1

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1000.000	915.000	2.000	917.000	4.00	.80	.01	917.01	.00	.62	2.83	3.000	.000	.00	1 .0
7.313	.0111					.0001	.00	2.00	.11	.49	.013	.00	.00	PIPE
1007.313	915.081	1.918	916.999	4.00	.84	.01	917.01	.00	.62	2.88	3.000	.000	.00	1 .0
6.857	.0111					.0001	.00	1.92	.11	.49	.013	.00	.00	PIPE
1014.170	915.157	1.842	916.999	4.00	.88	.01	917.01	.01	.62	2.92	3.000	.000	.00	1 .0
4.780	.0111					.0001	.00	1.85	.12	.49	.013	.00	.00	PIPE
1018.950	915.210	1.788	916.998	4.00	.91	.01	917.01	.00	.62	2.94	3.000	.000	.00	1 .0
6.172	.0111					.0001	.00	1.79	.13	.49	.013	.00	.00	PIPE
1025.122	915.278	1.719	916.998	4.00	.95	.01	917.01	.00	.62	2.97	3.000	.000	.00	1 .0
5.834	.0111					.0001	.00	1.72	.14	.49	.013	.00	.00	PIPE
1030.956	915.343	1.654	916.997	4.00	1.00	.02	917.01	.00	.62	2.98	3.000	.000	.00	1 .0
5.527	.0111					.0001	.00	1.65	.15	.49	.013	.00	.00	PIPE
1036.483	915.404	1.592	916.996	4.00	1.05	.02	917.01	.00	.62	2.99	3.000	.000	.00	1 .0
5.246	.0111					.0001	.00	1.59	.16	.49	.013	.00	.00	PIPE
1041.729	915.463	1.532	916.995	4.00	1.10	.02	917.01	.00	.62	3.00	3.000	.000	.00	1 .0
4.974	.0111					.0001	.00	1.53	.18	.49	.013	.00	.00	PIPE
1046.703	915.518	1.476	916.994	4.00	1.16	.02	917.01	.00	.62	3.00	3.000	.000	.00	1 .0
4.727	.0111					.0002	.00	1.48	.19	.49	.013	.00	.00	PIPE

AGUA MANSA PROJECT
DEVELOPED CONDITION
OUTLET PIPE BASIN 1

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1051.430	915.570	1.422	916.992	4.00	1.21	.02	917.02	.00	.62	3.00	3.000	.000	.00	1 .0
4.507	.0111					.0002	.00	1.42	.20	.49	.013	.00	.00	PIPE
1055.937	915.620	1.371	916.991	4.00	1.27	.03	917.02	.00	.62	2.99	3.000	.000	.00	1 .0
4.285	.0111					.0002	.00	1.37	.22	.49	.013	.00	.00	PIPE
1060.222	915.667	1.322	916.989	4.00	1.33	.03	917.02	.00	.62	2.98	3.000	.000	.00	1 .0
4.080	.0111					.0002	.00	1.32	.23	.49	.013	.00	.00	PIPE
1064.301	915.713	1.275	916.987	4.00	1.40	.03	917.02	.00	.62	2.97	3.000	.000	.00	1 .0
3.881	.0111					.0003	.00	1.27	.25	.49	.013	.00	.00	PIPE
1068.183	915.756	1.230	916.985	4.00	1.47	.03	917.02	.00	.62	2.95	3.000	.000	.00	1 .0
3.691	.0111					.0003	.00	1.23	.27	.49	.013	.00	.00	PIPE
1071.874	915.797	1.187	916.983	4.00	1.54	.04	917.02	.00	.62	2.93	3.000	.000	.00	1 .0
3.516	.0111					.0004	.00	1.19	.29	.49	.013	.00	.00	PIPE
1075.390	915.836	1.145	916.981	4.00	1.61	.04	917.02	.00	.62	2.91	3.000	.000	.00	1 .0
3.339	.0111					.0004	.00	1.15	.31	.49	.013	.00	.00	PIPE
1078.728	915.872	1.106	916.978	4.00	1.69	.04	917.02	.00	.62	2.89	3.000	.000	.00	1 .0
3.177	.0111					.0005	.00	1.11	.33	.49	.013	.00	.00	PIPE
1081.906	915.908	1.067	916.975	4.00	1.77	.05	917.02	.00	.62	2.87	3.000	.000	.00	1 .0
3.013	.0111					.0005	.00	1.07	.35	.49	.013	.00	.00	PIPE

AGUA MANSA PROJECT
DEVELOPED CONDITION
OUTLET PIPE BASIN 1

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1084.918	915.941	1.031	916.972	4.00	1.86	.05	917.03	.00	.62	2.85	3.000	.000	.00	1 .0
2.844	.0111					.0006	.00	1.03	.38	.49	.013	.00	.00	PIPE
1087.762	915.973	.996	916.968	4.00	1.95	.06	917.03	.00	.62	2.83	3.000	.000	.00	1 .0
2.700	.0111					.0007	.00	1.00	.40	.49	.013	.00	.00	PIPE
1090.462	916.003	.962	916.964	4.00	2.05	.07	917.03	.00	.62	2.80	3.000	.000	.00	1 .0
2.532	.0111					.0008	.00	.96	.43	.49	.013	.00	.00	PIPE
1092.995	916.031	.929	916.959	4.00	2.15	.07	917.03	.00	.62	2.77	3.000	.000	.00	1 .0
2.378	.0111					.0009	.00	.93	.46	.49	.013	.00	.00	PIPE
1095.373	916.057	.898	916.954	4.00	2.25	.08	917.03	.00	.62	2.75	3.000	.000	.00	1 .0
2.218	.0111					.0010	.00	.90	.49	.49	.013	.00	.00	PIPE
1097.591	916.082	.867	916.949	4.00	2.36	.09	917.04	.00	.62	2.72	3.000	.000	.00	1 .0
2.070	.0111					.0012	.00	.87	.53	.49	.013	.00	.00	PIPE
1099.661	916.104	.838	916.943	4.00	2.48	.10	917.04	.00	.62	2.69	3.000	.000	.00	1 .0
1.894	.0111					.0013	.00	.84	.56	.49	.013	.00	.00	PIPE
1101.555	916.125	.810	916.936	4.00	2.60	.10	917.04	.00	.62	2.66	3.000	.000	.00	1 .0
1.404	.0111					.0015	.00	.81	.60	.49	.013	.00	.00	PIPE
1102.958	916.141	.783	916.924	4.00	2.72	.12	917.04	.00	.62	2.64	3.000	.000	.00	1 .0

HYDRAULIC JUMP

AGUA MANSA PROJECT
DEVELOPED CONDITION
OUTLET PIPE BASIN 1

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1102.958	916.141	.486	916.627	4.00	5.38	.45	917.08	.00	.62	2.21	3.000	.000	.00	1 .0
507.112	.0111					.0111	5.62	.49	1.64	.49	.013	.00	.00	PIPE
1610.070	921.762	.486	922.248	4.00	5.38	.45	922.70	.00	.62	2.21	3.000	.000	.00	1 .0
35.459	.0111					.0107	.38	.49	1.64	.49	.013	.00	.00	PIPE
1645.529	922.155	.494	922.649	4.00	5.25	.43	923.08	.00	.62	2.23	3.000	.000	.00	1 .0
15.932	.0111					.0097	.15	.49	1.58	.49	.013	.00	.00	PIPE
1661.461	922.331	.511	922.842	4.00	5.01	.39	923.23	.00	.62	2.26	3.000	.000	.00	1 .0
6.923	.0111					.0085	.06	.51	1.48	.49	.013	.00	.00	PIPE
1668.383	922.408	.528	922.936	4.00	4.77	.35	923.29	.00	.62	2.29	3.000	.000	.00	1 .0
3.913	.0111					.0074	.03	.53	1.39	.49	.013	.00	.00	PIPE
1672.297	922.451	.546	922.997	4.00	4.55	.32	923.32	.00	.62	2.31	3.000	.000	.00	1 .0
2.342	.0111					.0065	.02	.55	1.30	.49	.013	.00	.00	PIPE
1674.638	922.477	.564	923.042	4.00	4.34	.29	923.33	.00	.62	2.34	3.000	.000	.00	1 .0
1.375	.0111					.0056	.01	.56	1.22	.49	.013	.00	.00	PIPE
1676.013	922.493	.583	923.076	4.00	4.14	.27	923.34	.00	.62	2.37	3.000	.000	.00	1 .0
.726	.0111					.0049	.00	.58	1.14	.49	.013	.00	.00	PIPE
1676.739	922.501	.603	923.104	4.00	3.95	.24	923.35	.00	.62	2.40	3.000	.000	.00	1 .0
.211	.0111					.0043	.00	.60	1.07	.49	.013	.00	.00	PIPE

AGUA MANSA PROJECT
DEVELOPED CONDITION
OUTLET PIPE BASIN 1

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1676.950	922.503	.625	923.128	4.00	3.75	.22	923.35	.00	.62	2.44	3.000	.000	.00	1 .0
WALL ENTRANCE														
1676.950	922.503	.905	923.408	4.00	1.11	.02	923.43	.00	.31	4.00	4.000	4.000	.00	0 .0

AGUA MANSA PROJECT
DEVELOPED CONDITION
OUTLET PIPE BASIN 1

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1000.000	915.000	2.000	917.000	8.00	1.60	.04	917.04	.02	.89	2.83	3.000	.000	.00	1 .0
7.165	.0111					.0002	.00	2.02	.21	.68	.013	.00	.00	PIPE
1007.165	915.079	1.918	916.998	8.00	1.68	.04	917.04	.02	.89	2.88	3.000	.000	.00	1 .0
6.687	.0111					.0003	.00	1.94	.23	.68	.013	.00	.00	PIPE
1013.852	915.154	1.842	916.995	8.00	1.76	.05	917.04	.02	.89	2.92	3.000	.000	.00	1 .0
5.098	.0111					.0003	.00	1.86	.25	.68	.013	.00	.00	PIPE
1018.950	915.210	1.784	916.994	8.00	1.83	.05	917.05	.00	.89	2.95	3.000	.000	.00	1 .0
5.939	.0111					.0003	.00	1.78	.26	.68	.013	.00	.00	PIPE
1024.889	915.276	1.715	916.991	8.00	1.92	.06	917.05	.00	.89	2.97	3.000	.000	.00	1 .0
5.576	.0111					.0004	.00	1.71	.28	.68	.013	.00	.00	PIPE
1030.465	915.338	1.650	916.987	8.00	2.01	.06	917.05	.00	.89	2.99	3.000	.000	.00	1 .0
5.240	.0111					.0004	.00	1.65	.31	.68	.013	.00	.00	PIPE
1035.705	915.396	1.588	916.983	8.00	2.11	.07	917.05	.00	.89	2.99	3.000	.000	.00	1 .0
4.918	.0111					.0005	.00	1.59	.33	.68	.013	.00	.00	PIPE
1040.623	915.450	1.529	916.979	8.00	2.21	.08	917.05	.00	.89	3.00	3.000	.000	.00	1 .0
4.627	.0111					.0006	.00	1.53	.35	.68	.013	.00	.00	PIPE
1045.250	915.502	1.473	916.974	8.00	2.32	.08	917.06	.00	.89	3.00	3.000	.000	.00	1 .0
4.340	.0111					.0007	.00	1.47	.38	.68	.013	.00	.00	PIPE

AGUA MANSA PROJECT
DEVELOPED CONDITION
OUTLET PIPE BASIN 1

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1049.590	915.550	1.419	916.969	8.00	2.43	.09	917.06	.00	.89	3.00	3.000	.000	.00	1 .0
4.065	.0111					.0007	.00	1.42	.41	.68	.013	.00	.00	PIPE
1053.654	915.595	1.368	916.962	8.00	2.55	.10	917.06	.00	.89	2.99	3.000	.000	.00	1 .0
3.791	.0111					.0008	.00	1.37	.44	.68	.013	.00	.00	PIPE
1057.445	915.637	1.319	916.955	8.00	2.67	.11	917.07	.00	.89	2.98	3.000	.000	.00	1 .0
3.537	.0111					.0010	.00	1.32	.47	.68	.013	.00	.00	PIPE
1060.983	915.676	1.272	916.948	8.00	2.80	.12	917.07	.00	.89	2.97	3.000	.000	.00	1 .0
3.273	.0111					.0011	.00	1.27	.50	.68	.013	.00	.00	PIPE
1064.256	915.712	1.227	916.939	8.00	2.94	.13	917.07	.00	.89	2.95	3.000	.000	.00	1 .0
3.007	.0111					.0012	.00	1.23	.54	.68	.013	.00	.00	PIPE
1067.262	915.745	1.184	916.929	8.00	3.08	.15	917.08	.00	.89	2.93	3.000	.000	.00	1 .0
2.746	.0111					.0014	.00	1.18	.58	.68	.013	.00	.00	PIPE
1070.008	915.776	1.143	916.919	8.00	3.24	.16	917.08	.00	.89	2.91	3.000	.000	.00	1 .0
.140	.0111					.0015	.00	1.14	.62	.68	.013	.00	.00	PIPE
1070.148	915.777	1.143	916.920	8.00	3.24	.16	917.08	.00	.89	2.91	3.000	.000	.00	1 .0
HYDRAULIC JUMP														
1070.148	915.777	.684	916.461	8.00	6.60	.68	917.14	.00	.89	2.52	3.000	.000	.00	1 .0
511.573	.0111					.0111	5.67	.68	1.68	.68	.013	.00	.00	PIPE

AGUA MANSA PROJECT
DEVELOPED CONDITION
OUTLET PIPE BASIN 1

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1581.722	921.448	.684	922.131	8.00	6.60	.68	922.81	.00	.89	2.52	3.000	.000	.00	1 .0
55.028	.0111					.0105	.58	.68	1.68	.68	.013	.00	.00	PIPE
1636.750	922.057	.702	922.759	8.00	6.36	.63	923.39	.00	.89	2.54	3.000	.000	.00	1 .0
18.917	.0111					.0093	.18	.70	1.59	.68	.013	.00	.00	PIPE
1655.667	922.267	.726	922.993	8.00	6.06	.57	923.56	.00	.89	2.57	3.000	.000	.00	1 .0
9.246	.0111					.0082	.08	.73	1.49	.68	.013	.00	.00	PIPE
1664.912	922.370	.751	923.121	8.00	5.78	.52	923.64	.00	.89	2.60	3.000	.000	.00	1 .0
5.389	.0111					.0071	.04	.75	1.39	.68	.013	.00	.00	PIPE
1670.301	922.429	.777	923.206	8.00	5.51	.47	923.68	.00	.89	2.63	3.000	.000	.00	1 .0
3.318	.0111					.0063	.02	.78	1.31	.68	.013	.00	.00	PIPE
1673.620	922.466	.804	923.270	8.00	5.25	.43	923.70	.00	.89	2.66	3.000	.000	.00	1 .0
1.984	.0111					.0055	.01	.80	1.22	.68	.013	.00	.00	PIPE
1675.604	922.488	.832	923.320	8.00	5.01	.39	923.71	.00	.89	2.69	3.000	.000	.00	1 .0
1.032	.0111					.0048	.00	.83	1.14	.68	.013	.00	.00	PIPE
1676.636	922.500	.860	923.360	8.00	4.77	.35	923.71	.00	.89	2.71	3.000	.000	.00	1 .0
.314	.0111					.0042	.00	.86	1.07	.68	.013	.00	.00	PIPE
1676.950	922.503	.891	923.394	8.00	4.55	.32	923.72	.00	.89	2.74	3.000	.000	.00	1 .0
WALL	ENTRANCE													

AGUA MANSA PROJECT
DEVELOPED CONDITION
OUTLET PIPE BASIN 1

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1676.950	922.503	1.285	923.788	8.00	1.56	.04	923.83	.00	.50	4.00	4.000	4.000	.00	0 .0

AGUA MANSA PROJECT
DEVELOPED CONDITION
OUTLET PIPE BASIN 1

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1000.000	915.000	2.000	917.000	12.00	2.40	.09	917.09	.04	1.10	2.83	3.000	.000	.00	1 .0
6.905	.0111					.0006	.00	2.04	.32	.84	.013	.00	.00	PIPE
1006.905	915.077	1.918	916.995	12.00	2.51	.10	917.09	.04	1.10	2.88	3.000	.000	.00	1 .0
6.390	.0111					.0006	.00	1.96	.34	.84	.013	.00	.00	PIPE
1013.295	915.147	1.842	916.989	12.00	2.64	.11	917.10	.05	1.10	2.92	3.000	.000	.00	1 .0
5.655	.0111					.0007	.00	1.89	.37	.84	.013	.00	.00	PIPE
1018.950	915.210	1.774	916.984	12.00	2.76	.12	917.10	.00	1.10	2.95	3.000	.000	.00	1 .0
5.503	.0111					.0008	.00	1.77	.40	.84	.013	.00	.00	PIPE
1024.453	915.271	1.705	916.976	12.00	2.89	.13	917.11	.00	1.10	2.97	3.000	.000	.00	1 .0
5.090	.0111					.0009	.00	1.71	.43	.84	.013	.00	.00	PIPE
1029.542	915.327	1.640	916.968	12.00	3.03	.14	917.11	.00	1.10	2.99	3.000	.000	.00	1 .0
4.693	.0111					.0010	.00	1.64	.46	.84	.013	.00	.00	PIPE
1034.235	915.379	1.579	916.958	12.00	3.18	.16	917.12	.00	1.10	3.00	3.000	.000	.00	1 .0
4.312	.0111					.0012	.01	1.58	.50	.84	.013	.00	.00	PIPE
1038.547	915.427	1.520	916.948	12.00	3.34	.17	917.12	.00	1.10	3.00	3.000	.000	.00	1 .0
3.944	.0111					.0013	.01	1.52	.54	.84	.013	.00	.00	PIPE
1042.491	915.471	1.465	916.935	12.00	3.50	.19	917.13	.00	1.10	3.00	3.000	.000	.00	1 .0
3.375	.0111					.0015	.01	1.46	.58	.84	.013	.00	.00	PIPE

AGUA MANSA PROJECT
DEVELOPED CONDITION
OUTLET PIPE BASIN 1

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1045.866	915.508	1.411	916.920	12.00	3.67	.21	917.13	.00	1.10	2.99	3.000	.000	.00	1 .0
HYDRAULIC JUMP														
1045.866	915.508	.839	916.347	12.00	7.42	.85	917.20	.00	1.10	2.69	3.000	.000	.00	1 .0
508.722	.0111					.0111	5.64	.84	1.69	.84	.013	.00	.00	PIPE
1554.588	921.147	.839	921.986	12.00	7.42	.85	922.84	.00	1.10	2.69	3.000	.000	.00	1 .0
70.452	.0111					.0105	.74	.84	1.69	.84	.013	.00	.00	PIPE
1625.039	921.928	.862	922.789	12.00	7.15	.79	923.58	.00	1.10	2.71	3.000	.000	.00	1 .0
24.490	.0111					.0094	.23	.86	1.60	.84	.013	.00	.00	PIPE
1649.530	922.199	.892	923.091	12.00	6.81	.72	923.81	.00	1.10	2.74	3.000	.000	.00	1 .0
11.900	.0111					.0082	.10	.89	1.50	.84	.013	.00	.00	PIPE
1661.430	922.331	.923	923.254	12.00	6.50	.66	923.91	.00	1.10	2.77	3.000	.000	.00	1 .0
6.960	.0111					.0072	.05	.92	1.40	.84	.013	.00	.00	PIPE
1668.389	922.408	.955	923.363	12.00	6.19	.60	923.96	.00	1.10	2.80	3.000	.000	.00	1 .0
4.266	.0111					.0063	.03	.96	1.31	.84	.013	.00	.00	PIPE
1672.656	922.455	.989	923.445	12.00	5.91	.54	923.99	.00	1.10	2.82	3.000	.000	.00	1 .0
2.554	.0111					.0055	.01	.99	1.23	.84	.013	.00	.00	PIPE
1675.209	922.484	1.024	923.508	12.00	5.63	.49	924.00	.00	1.10	2.85	3.000	.000	.00	1 .0
1.336	.0111					.0048	.01	1.02	1.15	.84	.013	.00	.00	PIPE

AGUA MANSA PROJECT
DEVELOPED CONDITION
OUTLET PIPE BASIN 1

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1676.546	922.499	1.061	923.559	12.00	5.37	.45	924.01	.00	1.10	2.87	3.000	.000	.00	1 .0
.404	.0111					.0042	.00	1.06	1.07	.84	.013	.00	.00	PIPE
1676.950	922.503	1.099	923.602	12.00	5.11	.41	924.01	.00	1.10	2.89	3.000	.000	.00	1 .0
WALL	ENTRANCE													
1676.950	922.503	1.584	924.087	12.00	1.89	.06	924.14	.00	.65	4.00	4.000	4.000	.00	0 .0

AGUA MANSA PROJECT
DEVELOPED CONDITION
OUTLET PIPE BASIN 1

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1000.000	915.000	2.000	917.000	16.00	3.20	.16	917.16	.07	1.28	2.83	3.000	.000	.00	1 .0
6.516	.0111					.0010	.01	2.07	.42	.97	.013	.00	.00	PIPE
1006.516	915.072	1.918	916.991	16.00	3.35	.17	917.17	.08	1.28	2.88	3.000	.000	.00	1 .0
5.938	.0111					.0011	.01	1.99	.46	.97	.013	.00	.00	PIPE
1012.454	915.138	1.842	916.980	16.00	3.52	.19	917.17	.08	1.28	2.92	3.000	.000	.00	1 .0
5.389	.0111					.0013	.01	1.93	.50	.97	.013	.00	.00	PIPE
1017.843	915.198	1.770	916.967	16.00	3.69	.21	917.18	.09	1.28	2.95	3.000	.000	.00	1 .0
1.107	.0111					.0014	.00	1.86	.54	.97	.013	.00	.00	PIPE
1018.950	915.210	1.755	916.965	16.00	3.72	.22	917.18	.00	1.28	2.96	3.000	.000	.00	1 .0
4.771	.0111					.0015	.01	1.75	.54	.97	.013	.00	.00	PIPE
1023.721	915.263	1.688	916.950	16.00	3.91	.24	917.19	.00	1.28	2.98	3.000	.000	.00	1 .0
2.848	.0111					.0016	.00	1.69	.59	.97	.013	.00	.00	PIPE
1026.570	915.294	1.643	916.938	16.00	4.04	.25	917.19	.00	1.28	2.99	3.000	.000	.00	1 .0
HYDRAULIC JUMP														
1026.570	915.294	.974	916.268	16.00	8.05	1.01	917.27	.00	1.28	2.81	3.000	.000	.00	1 .0
499.946	.0111					.0111	5.54	.97	1.69	.97	.013	.00	.00	PIPE
1526.516	920.836	.974	921.809	16.00	8.05	1.01	922.81	.00	1.28	2.81	3.000	.000	.00	1 .0
83.652	.0111					.0106	.89	.97	1.69	.97	.013	.00	.00	PIPE

AGUA MANSA PROJECT
DEVELOPED CONDITION
OUTLET PIPE BASIN 1

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1610.168	921.763	.996	922.759	16.00	7.80	.94	923.70	.00	1.28	2.83	3.000	.000	.00	1 .0
32.417	.0111					.0095	.31	1.00	1.61	.97	.013	.00	.00	PIPE
1642.585	922.122	1.032	923.154	16.00	7.43	.86	924.01	.00	1.28	2.85	3.000	.000	.00	1 .0
15.098	.0111					.0083	.13	1.03	1.51	.97	.013	.00	.00	PIPE
1657.683	922.289	1.068	923.358	16.00	7.09	.78	924.14	.00	1.28	2.87	3.000	.000	.00	1 .0
8.688	.0111					.0073	.06	1.07	1.41	.97	.013	.00	.00	PIPE
1666.371	922.386	1.107	923.492	16.00	6.76	.71	924.20	.00	1.28	2.89	3.000	.000	.00	1 .0
5.286	.0111					.0064	.03	1.11	1.32	.97	.013	.00	.00	PIPE
1671.657	922.444	1.146	923.591	16.00	6.44	.64	924.24	.00	1.28	2.92	3.000	.000	.00	1 .0
3.155	.0111					.0056	.02	1.15	1.23	.97	.013	.00	.00	PIPE
1674.812	922.479	1.188	923.667	16.00	6.14	.59	924.25	.00	1.28	2.93	3.000	.000	.00	1 .0
1.641	.0111					.0049	.01	1.19	1.15	.97	.013	.00	.00	PIPE
1676.453	922.497	1.231	923.728	16.00	5.86	.53	924.26	.00	1.28	2.95	3.000	.000	.00	1 .0
.497	.0111					.0043	.00	1.23	1.07	.97	.013	.00	.00	PIPE
1676.950	922.503	1.277	923.780	16.00	5.58	.48	924.26	.00	1.28	2.97	3.000	.000	.00	1 .0
WALL ENTRANCE														
1676.950	922.503	1.845	924.348	16.00	2.17	.07	924.42	.00	.79	4.00	4.000	4.000	.00	0 .0

Program Package Serial Number: 1382

WATER SURFACE PROFILE LISTING Date:12- 5-2014 Time:11:32:41

AGUA MANSA PROJECT
DEVELOPED CONDITION
OUTLET PIPE BASIN 1

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE	Critical Depth / Dpth	Flow Top Width / Froude N	Height/ Dia.-FT / Norm Dp	Base Wt or I.D. / "N"	ZL / X-Fall	ZR	No Wth Prs/Pip / Type	Ch
1000.000	915.000	2.000	917.000	20.00	4.00	.25	917.25	.11	1.44	2.83	3.000	.000	.00		1	.0
5.995	.0111					.0016	.01	2.11	.53	1.10	.013	.00	.00		PIPE	
1005.995	915.066	1.918	916.984	20.00	4.19	.27	917.26	.12	1.44	2.88	3.000	.000	.00		1	.0
4.822	.0111					.0018	.01	2.04	.57	1.10	.013	.00	.00		PIPE	
1010.816	915.120	1.841	916.961	20.00	4.40	.30	917.26	.13	1.44	2.92	3.000	.000	.00		1	.0
HYDRAULIC JUMP																
1010.816	915.120	1.096	916.216	20.00	8.56	1.14	917.35	.49	1.44	2.89	3.000	.000	.00		1	.0
8.134	.0111					.0111	.09	1.59	1.68	1.10	.013	.00	.00		PIPE	
1018.950	915.210	1.096	916.306	20.00	8.56	1.14	917.44	.00	1.44	2.89	3.000	.000	.00		1	.0
474.577	.0111					.0111	5.26	1.10	1.68	1.10	.013	.00	.00		PIPE	
1493.527	920.470	1.096	921.566	20.00	8.56	1.14	922.70	.00	1.44	2.89	3.000	.000	.00		1	.0
96.103	.0111					.0107	1.03	1.10	1.68	1.10	.013	.00	.00		PIPE	
1589.630	921.535	1.114	922.649	20.00	8.37	1.09	923.74	.00	1.44	2.90	3.000	.000	.00		1	.0
44.738	.0111					.0098	.44	1.11	1.62	1.10	.013	.00	.00		PIPE	
1634.368	922.031	1.154	923.185	20.00	7.98	.99	924.17	.00	1.44	2.92	3.000	.000	.00		1	.0
19.040	.0111					.0086	.16	1.15	1.52	1.10	.013	.00	.00		PIPE	
1653.409	922.242	1.196	923.438	20.00	7.61	.90	924.34	.00	1.44	2.94	3.000	.000	.00		1	.0
10.859	.0111					.0075	.08	1.20	1.42	1.10	.013	.00	.00		PIPE	

AGUA MANSA PROJECT
DEVELOPED CONDITION
OUTLET PIPE BASIN 1

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1664.268	922.362	1.239	923.602	20.00	7.25	.82	924.42	.00	1.44	2.95	3.000	.000	.00	1 .0
6.309	.0111					.0066	.04	1.24	1.32	1.10	.013	.00	.00	PIPE
1670.577	922.432	1.285	923.717	20.00	6.92	.74	924.46	.00	1.44	2.97	3.000	.000	.00	1 .0
3.883	.0111					.0058	.02	1.29	1.23	1.10	.013	.00	.00	PIPE
1674.460	922.475	1.332	923.807	20.00	6.59	.68	924.48	.00	1.44	2.98	3.000	.000	.00	1 .0
1.901	.0111					.0051	.01	1.33	1.15	1.10	.013	.00	.00	PIPE
1676.361	922.496	1.382	923.879	20.00	6.29	.61	924.49	.00	1.44	2.99	3.000	.000	.00	1 .0
.589	.0111					.0045	.00	1.38	1.07	1.10	.013	.00	.00	PIPE
1676.950	922.503	1.435	923.938	20.00	5.99	.56	924.49	.00	1.44	3.00	3.000	.000	.00	1 .0
WALL ENTRANCE														
1676.950	922.503	2.083	924.586	20.00	2.40	.09	924.68	.00	.92	4.00	4.000	4.000	.00	0 .0

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AGUA MANSA PROJECT
DEVELOPED CONDITION
OUTLET PIPE BASIN 1

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1000.000	915.000	1.237	916.237	25.00	9.10	1.28	917.52	.57	1.61	2.95	3.000	.000	.00	1 .0
18.950	.0111					.0111	.21	1.81	1.66	1.24	.013	.00	.00	PIPE
1018.950	915.210	1.237	916.447	25.00	9.10	1.28	917.73	.00	1.61	2.95	3.000	.000	.00	1 .0
415.051	.0111					.0111	4.60	1.24	1.66	1.24	.013	.00	.00	PIPE
1434.001	919.810	1.237	921.047	25.00	9.10	1.28	922.33	.00	1.61	2.95	3.000	.000	.00	1 .0
111.760	.0111					.0110	1.22	1.24	1.66	1.24	.013	.00	.00	PIPE
1545.760	921.049	1.244	922.293	25.00	9.02	1.26	923.56	.00	1.61	2.96	3.000	.000	.00	1 .0
74.896	.0111					.0102	.76	1.24	1.64	1.24	.013	.00	.00	PIPE
1620.656	921.879	1.290	923.169	25.00	8.60	1.15	924.32	.00	1.61	2.97	3.000	.000	.00	1 .0
26.188	.0111					.0089	.23	1.29	1.53	1.24	.013	.00	.00	PIPE
1646.843	922.169	1.338	923.507	25.00	8.20	1.04	924.55	.00	1.61	2.98	3.000	.000	.00	1 .0
14.182	.0111					.0078	.11	1.34	1.43	1.24	.013	.00	.00	PIPE
1661.025	922.326	1.387	923.714	25.00	7.82	.95	924.66	.00	1.61	2.99	3.000	.000	.00	1 .0
7.952	.0111					.0069	.05	1.39	1.33	1.24	.013	.00	.00	PIPE
1668.977	922.415	1.440	923.855	25.00	7.45	.86	924.72	.00	1.61	3.00	3.000	.000	.00	1 .0
4.873	.0111					.0061	.03	1.44	1.24	1.24	.013	.00	.00	PIPE
1673.850	922.469	1.494	923.963	25.00	7.11	.78	924.75	.00	1.61	3.00	3.000	.000	.00	1 .0
2.490	.0111					.0053	.01	1.49	1.16	1.24	.013	.00	.00	PIPE

AGUA MANSA PROJECT
DEVELOPED CONDITION
OUTLET PIPE BASIN 1

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1676.339	922.496	1.551	924.047	25.00	6.78	.71	924.76	.00	1.61	3.00	3.000	.000	.00	1 .0
.610	.0111					.0047	.00	1.55	1.08	1.24	.013	.00	.00	PIPE
1676.950	922.503	1.613	924.116	25.00	6.45	.65	924.76	.00	1.61	2.99	3.000	.000	.00	1 .0
WALL	ENTRANCE													
1676.950	922.503	2.363	924.866	25.00	2.64	.11	924.97	.00	1.07	4.00	4.000	4.000	.00	0 .0

Program Package Serial Number: 1382

WATER SURFACE PROFILE LISTING Date:12- 5-2014 Time:11:32:41

AGUA MANSA PROJECT
DEVELOPED CONDITION
OUTLET PIPE BASIN 1

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1000.000	915.000	1.370	916.370	30.00	9.54	1.41	917.78	.64	1.77	2.99	3.000	.000	.00	1 .0
18.950	.0111					.0111	.21	2.00	1.64	1.37	.013	.00	.00	PIPE
1018.950	915.210	1.370	916.580	30.00	9.54	1.41	917.99	.00	1.77	2.99	3.000	.000	.00	1 .0
463.658	.0111					.0111	5.14	1.37	1.64	1.37	.013	.00	.00	PIPE
1482.608	920.349	1.370	921.719	30.00	9.54	1.41	923.13	.00	1.77	2.99	3.000	.000	.00	1 .0
116.617	.0111					.0105	1.23	1.37	1.64	1.37	.013	.00	.00	PIPE
1599.225	921.642	1.411	923.053	30.00	9.18	1.31	924.36	.00	1.77	2.99	3.000	.000	.00	1 .0
38.823	.0111					.0094	.36	1.41	1.55	1.37	.013	.00	.00	PIPE
1638.049	922.072	1.464	923.536	30.00	8.75	1.19	924.73	.00	1.77	3.00	3.000	.000	.00	1 .0
18.476	.0111					.0083	.15	1.46	1.44	1.37	.013	.00	.00	PIPE
1656.525	922.277	1.520	923.797	30.00	8.35	1.08	924.88	.00	1.77	3.00	3.000	.000	.00	1 .0
10.592	.0111					.0073	.08	1.52	1.34	1.37	.013	.00	.00	PIPE
1667.117	922.394	1.578	923.972	30.00	7.96	.98	924.96	.00	1.77	3.00	3.000	.000	.00	1 .0
5.867	.0111					.0064	.04	1.58	1.25	1.37	.013	.00	.00	PIPE
1672.983	922.459	1.640	924.099	30.00	7.59	.89	924.99	.00	1.77	2.99	3.000	.000	.00	1 .0
3.183	.0111					.0057	.02	1.64	1.16	1.37	.013	.00	.00	PIPE
1676.167	922.494	1.704	924.198	30.00	7.23	.81	925.01	.00	1.77	2.97	3.000	.000	.00	1 .0
.783	.0111					.0050	.00	1.70	1.08	1.37	.013	.00	.00	PIPE

AGUA MANSA PROJECT
DEVELOPED CONDITION
OUTLET PIPE BASIN 1

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1676.950	922.503	1.774	924.277	30.00	6.89	.74	925.01	.00	1.77	2.95	3.000	.000	.00	1 .0
WALL ENTRANCE														
1676.950	922.503	2.636	925.139	30.00	2.84	.13	925.26	.00	1.20	4.00	4.000	4.000	.00	0 .0

Program Package Serial Number: 1382

WATER SURFACE PROFILE LISTING Date:12- 5-2014 Time:11:32:41

AGUA MANSA PROJECT
DEVELOPED CONDITION
OUTLET PIPE BASIN 1

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1000.000	915.000	1.497	916.497	35.00	9.93	1.53	918.03	.69	1.92	3.00	3.000	.000	.00	1 .0
18.950	.0111					.0111	.21	2.19	1.61	1.50	.013	.00	.00	PIPE
1018.950	915.210	1.497	916.707	35.00	9.93	1.53	918.24	.00	1.92	3.00	3.000	.000	.00	1 .0
414.041	.0111					.0111	4.59	1.50	1.61	1.50	.013	.00	.00	PIPE
1432.991	919.799	1.497	921.296	35.00	9.93	1.53	922.83	.00	1.92	3.00	3.000	.000	.00	1 .0
126.406	.0111					.0108	1.37	1.50	1.61	1.50	.013	.00	.00	PIPE
1559.397	921.200	1.519	922.719	35.00	9.74	1.47	924.19	.00	1.92	3.00	3.000	.000	.00	1 .0
65.582	.0111					.0099	.65	1.52	1.57	1.50	.013	.00	.00	PIPE
1624.979	921.927	1.577	923.504	35.00	9.29	1.34	924.84	.00	1.92	3.00	3.000	.000	.00	1 .0
25.644	.0111					.0087	.22	1.58	1.46	1.50	.013	.00	.00	PIPE
1650.624	922.211	1.639	923.850	35.00	8.86	1.22	925.07	.00	1.92	2.99	3.000	.000	.00	1 .0
13.912	.0111					.0077	.11	1.64	1.36	1.50	.013	.00	.00	PIPE
1664.536	922.365	1.703	924.069	35.00	8.45	1.11	925.18	.00	1.92	2.97	3.000	.000	.00	1 .0
7.439	.0111					.0068	.05	1.70	1.26	1.50	.013	.00	.00	PIPE
1671.975	922.448	1.772	924.220	35.00	8.05	1.01	925.23	.00	1.92	2.95	3.000	.000	.00	1 .0
3.873	.0111					.0060	.02	1.77	1.17	1.50	.013	.00	.00	PIPE
1675.848	922.491	1.844	924.335	35.00	7.68	.92	925.25	.00	1.92	2.92	3.000	.000	.00	1 .0
1.102	.0111					.0053	.01	1.84	1.08	1.50	.013	.00	.00	PIPE

AGUA MANSA PROJECT
DEVELOPED CONDITION
OUTLET PIPE BASIN 1

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1676.950	922.503	1.922	924.425	35.00	7.32	.83	925.26	.00	1.92	2.88	3.000	.000	.00	1 .0
WALL ENTRANCE														
1676.950	922.503	2.914	925.417	35.00	3.00	.14	925.56	.00	1.33	4.00	4.000	4.000	.00	0 .0

AGUA MANSA PROJECT
DEVELOPED CONDITION
OUTLET PIPE BASIN 1

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1000.000	915.000	1.622	916.622	40.00	10.26	1.63	918.26	.73	2.06	2.99	3.000	.000	.00	1 .0
18.950	.0111					.0111	.21	2.36	1.58	1.62	.013	.00	.00	PIPE
1018.950	915.210	1.622	916.832	40.00	10.26	1.63	918.47	.00	2.06	2.99	3.000	.000	.00	1 .0
452.636	.0111					.0111	5.02	1.62	1.58	1.62	.013	.00	.00	PIPE
1471.586	920.227	1.622	921.849	40.00	10.26	1.63	923.48	.00	2.06	2.99	3.000	.000	.00	1 .0
131.753	.0111					.0105	1.38	1.62	1.58	1.62	.013	.00	.00	PIPE
1603.339	921.687	1.679	923.366	40.00	9.82	1.50	924.86	.00	2.06	2.98	3.000	.000	.00	1 .0
39.043	.0111					.0093	.36	1.68	1.48	1.62	.013	.00	.00	PIPE
1642.383	922.120	1.746	923.866	40.00	9.36	1.36	925.23	.00	2.06	2.96	3.000	.000	.00	1 .0
18.520	.0111					.0082	.15	1.75	1.37	1.62	.013	.00	.00	PIPE
1660.902	922.325	1.817	924.142	40.00	8.93	1.24	925.38	.00	2.06	2.93	3.000	.000	.00	1 .0
9.893	.0111					.0073	.07	1.82	1.27	1.62	.013	.00	.00	PIPE
1670.795	922.435	1.892	924.327	40.00	8.51	1.13	925.45	.00	2.06	2.90	3.000	.000	.00	1 .0
4.828	.0111					.0065	.03	1.89	1.18	1.62	.013	.00	.00	PIPE
1675.623	922.488	1.972	924.460	40.00	8.12	1.02	925.48	.00	2.06	2.85	3.000	.000	.00	1 .0
1.327	.0111					.0057	.01	1.97	1.09	1.62	.013	.00	.00	PIPE
1676.950	922.503	2.059	924.562	40.00	7.73	.93	925.49	.00	2.06	2.78	3.000	.000	.00	1 .0
WALL	ENTRANCE													

AGUA MANSA PROJECT
DEVELOPED CONDITION
OUTLET PIPE BASIN 1

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1676.950	922.503	3.224	925.727	40.00	3.10	.15	925.88	.00	1.46	4.00	4.000	4.000	.00	0 .0

FLOOD HYDROGRAPH ROUTING PROGRAM
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Study date: 12/05/14

AGUA MANSA PROJECT
100 YEAR STORM
DEVELOPED CONDITION
BASIN 1

Program License Serial Number 5028

********** HYDROGRAPH INFORMATION **********

From study/file name: aguama1.rte
**********HYDROGRAPH DATA**********
Number of intervals = 294
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 34.945 (CFS)
Total volume = 4.617 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

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Process from Point/Station 10.000 to Point/Station 20.000
**** RETARDING BASIN ROUTING ****

User entry of depth-outflow-storage data

Total number of inflow hydrograph intervals = 294
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

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

Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
1.000	0.350	0.001	0.350	0.350
2.000	0.750	0.002	0.750	0.750
2.500	0.980	0.003	0.980	0.980
3.500	1.480	4.700	1.464	1.496
4.500	2.030	18.300	1.967	2.093
5.500	2.650	36.200	2.525	2.775

Hydrograph Detention Basin Routing

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

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	8.7	17.47	26.21	34.94	Depth (Ft.)
0.083	0.05	0.00	0.000	O	|	|	|	|	0.00
0.167	0.33	0.00	0.002	O	|	|	|	|	0.00
0.250	0.74	0.00	0.005	O	|	|	|	|	0.01
0.333	0.93	0.00	0.011	O	|	|	|	|	0.03
0.417	0.99	0.00	0.018	O	|	|	|	|	0.05
0.500	1.01	0.00	0.024	O	|	|	|	|	0.07
0.583	1.02	0.00	0.031	O	|	|	|	|	0.09
0.667	1.02	0.00	0.038	O	|	|	|	|	0.11
0.750	1.03	0.00	0.046	O	|	|	|	|	0.13
0.833	1.03	0.00	0.053	O	|	|	|	|	0.15
0.917	1.03	0.00	0.060	O	|	|	|	|	0.17
1.000	1.03	0.00	0.067	O	|	|	|	|	0.19
1.083	1.04	0.00	0.074	O	|	|	|	|	0.21
1.167	1.04	0.00	0.081	O	|	|	|	|	0.23
1.250	1.04	0.00	0.088	O	|	|	|	|	0.25
1.333	1.05	0.00	0.095	O	|	|	|	|	0.27
1.417	1.05	0.00	0.103	O	|	|	|	|	0.29
1.500	1.05	0.00	0.110	O	|	|	|	|	0.31
1.583	1.06	0.00	0.117	O	|	|	|	|	0.33
1.667	1.06	0.00	0.124	O	|	|	|	|	0.36
1.750	1.06	0.00	0.132	O	|	|	|	|	0.38
1.833	1.07	0.00	0.139	O	|	|	|	|	0.40
1.917	1.07	0.00	0.146	O	|	|	|	|	0.42
2.000	1.07	0.00	0.154	O	|	|	|	|	0.44
2.083	1.08	0.00	0.161	O	|	|	|	|	0.46
2.167	1.08	0.00	0.169	O	|	|	|	|	0.48
2.250	1.09	0.00	0.176	O	|	|	|	|	0.50
2.333	1.09	0.00	0.184	O	|	|	|	|	0.52
2.417	1.09	0.00	0.191	OI	|	|	|	|	0.55
2.500	1.10	0.00	0.199	OI	|	|	|	|	0.57
2.583	1.10	0.00	0.206	OI	|	|	|	|	0.59
2.667	1.10	0.00	0.214	OI	|	|	|	|	0.61
2.750	1.11	0.00	0.221	OI	|	|	|	|	0.63
2.833	1.11	0.00	0.229	OI	|	|	|	|	0.65
2.917	1.12	0.00	0.237	OI	|	|	|	|	0.68
3.000	1.12	0.00	0.244	OI	|	|	|	|	0.70
3.083	1.12	0.00	0.252	OI	|	|	|	|	0.72
3.167	1.13	0.00	0.260	OI	|	|	|	|	0.74
3.250	1.13	0.00	0.268	OI	|	|	|	|	0.76
3.333	1.14	0.00	0.275	OI	|	|	|	|	0.79
3.417	1.14	0.00	0.283	OI	|	|	|	|	0.81
3.500	1.14	0.00	0.291	OI	|	|	|	|	0.83
3.583	1.15	0.00	0.299	OI	|	|	|	|	0.85
3.667	1.15	0.00	0.307	OI	|	|	|	|	0.88
3.750	1.16	0.00	0.315	OI	|	|	|	|	0.90
3.833	1.16	0.00	0.323	OI	|	|	|	|	0.92
3.917	1.16	0.00	0.331	OI	|	|	|	|	0.95
4.000	1.17	0.00	0.339	OI	|	|	|	|	0.97
4.083	1.17	0.00	0.347	OI	|	|	|	|	0.99
4.167	1.18	0.00	0.355	OI	|	|	|	|	1.01
4.250	1.18	0.00	0.363	OI	|	|	|	|	1.03
4.333	1.19	0.00	0.371	OI	|	|	|	|	1.05
4.417	1.19	0.00	0.379	OI	|	|	|	|	1.07
4.500	1.20	0.00	0.388	OI	|	|	|	|	1.09
4.583	1.20	0.00	0.396	OI	|	|	|	|	1.11

4.667	1.21	0.00	0.404	OI					1.14
4.750	1.21	0.00	0.413	OI					1.16
4.833	1.22	0.00	0.421	OI					1.18
4.917	1.22	0.00	0.429	OI					1.20
5.000	1.23	0.00	0.438	OI					1.22
5.083	1.23	0.00	0.446	OI					1.24
5.167	1.24	0.00	0.455	OI					1.26
5.250	1.24	0.00	0.463	OI					1.28
5.333	1.25	0.00	0.472	OI					1.30
5.417	1.25	0.00	0.480	OI					1.33
5.500	1.26	0.00	0.489	OI					1.35
5.583	1.26	0.00	0.498	OI					1.37
5.667	1.27	0.00	0.506	OI					1.39
5.750	1.27	0.00	0.515	OI					1.41
5.833	1.28	0.00	0.524	OI					1.43
5.917	1.29	0.00	0.533	OI					1.46
6.000	1.29	0.00	0.542	OI					1.48
6.083	1.30	0.00	0.550	OI					1.50
6.167	1.30	0.00	0.559	OI					1.52
6.250	1.31	0.00	0.568	OI					1.55
6.333	1.32	0.00	0.577	OI					1.57
6.417	1.32	0.00	0.587	OI					1.59
6.500	1.33	0.00	0.596	OI					1.61
6.583	1.33	0.00	0.605	OI					1.64
6.667	1.34	0.00	0.614	OI					1.66
6.750	1.35	0.00	0.623	OI					1.68
6.833	1.35	0.00	0.633	OI					1.71
6.917	1.36	0.00	0.642	OI					1.73
7.000	1.37	0.00	0.651	OI					1.75
7.083	1.38	0.00	0.661	OI					1.78
7.167	1.38	0.00	0.670	OI					1.80
7.250	1.39	0.00	0.680	OI					1.82
7.333	1.40	0.00	0.689	OI					1.85
7.417	1.40	0.00	0.699	OI					1.87
7.500	1.41	0.00	0.709	OI					1.90
7.583	1.42	0.00	0.718	OI					1.92
7.667	1.43	0.00	0.728	OI					1.95
7.750	1.43	0.00	0.738	OI					1.97
7.833	1.44	0.00	0.748	OI					1.99
7.917	1.45	0.00	0.758	OI					2.02
8.000	1.46	0.00	0.768	OI					2.04
8.083	1.47	0.00	0.778	OI					2.06
8.167	1.48	0.00	0.788	OI					2.08
8.250	1.48	0.00	0.798	OI					2.10
8.333	1.49	0.00	0.808	OI					2.13
8.417	1.50	0.00	0.819	OI					2.15
8.500	1.51	0.00	0.829	OI					2.17
8.583	1.52	0.00	0.839	OI					2.19
8.667	1.53	0.00	0.850	OI					2.22
8.750	1.54	0.00	0.861	OI					2.24
8.833	1.55	0.00	0.871	OI					2.26
8.917	1.56	0.00	0.882	OI					2.29
9.000	1.57	0.00	0.893	OI					2.31
9.083	1.58	0.00	0.903	OI					2.33
9.167	1.59	0.00	0.914	OI					2.36
9.250	1.60	0.00	0.925	OI					2.38
9.333	1.61	0.00	0.936	OI					2.40
9.417	1.62	0.00	0.947	OI					2.43
9.500	1.63	0.00	0.959	OI					2.45
9.583	1.64	0.00	0.970	OI					2.48
9.667	1.66	0.01	0.981	OI					2.50
9.750	1.67	0.12	0.992	OI					2.52
9.833	1.68	0.21	1.002	OI					2.54

9.917	1.69	0.31	1.012	OI					2.56
10.000	1.70	0.39	1.022	OI					2.58
10.083	1.72	0.48	1.030	OI					2.60
10.167	1.73	0.55	1.039	OI					2.62
10.250	1.74	0.63	1.047	OI					2.63
10.333	1.76	0.70	1.054	OI					2.65
10.417	1.77	0.77	1.061	OI					2.66
10.500	1.79	0.83	1.068	OI					2.68
10.583	1.80	0.89	1.074	OI					2.69
10.667	1.82	0.95	1.080	OI					2.70
10.750	1.83	1.00	1.086	OI					2.71
10.833	1.85	1.05	1.092	OI					2.72
10.917	1.86	1.10	1.097	O					2.73
11.000	1.88	1.15	1.102	O					2.74
11.083	1.90	1.20	1.107	O					2.75
11.167	1.91	1.24	1.112	O					2.76
11.250	1.93	1.29	1.116	O					2.77
11.333	1.95	1.33	1.121	O					2.78
11.417	1.97	1.37	1.125	O					2.79
11.500	1.99	1.40	1.129	O					2.80
11.583	2.01	1.44	1.133	O					2.81
11.667	2.03	1.48	1.137	O					2.81
11.750	2.05	1.51	1.141	O					2.82
11.833	2.07	1.55	1.144	O					2.83
11.917	2.09	1.58	1.148	O					2.84
12.000	2.12	1.61	1.151	O					2.84
12.083	2.15	1.65	1.155	O					2.85
12.167	2.21	1.68	1.158	OI					2.86
12.250	2.30	1.72	1.162	OI					2.86
12.333	2.36	1.75	1.166	OI					2.87
12.417	2.39	1.79	1.171	OI					2.88
12.500	2.42	1.83	1.175	OI					2.89
12.583	2.45	1.87	1.179	OI					2.90
12.667	2.48	1.91	1.183	OI					2.91
12.750	2.51	1.94	1.187	OI					2.91
12.833	2.55	1.98	1.191	OI					2.92
12.917	2.58	2.02	1.194	OI					2.93
13.000	2.61	2.05	1.198	OI					2.94
13.083	2.65	2.09	1.202	OI					2.94
13.167	2.69	2.13	1.206	OI					2.95
13.250	2.73	2.16	1.210	OI					2.96
13.333	2.77	2.20	1.214	O					2.97
13.417	2.81	2.24	1.218	O					2.98
13.500	2.86	2.27	1.222	O					2.98
13.583	2.90	2.31	1.226	O					2.99
13.667	2.95	2.35	1.230	O					3.00
13.750	3.01	2.39	1.234	O					3.01
13.833	3.06	2.43	1.238	O					3.02
13.917	3.12	2.47	1.243	O					3.03
14.000	3.18	2.51	1.247	O					3.03
14.083	3.24	2.56	1.252	O					3.04
14.167	3.31	2.60	1.257	OI					3.05
14.250	3.39	2.65	1.262	OI					3.06
14.333	3.46	2.70	1.267	OI					3.07
14.417	3.55	2.75	1.272	OI					3.08
14.500	3.64	2.80	1.278	OI					3.10
14.583	3.73	2.86	1.284	OI					3.11
14.667	3.84	2.92	1.290	OI					3.12
14.750	3.95	2.98	1.297	OI					3.13
14.833	4.07	3.04	1.303	OI					3.15
14.917	4.21	3.11	1.311	OI					3.16
15.000	4.36	3.18	1.319	OI					3.18
15.083	4.52	3.26	1.327	O I					3.19

15.167	4.70	3.35	1.336	OI					3.21
15.250	4.91	3.44	1.346	OI					3.23
15.333	5.15	3.54	1.356	OI					3.25
15.417	5.38	3.65	1.368	OI					3.28
15.500	5.44	3.76	1.380	OI					3.30
15.583	5.45	3.86	1.391	OI					3.32
15.667	5.74	3.97	1.402	O I					3.34
15.750	6.29	4.10	1.416	O I					3.37
15.833	7.09	4.26	1.433	O I					3.41
15.917	8.37	4.48	1.456	O I					3.45
16.000	10.80	4.95	1.490	O I					3.52
16.083	17.07	6.36	1.547	O I					3.62
16.167	30.64	9.10	1.658	O			I		3.82
16.250	34.94	12.82	1.808	O				I	4.10
16.333	20.71	15.18	1.904	O	I				4.27
16.417	11.15	15.30	1.908	I O					4.28
16.500	7.34	14.35	1.870	I O					4.21
16.583	6.38	13.17	1.823	I O					4.12
16.667	5.32	12.02	1.776	I O					4.04
16.750	4.84	10.93	1.732	I O					3.96
16.833	4.46	9.95	1.692	I O					3.89
16.917	4.16	9.06	1.656	I O					3.82
17.000	3.91	8.27	1.625	I O					3.76
17.083	3.70	7.57	1.596	I O					3.71
17.167	3.51	6.95	1.571	I O					3.67
17.250	3.36	6.40	1.549	I O					3.62
17.333	3.22	5.91	1.529	I O					3.59
17.417	3.09	5.48	1.511	I O					3.56
17.500	2.98	5.09	1.496	I O					3.53
17.583	2.88	4.76	1.482	I O					3.50
17.667	2.79	4.60	1.470	I O					3.48
17.750	2.71	4.49	1.457	I O					3.45
17.833	2.63	4.37	1.445	I O					3.43
17.917	2.56	4.26	1.433	IO					3.41
18.000	2.50	4.15	1.422	IO					3.38
18.083	2.43	4.05	1.411	IO					3.36
18.167	2.33	3.94	1.399	IO					3.34
18.250	2.22	3.84	1.388	IO					3.32
18.333	2.14	3.73	1.377	I O					3.29
18.417	2.09	3.63	1.366	I O					3.27
18.500	2.04	3.53	1.356	I O					3.25
18.583	2.00	3.44	1.346	I O					3.23
18.667	1.96	3.35	1.336	I O					3.21
18.750	1.92	3.26	1.327	IO					3.19
18.833	1.89	3.17	1.318	IO					3.18
18.917	1.85	3.09	1.309	IO					3.16
19.000	1.82	3.01	1.301	IO					3.14
19.083	1.79	2.94	1.293	IO					3.13
19.167	1.76	2.87	1.285	IO					3.11
19.250	1.74	2.80	1.277	IO					3.09
19.333	1.71	2.73	1.270	IO					3.08
19.417	1.69	2.66	1.263	IO					3.07
19.500	1.66	2.60	1.257	IO					3.05
19.583	1.64	2.54	1.250	IO					3.04
19.667	1.62	2.49	1.244	IO					3.03
19.750	1.59	2.43	1.238	IO					3.02
19.833	1.57	2.38	1.233	IO					3.01
19.917	1.55	2.33	1.227	IO					2.99
20.000	1.53	2.28	1.222	IO					2.98
20.083	1.52	2.23	1.217	IO					2.97
20.167	1.50	2.18	1.212	IO					2.96
20.250	1.48	2.14	1.208	O					2.96
20.333	1.46	2.10	1.203	O					2.95

25.667	0.00	0.37	1.019	O	|	|	|	|	2.58
25.750	0.00	0.35	1.017	O	|	|	|	|	2.57
25.833	0.00	0.33	1.015	O	|	|	|	|	2.57
25.917	0.00	0.31	1.012	O	|	|	|	|	2.56
26.000	0.00	0.29	1.010	O	|	|	|	|	2.56
26.083	0.00	0.27	1.008	O	|	|	|	|	2.56
26.167	0.00	0.25	1.007	O	|	|	|	|	2.55
26.250	0.00	0.24	1.005	O	|	|	|	|	2.55
26.333	0.00	0.22	1.003	O	|	|	|	|	2.55
26.417	0.00	0.21	1.002	O	|	|	|	|	2.54
26.500	0.00	0.20	1.000	O	|	|	|	|	2.54
26.583	0.00	0.18	0.999	O	|	|	|	|	2.54
26.667	0.00	0.17	0.998	O	|	|	|	|	2.54
26.750	0.00	0.16	0.997	O	|	|	|	|	2.53
26.833	0.00	0.15	0.996	O	|	|	|	|	2.53
26.917	0.00	0.14	0.995	O	|	|	|	|	2.53
27.000	0.00	0.13	0.994	O	|	|	|	|	2.53
27.083	0.00	0.12	0.993	O	|	|	|	|	2.53
27.167	0.00	0.12	0.992	O	|	|	|	|	2.52
27.250	0.00	0.11	0.991	O	|	|	|	|	2.52
27.333	0.00	0.10	0.991	O	|	|	|	|	2.52
27.417	0.00	0.10	0.990	O	|	|	|	|	2.52

Remaining water in basin = 0.99 (Ac.Ft)

```
****************************HYDROGRAPH DATA****************************
              Number of intervals =   329
              Time interval =    5.0 (Min.)
              Maximum/Peak flow rate =       15.296 (CFS)
              Total volume =       3.627 (Ac.Ft)
      Status of hydrographs being held in storage
                 Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
      Peak (CFS)      0.000     0.000     0.000     0.000     0.000
      Vol (Ac.Ft)     0.000     0.000     0.000     0.000     0.000
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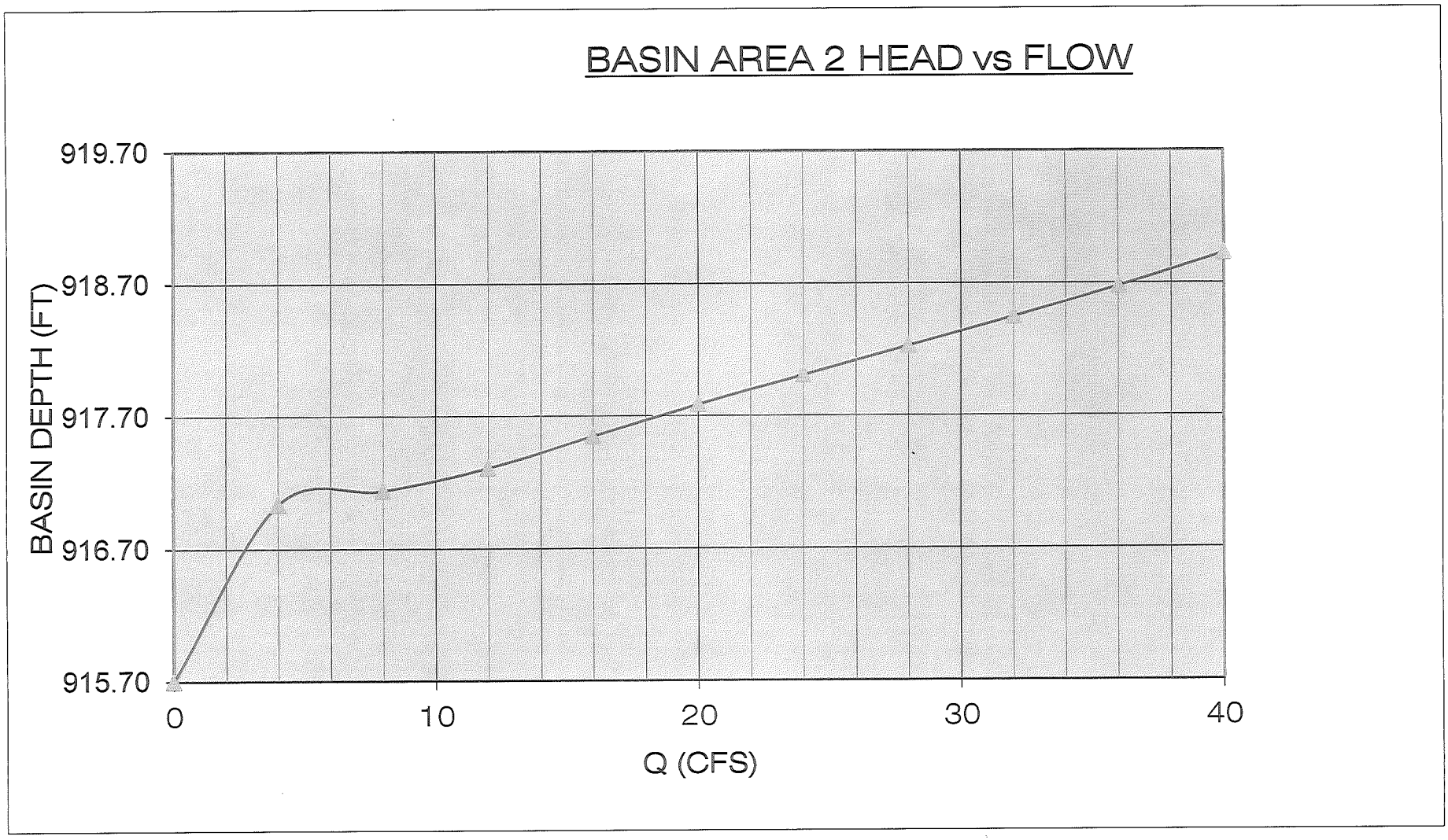
WSPG AND BASIN ROUTING

DRAINAGE AREA 2

BASIN # 2


BASIN AREA 2 HEAD vs FLOW
919.70
918.70
917.70
916.70
915.70
BASIN DEPTH (FT)
0
10
20
30
40
Q (CFS)

BASIN DA2

elevation	area	area	h	Volume	Accumulate vol	
ft	sqft	Ac	ft	Ac-ft	Ac-ft	cf
914	30,332	0.696	0	0	0	0
915	33,629	0.772	1	0.73	0.73	31,981
916	37,011	0.850	2	0.81	1.55	67,301
917	40,478	0.929	3	0.89	2.43	106,045
918	44,030	1.011	4	0.97	3.40	148,299
919	47,668	1.094	5	1.05	4.46	194,148
920	51,391	1.180	6	1.14	5.59	243,678

Routing basin 2

elev	h	v	q
FT	FT	Ac-ft	cfs
914	0	0	0
915	1	0.73	0
915.7	1.7	1.30	0
946.7	2.7	2.17	2.9
917.7	3.7	3.11	18.4
918.7	4.7	4.14	36

Basin 2	
24" PIPE	
Q	H
0	915.70
4	917.04
8	917.14
12	917.31
16	917.55
20	917.79
24	918.01
28	918.23
32	918.45
36	918.68
40	918.93

AGUA MANSA PROJECT
DEVELOPED CONDITION
AREA 2

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1000.000	915.000	2.000	917.000	4.00	.80	.01	917.01	.00	.62	2.83	3.000	.000	.00	1 .0
15.006	.0055					.0001	.00	2.00	.11	.58	.013	.00	.00	PIPE
1015.006	915.082	1.918	917.000	4.00	.84	.01	917.01	.00	.62	2.88	3.000	.000	.00	1 .0
14.099	.0055					.0001	.00	1.92	.11	.58	.013	.00	.00	PIPE
1029.105	915.159	1.841	917.000	4.00	.88	.01	917.01	.00	.62	2.92	3.000	.000	.00	1 .0
13.172	.0055					.0001	.00	1.84	.12	.58	.013	.00	.00	PIPE
1042.278	915.231	1.769	917.000	4.00	.92	.01	917.01	.00	.62	2.95	3.000	.000	.00	1 .0
12.430	.0055					.0001	.00	1.77	.13	.58	.013	.00	.00	PIPE
1054.708	915.298	1.701	917.000	4.00	.97	.01	917.01	.00	.62	2.97	3.000	.000	.00	1 .0
11.872	.0055					.0001	.00	1.70	.14	.58	.013	.00	.00	PIPE
1066.580	915.363	1.636	916.999	4.00	1.01	.02	917.02	.00	.62	2.99	3.000	.000	.00	1 .0
11.126	.0055					.0001	.00	1.64	.16	.58	.013	.00	.00	PIPE
1077.705	915.424	1.575	916.999	4.00	1.06	.02	917.02	.00	.62	3.00	3.000	.000	.00	1 .0
8.465	.0055					.0001	.00	1.58	.17	.58	.013	.00	.00	PIPE
1086.170	915.470	1.529	916.999	4.00	1.10	.02	917.02	.00	.62	3.00	3.000	.000	.00	1 .0
5.820	.0055					.0001	.00	1.53	.18	.58	.013	.00	.00	PIPE
1091.990	915.502	1.498	917.000	4.00	1.13	.02	917.02	.00	.62	3.00	3.000	.000	.00	1 .0
9.693	.0056					.0002	.00	1.50	.18	.57	.013	.00	.00	PIPE

AGUA MANSA PROJECT
DEVELOPED CONDITION
AREA 2

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE	Critical Depth / Dpth	Flow Top Width / Froude N	Height/ Dia.-FT / Norm Dp	Base Wt or I.D. / "N"	ZL / X-Fall	ZR	No Wth Prs/Pip / Type Ch
1101.683	915.556	1.443	916.999	4.00	1.19	.02	917.02	.00	.62	3.00	3.000	.000	.00		1 .0
6.047	.0056					.0002	.00	1.45	.20	.57	.013	.00	.00		PIPE
1107.730	915.590	1.410	917.000	4.00	1.23	.02	917.02	.00	.62	2.99	3.000	.000	.00		1 .0
9.071	.0056					.0002	.00	1.41	.21	.57	.013	.00	.00		PIPE
1116.801	915.641	1.358	916.999	4.00	1.29	.03	917.02	.00	.62	2.99	3.000	.000	.00		1 .0
8.433	.0056					.0002	.00	1.36	.22	.57	.013	.00	.00		PIPE
1125.234	915.688	1.310	916.998	4.00	1.35	.03	917.03	.00	.62	2.98	3.000	.000	.00		1 .0
3.016	.0056					.0002	.00	1.31	.24	.57	.013	.00	.00		PIPE
1128.250	915.705	1.293	916.998	4.00	1.37	.03	917.03	.00	.62	2.97	3.000	.000	.00		1 .0
WALL ENTRANCE															
1128.250	915.705	1.333	917.038	4.00	.75	.01	917.05	.00	.31	4.00	4.000	4.000	.00		0 .0

AGUA MANSA PROJECT
DEVELOPED CONDITION
AREA 2

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE	Critical Depth / Dpth	Flow Top Width / Froude N	Height/Dia.-FT / Norm Dp	Base Wt or I.D. / "N"	ZL / X-Fall	ZR	No Wth Prs/Pip / Type	Ch
1000.000	915.000	2.000	917.000	8.00	1.60	.04	917.04	.00	.89	2.83	3.000	.000	.00		1	.0
14.972	.0055					.0002	.00	2.00	.21	.82	.013	.00	.00		PIPE	
1014.972	915.082	1.918	917.000	8.00	1.68	.04	917.04	.00	.89	2.88	3.000	.000	.00		1	.0
14.040	.0055					.0003	.00	1.92	.23	.82	.013	.00	.00		PIPE	
1029.012	915.158	1.841	916.999	8.00	1.76	.05	917.05	.00	.89	2.92	3.000	.000	.00		1	.0
13.080	.0055					.0003	.00	1.84	.25	.82	.013	.00	.00		PIPE	
1042.093	915.230	1.769	916.999	8.00	1.84	.05	917.05	.00	.89	2.95	3.000	.000	.00		1	.0
12.307	.0055					.0004	.00	1.77	.27	.82	.013	.00	.00		PIPE	
1054.400	915.297	1.701	916.998	8.00	1.93	.06	917.06	.00	.89	2.97	3.000	.000	.00		1	.0
11.724	.0055					.0004	.00	1.70	.29	.82	.013	.00	.00		PIPE	
1066.124	915.361	1.636	916.997	8.00	2.03	.06	917.06	.00	.89	2.99	3.000	.000	.00		1	.0
10.933	.0055					.0005	.01	1.64	.31	.82	.013	.00	.00		PIPE	
1077.057	915.420	1.575	916.995	8.00	2.13	.07	917.07	.00	.89	3.00	3.000	.000	.00		1	.0
9.113	.0055					.0005	.00	1.58	.33	.82	.013	.00	.00		PIPE	
1086.170	915.470	1.525	916.995	8.00	2.22	.08	917.07	.00	.89	3.00	3.000	.000	.00		1	.0
5.820	.0055					.0006	.00	1.52	.36	.82	.013	.00	.00		PIPE	
1091.990	915.502	1.492	916.994	8.00	2.28	.08	917.07	.01	.89	3.00	3.000	.000	.00		1	.0
9.349	.0056					.0006	.01	1.50	.37	.81	.013	.00	.00		PIPE	

AGUA MANSA PROJECT
DEVELOPED CONDITION
AREA 2

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1101.339	915.554	1.437	916.991	8.00	2.39	.09	917.08	.01	.89	3.00	3.000	.000	.00	1 .0
6.391	.0056					.0007	.00	1.45	.40	.81	.013	.00	.00	PIPE
1107.730	915.590	1.400	916.990	8.00	2.47	.09	917.09	.00	.89	2.99	3.000	.000	.00	1 .0
8.581	.0056					.0008	.01	1.40	.42	.81	.013	.00	.00	PIPE
1116.311	915.638	1.349	916.987	8.00	2.59	.10	917.09	.00	.89	2.98	3.000	.000	.00	1 .0
7.961	.0056					.0009	.01	1.35	.45	.81	.013	.00	.00	PIPE
1124.272	915.683	1.301	916.984	8.00	2.72	.11	917.10	.00	.89	2.97	3.000	.000	.00	1 .0
3.978	.0056					.0010	.00	1.30	.48	.81	.013	.00	.00	PIPE
1128.250	915.705	1.277	916.982	8.00	2.79	.12	917.10	.00	.89	2.97	3.000	.000	.00	1 .0
WALL ENTRANCE														
1128.250	915.705	1.436	917.141	8.00	1.39	.03	917.17	.00	.50	4.00	4.000	4.000	.00	0 .0

FILE: AGUAMA2.WSW

W S P G W - CIVILDESIGN Version 14.03
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WATER SURFACE PROFILE LISTING

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AGUA MANSA PROJECT
DEVELOPED CONDITION
AREA 2

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1000.000	915.000	2.000	917.000	12.00	2.40	.09	917.09	.00	1.10	2.83	3.000	.000	.00	1 .0
14.911	.0055					.0006	.01	2.00	.32	1.01	.013	.00	.00	PIPE
1014.911	915.081	1.918	916.999	12.00	2.51	.10	917.10	.00	1.10	2.88	3.000	.000	.00	1 .0
13.929	.0055					.0006	.01	1.92	.34	1.01	.013	.00	.00	PIPE
1028.840	915.157	1.841	916.998	12.00	2.64	.11	917.11	.00	1.10	2.92	3.000	.000	.00	1 .0
12.906	.0055					.0007	.01	1.84	.37	1.01	.013	.00	.00	PIPE
1041.747	915.228	1.769	916.997	12.00	2.77	.12	917.12	.00	1.10	2.95	3.000	.000	.00	1 .0
12.072	.0055					.0008	.01	1.77	.40	1.01	.013	.00	.00	PIPE
1053.819	915.294	1.701	916.995	12.00	2.90	.13	917.13	.00	1.10	2.97	3.000	.000	.00	1 .0
11.432	.0055					.0009	.01	1.70	.43	1.01	.013	.00	.00	PIPE
1065.252	915.356	1.636	916.992	12.00	3.04	.14	917.14	.00	1.10	2.99	3.000	.000	.00	1 .0
10.546	.0055					.0010	.01	1.64	.47	1.01	.013	.00	.00	PIPE
1075.798	915.413	1.575	916.988	12.00	3.19	.16	917.15	.00	1.10	3.00	3.000	.000	.00	1 .0
9.852	.0055					.0012	.01	1.58	.50	1.01	.013	.00	.00	PIPE
1085.650	915.467	1.517	916.984	12.00	3.35	.17	917.16	.00	1.10	3.00	3.000	.000	.00	1 .0
.520	.0055					.0012	.00	1.52	.54	1.01	.013	.00	.00	PIPE
1086.170	915.470	1.514	916.984	12.00	3.35	.17	917.16	.00	1.10	3.00	3.000	.000	.00	1 .0
5.820	.0055					.0013	.01	1.51	.54	1.01	.013	.00	.00	PIPE

AGUA MANSA PROJECT
DEVELOPED CONDITION
AREA 2

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1091.990	915.502	1.479	916.981	12.00	3.46	.19	917.17	.02	1.10	3.00	3.000	.000	.00	1 .0
8.617	.0056					.0014	.01	1.50	.57	1.00	.013	.00	.00	PIPE
1100.607	915.550	1.425	916.975	12.00	3.62	.20	917.18	.03	1.10	3.00	3.000	.000	.00	1 .0
7.123	.0056					.0016	.01	1.45	.61	1.00	.013	.00	.00	PIPE
1107.730	915.590	1.379	916.969	12.00	3.78	.22	917.19	.00	1.10	2.99	3.000	.000	.00	1 .0
7.333	.0056					.0019	.01	1.38	.65	1.00	.013	.00	.00	PIPE
1115.063	915.631	1.329	916.960	12.00	3.97	.24	917.20	.00	1.10	2.98	3.000	.000	.00	1 .0
6.445	.0056					.0021	.01	1.33	.69	1.00	.013	.00	.00	PIPE
1121.508	915.667	1.282	916.949	12.00	4.16	.27	917.22	.00	1.10	2.97	3.000	.000	.00	1 .0
5.955	.0056					.0024	.01	1.28	.74	1.00	.013	.00	.00	PIPE
1127.463	915.701	1.236	916.937	12.00	4.37	.30	917.23	.00	1.10	2.95	3.000	.000	.00	1 .0
.787	.0056					.0026	.00	1.24	.80	1.00	.013	.00	.00	PIPE
1128.250	915.705	1.230	916.935	12.00	4.40	.30	917.24	.00	1.10	2.95	3.000	.000	.00	1 .0
WALL ENTRANCE														
1128.250	915.705	1.603	917.308	12.00	1.87	.05	917.36	.00	.65	4.00	4.000	4.000	.00	0 .0

FILE: AGUAMA2.WSW

W S P G W - CIVILDESIGN Version 14.03
Program Package Serial Number: 1382
WATER SURFACE PROFILE LISTING

Date:12- 7-2014 Time:12:33: 2

AGUA MANSA PROJECT
DEVELOPED CONDITION
AREA 2

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE	Critical Depth / Dpth	Flow Top Width / Froude N	Height/ Dia.-FT / Norm Dp	Base Wt or I.D. / "N"	X-Fall	ZL / ZR	No Wth Prs/Pip / Type	Ch
1000.000	915.000	2.000	917.000	16.00	3.20	.16	917.16	.00	1.28	2.83	3.000	.000		.00	1	.0
14.811	.0055					.0010	.01	2.00	.42	1.18	.013	.00		.00	PIPE	
1014.811	915.081	1.918	916.999	16.00	3.35	.17	917.17	.00	1.28	2.88	3.000	.000		.00	1	.0
13.745	.0055					.0011	.02	1.92	.46	1.18	.013	.00		.00	PIPE	
1028.555	915.156	1.841	916.997	16.00	3.52	.19	917.19	.00	1.28	2.92	3.000	.000		.00	1	.0
12.608	.0055					.0013	.02	1.84	.50	1.18	.013	.00		.00	PIPE	
1041.163	915.224	1.769	916.994	16.00	3.69	.21	917.20	.00	1.28	2.95	3.000	.000		.00	1	.0
11.655	.0055					.0014	.02	1.77	.54	1.18	.013	.00		.00	PIPE	
1052.818	915.288	1.701	916.989	16.00	3.87	.23	917.22	.00	1.28	2.97	3.000	.000		.00	1	.0
10.895	.0055					.0016	.02	1.70	.58	1.18	.013	.00		.00	PIPE	
1063.714	915.347	1.636	916.984	16.00	4.06	.26	917.24	.00	1.28	2.99	3.000	.000		.00	1	.0
9.798	.0055					.0018	.02	1.64	.62	1.18	.013	.00		.00	PIPE	
1073.512	915.401	1.575	916.976	16.00	4.25	.28	917.26	.00	1.28	3.00	3.000	.000		.00	1	.0
8.868	.0055					.0021	.02	1.58	.67	1.18	.013	.00		.00	PIPE	
1082.380	915.449	1.517	916.966	16.00	4.46	.31	917.28	.00	1.28	3.00	3.000	.000		.00	1	.0
3.791	.0055					.0023	.01	1.52	.72	1.18	.013	.00		.00	PIPE	
1086.170	915.470	1.491	916.961	16.00	4.56	.32	917.28	.00	1.28	3.00	3.000	.000		.00	1	.0
5.820	.0055					.0025	.01	1.49	.74	1.17	.013	.00		.00	PIPE	

AGUA MANSA PROJECT
DEVELOPED CONDITION
AREA 2

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1091.990	915.502	1.449	916.951	16.00	4.73	.35	917.30	.05	1.28	3.00	3.000	.000	.00	1 .0
6.482	.0056					.0028	.02	1.50	.79	1.17	.013	.00	.00	PIPE
1098.472	915.538	1.396	916.934	16.00	4.96	.38	917.32	.05	1.28	2.99	3.000	.000	.00	1 .0
1.833	.0056					.0031	.01	1.45	.84	1.17	.013	.00	.00	PIPE
1100.305	915.549	1.346	916.895	16.00	5.21	.42	917.32	.06	1.28	2.98	3.000	.000	.00	1 .0
HYDRAULIC JUMP														
1100.305	915.549	1.175	916.724	16.00	6.23	.60	917.33	.08	1.28	2.93	3.000	.000	.00	1 .0
7.425	.0056					.0054	.04	1.25	1.17	1.17	.013	.00	.00	PIPE
1107.730	915.590	1.184	916.774	16.00	6.17	.59	917.36	.00	1.28	2.93	3.000	.000	.00	1 .0
3.098	.0056					.0053	.02	1.18	1.16	1.17	.013	.00	.00	PIPE
1110.828	915.607	1.187	916.794	16.00	6.14	.59	917.38	.00	1.28	2.93	3.000	.000	.00	1 .0
15.424	.0056					.0049	.08	1.19	1.15	1.17	.013	.00	.00	PIPE
1126.251	915.694	1.230	916.924	16.00	5.86	.53	917.46	.00	1.28	2.95	3.000	.000	.00	1 .0
1.999	.0056					.0043	.01	1.23	1.07	1.17	.013	.00	.00	PIPE
1128.250	915.705	1.277	916.982	16.00	5.58	.48	917.47	.00	1.28	2.97	3.000	.000	.00	1 .0
WALL ENTRANCE														
1128.250	915.705	1.845	917.550	16.00	2.17	.07	917.62	.00	.79	4.00	4.000	4.000	.00	0 .0

FILE: AGUAMA2.WSW

W S P G W - CIVILDESIGN Version 14.03
Program Package Serial Number: 1382
WATER SURFACE PROFILE LISTING

Date:12- 7-2014 Time:12:33: 2

AGUA MANSA PROJECT
DEVELOPED CONDITION
AREA 2

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1000.000	915.000	2.000	917.000	20.00	4.00	.25	917.25	.00	1.44	2.83	3.000	.000	.00	1 .0
14.649	.0055					.0016	.02	2.00	.53	1.33	.013	.00	.00	PIPE
1014.649	915.080	1.918	916.998	20.00	4.19	.27	917.27	.00	1.44	2.88	3.000	.000	.00	1 .0
13.435	.0055					.0018	.02	1.92	.57	1.33	.013	.00	.00	PIPE
1028.084	915.153	1.841	916.994	20.00	4.39	.30	917.29	.00	1.44	2.92	3.000	.000	.00	1 .0
12.084	.0055					.0020	.02	1.84	.62	1.33	.013	.00	.00	PIPE
1040.168	915.219	1.769	916.988	20.00	4.61	.33	917.32	.00	1.44	2.95	3.000	.000	.00	1 .0
10.880	.0055					.0022	.02	1.77	.67	1.33	.013	.00	.00	PIPE
1051.048	915.278	1.701	916.980	20.00	4.83	.36	917.34	.00	1.44	2.97	3.000	.000	.00	1 .0
9.822	.0055					.0025	.02	1.70	.72	1.33	.013	.00	.00	PIPE
1060.870	915.332	1.636	916.968	20.00	5.07	.40	917.37	.00	1.44	2.99	3.000	.000	.00	1 .0
8.153	.0055					.0029	.02	1.64	.78	1.33	.013	.00	.00	PIPE
1069.024	915.377	1.575	916.952	20.00	5.32	.44	917.39	.00	1.44	3.00	3.000	.000	.00	1 .0
3.589	.0055					.0033	.01	1.58	.84	1.33	.013	.00	.00	PIPE
1072.612	915.396	1.517	916.913	20.00	5.58	.48	917.40	.00	1.44	3.00	3.000	.000	.00	1 .0
HYDRAULIC JUMP														
1072.612	915.396	1.330	916.726	20.00	6.61	.68	917.40	.00	1.44	2.98	3.000	.000	.00	1 .0
13.558	.0055					.0055	.07	1.33	1.16	1.33	.013	.00	.00	PIPE

AGUA MANSA PROJECT
DEVELOPED CONDITION
AREA 2

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1086.170	915.470	1.330	916.800	20.00	6.61	.68	917.48	.00	1.44	2.98	3.000	.000	.00	1 .0
5.820	.0055					.0055	.03	1.33	1.16	1.33	.013	.00	.00	PIPE
1091.990	915.502	1.330	916.832	20.00	6.61	.68	917.51	.09	1.44	2.98	3.000	.000	.00	1 .0
15.740	.0056					.0054	.08	1.42	1.16	1.32	.013	.00	.00	PIPE
1107.730	915.590	1.340	916.930	20.00	6.54	.67	917.60	.00	1.44	2.98	3.000	.000	.00	1 .0
17.051	.0056					.0050	.09	1.34	1.14	1.32	.013	.00	.00	PIPE
1124.781	915.686	1.382	917.068	20.00	6.29	.61	917.68	.00	1.44	2.99	3.000	.000	.00	1 .0
3.469	.0056					.0045	.02	1.38	1.07	1.32	.013	.00	.00	PIPE
1128.250	915.705	1.435	917.140	20.00	5.99	.56	917.70	.00	1.44	3.00	3.000	.000	.00	1 .0
WALL	ENTRANCE													
1128.250	915.705	2.083	917.788	20.00	2.40	.09	917.88	.00	.92	4.00	4.000	4.000	.00	0 .0

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                    FLOOD HYDROGRAPH ROUTING PROGRAM
          Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004
                      Study date: 12/07/14

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AGUA MANSA PROJECT
100 YEAR STORM
DEVELOPED CONDITION
BASIN 2
------------------------------------------------------------------------

Program License Serial Number 5028

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******************** HYDROGRAPH INFORMATION *********************

            From study/file name: AGUANA2.rte
****************************HYDROGRAPH DATA****************************
            Number of intervals =   294
            Time interval =    5.0 (Min.)
            Maximum/Peak flow rate =       45.921 (CFS)
            Total volume =       6.265 (Ac.Ft)
      Status of hydrographs being held in storage
                 Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
      Peak (CFS)      0.000     0.000     0.000     0.000     0.000
      Vol (Ac.Ft)     0.000     0.000     0.000     0.000     0.000
**********************************************************************


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station       10.000
**** RETARDING BASIN ROUTING ****
______________________________________________________________________

User entry of depth-outflow-storage data
----------------------------------------------------------------------
Total number of inflow hydrograph intervals = 294
Hydrograph time unit =  5.000 (Min.)
Initial depth in storage basin =   0.00(Ft.)
----------------------------------------------------------------------
----------------------------------------------------------------------
Initial basin depth =   0.00 (Ft.)
Initial basin storage =      0.00 (Ac.Ft)
Initial basin outflow =   0.00 (CFS)
----------------------------------------------------------------------
----------------------------------------------------------------------
Depth vs. Storage and Depth vs. Discharge data:
 Basin Depth  Storage    Outflow   (S-O*dt/2)   (S+O*dt/2)
     (Ft.)    (Ac.Ft)    (CFS)     (Ac.Ft)      (Ac.Ft)
----------------------------------------------------------------------
    0.000      0.000      0.000      0.000        0.000
```

1.000	0.730	0.001	0.730	0.730
1.700	1.300	0.002	1.300	1.300
2.700	2.170	2.900	2.160	2.180
3.700	3.110	18.400	3.047	3.173
4.700	4.140	36.000	4.016	4.264

Hydrograph Detention Basin Routing

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

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	11.5	22.96	34.44	45.92	Depth (Ft.)
0.083	0.07	0.00	0.000	O	|	|	|	|	0.00
0.167	0.47	0.00	0.002	O	|	|	|	|	0.00
0.250	1.03	0.00	0.007	O	|	|	|	|	0.01
0.333	1.28	0.00	0.015	O	|	|	|	|	0.02
0.417	1.36	0.00	0.024	O	|	|	|	|	0.03
0.500	1.38	0.00	0.034	O	|	|	|	|	0.05
0.583	1.39	0.00	0.043	O	|	|	|	|	0.06
0.667	1.40	0.00	0.053	O	|	|	|	|	0.07
0.750	1.40	0.00	0.062	O	|	|	|	|	0.09
0.833	1.41	0.00	0.072	O	|	|	|	|	0.10
0.917	1.41	0.00	0.082	O	|	|	|	|	0.11
1.000	1.41	0.00	0.092	O	|	|	|	|	0.13
1.083	1.42	0.00	0.101	O	|	|	|	|	0.14
1.167	1.42	0.00	0.111	O	|	|	|	|	0.15
1.250	1.43	0.00	0.121	O	|	|	|	|	0.17
1.333	1.43	0.00	0.131	O	|	|	|	|	0.18
1.417	1.44	0.00	0.141	OI	|	|	|	|	0.19
1.500	1.44	0.00	0.151	OI	|	|	|	|	0.21
1.583	1.44	0.00	0.160	OI	|	|	|	|	0.22
1.667	1.45	0.00	0.170	OI	|	|	|	|	0.23
1.750	1.45	0.00	0.180	OI	|	|	|	|	0.25
1.833	1.46	0.00	0.190	OI	|	|	|	|	0.26
1.917	1.46	0.00	0.200	OI	|	|	|	|	0.27
2.000	1.47	0.00	0.211	OI	|	|	|	|	0.29
2.083	1.47	0.00	0.221	OI	|	|	|	|	0.30
2.167	1.48	0.00	0.231	OI	|	|	|	|	0.32
2.250	1.48	0.00	0.241	OI	|	|	|	|	0.33
2.333	1.49	0.00	0.251	OI	|	|	|	|	0.34
2.417	1.49	0.00	0.262	OI	|	|	|	|	0.36
2.500	1.50	0.00	0.272	OI	|	|	|	|	0.37
2.583	1.50	0.00	0.282	OI	|	|	|	|	0.39
2.667	1.51	0.00	0.293	OI	|	|	|	|	0.40
2.750	1.51	0.00	0.303	OI	|	|	|	|	0.42
2.833	1.52	0.00	0.313	OI	|	|	|	|	0.43
2.917	1.52	0.00	0.324	OI	|	|	|	|	0.44
3.000	1.53	0.00	0.334	OI	|	|	|	|	0.46
3.083	1.53	0.00	0.345	OI	|	|	|	|	0.47
3.167	1.54	0.00	0.356	OI	|	|	|	|	0.49
3.250	1.55	0.00	0.366	OI	|	|	|	|	0.50
3.333	1.55	0.00	0.377	OI	|	|	|	|	0.52
3.417	1.56	0.00	0.388	OI	|	|	|	|	0.53
3.500	1.56	0.00	0.398	OI	|	|	|	|	0.55
3.583	1.57	0.00	0.409	OI	|	|	|	|	0.56
3.667	1.57	0.00	0.420	OI	|	|	|	|	0.58

3.750	1.58	0.00	0.431	OI					0.59
3.833	1.59	0.00	0.442	OI					0.60
3.917	1.59	0.00	0.453	OI					0.62
4.000	1.60	0.00	0.464	OI					0.63
4.083	1.60	0.00	0.475	OI					0.65
4.167	1.61	0.00	0.486	OI					0.67
4.250	1.62	0.00	0.497	OI					0.68
4.333	1.62	0.00	0.508	OI					0.70
4.417	1.63	0.00	0.519	OI					0.71
4.500	1.64	0.00	0.530	OI					0.73
4.583	1.64	0.00	0.542	OI					0.74
4.667	1.65	0.00	0.553	OI					0.76
4.750	1.66	0.00	0.564	OI					0.77
4.833	1.66	0.00	0.576	OI					0.79
4.917	1.67	0.00	0.587	OI					0.80
5.000	1.68	0.00	0.599	OI					0.82
5.083	1.68	0.00	0.610	OI					0.84
5.167	1.69	0.00	0.622	OI					0.85
5.250	1.70	0.00	0.634	OI					0.87
5.333	1.70	0.00	0.645	OI					0.88
5.417	1.71	0.00	0.657	OI					0.90
5.500	1.72	0.00	0.669	OI					0.92
5.583	1.73	0.00	0.681	OI					0.93
5.667	1.73	0.00	0.693	OI					0.95
5.750	1.74	0.00	0.705	OI					0.97
5.833	1.75	0.00	0.717	OI					0.98
5.917	1.76	0.00	0.729	OI					1.00
6.000	1.77	0.00	0.741	OI					1.01
6.083	1.77	0.00	0.753	OI					1.03
6.167	1.78	0.00	0.765	OI					1.04
6.250	1.79	0.00	0.777	OI					1.06
6.333	1.80	0.00	0.790	OI					1.07
6.417	1.81	0.00	0.802	OI					1.09
6.500	1.82	0.00	0.815	OI					1.10
6.583	1.82	0.00	0.827	OI					1.12
6.667	1.83	0.00	0.840	OI					1.13
6.750	1.84	0.00	0.852	OI					1.15
6.833	1.85	0.00	0.865	OI					1.17
6.917	1.86	0.00	0.878	OI					1.18
7.000	1.87	0.00	0.891	OI					1.20
7.083	1.88	0.00	0.904	OI					1.21
7.167	1.89	0.00	0.917	OI					1.23
7.250	1.90	0.00	0.930	OI					1.25
7.333	1.91	0.00	0.943	OI					1.26
7.417	1.92	0.00	0.956	OI					1.28
7.500	1.93	0.00	0.969	OI					1.29
7.583	1.94	0.00	0.983	OI					1.31
7.667	1.95	0.00	0.996	OI					1.33
7.750	1.96	0.00	1.009	OI					1.34
7.833	1.97	0.00	1.023	OI					1.36
7.917	1.98	0.00	1.036	OI					1.38
8.000	1.99	0.00	1.050	OI					1.39
8.083	2.01	0.00	1.064	OI					1.41
8.167	2.02	0.00	1.078	OI					1.43
8.250	2.03	0.00	1.092	OI					1.44
8.333	2.04	0.00	1.106	OI					1.46
8.417	2.05	0.00	1.120	OI					1.48

8.500	2.06	0.00	1.134	OI	|	|	|	|	1.50
8.583	2.08	0.00	1.148	OI	|	|	|	|	1.51
8.667	2.09	0.00	1.163	OI	|	|	|	|	1.53
8.750	2.10	0.00	1.177	OI	|	|	|	|	1.55
8.833	2.12	0.00	1.191	OI	|	|	|	|	1.57
8.917	2.13	0.00	1.206	OI	|	|	|	|	1.58
9.000	2.14	0.00	1.221	OI	|	|	|	|	1.60
9.083	2.16	0.00	1.236	OI	|	|	|	|	1.62
9.167	2.17	0.00	1.250	OI	|	|	|	|	1.64
9.250	2.19	0.00	1.265	OI	|	|	|	|	1.66
9.333	2.20	0.00	1.281	OI	|	|	|	|	1.68
9.417	2.22	0.00	1.296	OI	|	|	|	|	1.69
9.500	2.23	0.04	1.311	OI	|	|	|	|	1.71
9.583	2.25	0.09	1.326	OI	|	|	|	|	1.73
9.667	2.26	0.14	1.341	OI	|	|	|	|	1.75
9.750	2.28	0.19	1.355	OI	|	|	|	|	1.76
9.833	2.30	0.23	1.369	OI	|	|	|	|	1.78
9.917	2.31	0.28	1.384	OI	|	|	|	|	1.80
10.000	2.33	0.33	1.397	OI	|	|	|	|	1.81
10.083	2.35	0.37	1.411	OI	|	|	|	|	1.83
10.167	2.36	0.42	1.425	OI	|	|	|	|	1.84
10.250	2.38	0.46	1.438	OI	|	|	|	|	1.86
10.333	2.40	0.51	1.451	OI	|	|	|	|	1.87
10.417	2.42	0.55	1.464	OI	|	|	|	|	1.89
10.500	2.44	0.59	1.477	OI	|	|	|	|	1.90
10.583	2.46	0.63	1.490	OI	|	|	|	|	1.92
10.667	2.48	0.68	1.502	OI	|	|	|	|	1.93
10.750	2.50	0.72	1.514	OI	|	|	|	|	1.95
10.833	2.52	0.76	1.527	OI	|	|	|	|	1.96
10.917	2.55	0.80	1.539	OI	|	|	|	|	1.97
11.000	2.57	0.84	1.551	OI	|	|	|	|	1.99
11.083	2.59	0.88	1.563	OI	|	|	|	|	2.00
11.167	2.62	0.92	1.574	OI	|	|	|	|	2.02
11.250	2.64	0.95	1.586	OI	|	|	|	|	2.03
11.333	2.66	0.99	1.598	OI	|	|	|	|	2.04
11.417	2.69	1.03	1.609	OI	|	|	|	|	2.06
11.500	2.72	1.07	1.620	OI	|	|	|	|	2.07
11.583	2.74	1.11	1.632	OI	|	|	|	|	2.08
11.667	2.77	1.14	1.643	OI	|	|	|	|	2.09
11.750	2.80	1.18	1.654	OI	|	|	|	|	2.11
11.833	2.83	1.22	1.665	OI	|	|	|	|	2.12
11.917	2.86	1.26	1.676	OI	|	|	|	|	2.13
12.000	2.89	1.29	1.687	O I	|	|	|	|	2.15
12.083	2.94	1.33	1.698	O I	|	|	|	|	2.16
12.167	3.03	1.37	1.710	O I	|	|	|	|	2.17
12.250	3.15	1.41	1.721	O I	|	|	|	|	2.18
12.333	3.22	1.45	1.734	|OI	|	|	|	|	2.20
12.417	3.27	1.49	1.746	|OI	|	|	|	|	2.21
12.500	3.31	1.53	1.758	|OI	|	|	|	|	2.23
12.583	3.35	1.57	1.770	|OI	|	|	|	|	2.24
12.667	3.39	1.61	1.783	|OI	|	|	|	|	2.25
12.750	3.44	1.65	1.795	|OI	|	|	|	|	2.27
12.833	3.48	1.69	1.807	|OI	|	|	|	|	2.28
12.917	3.53	1.73	1.820	|OI	|	|	|	|	2.30
13.000	3.57	1.77	1.832	|OI	|	|	|	|	2.31
13.083	3.62	1.82	1.844	|OI	|	|	|	|	2.33
13.167	3.68	1.86	1.857	|OI	|	|	|	|	2.34

13.250	3.73	1.90	1.869	|OI	|	|	|	|	2.35
13.333	3.79	1.94	1.882	|OI	|	|	|	|	2.37
13.417	3.85	1.98	1.895	|OI	|	|	|	|	2.38
13.500	3.91	2.03	1.908	|OI	|	|	|	|	2.40
13.583	3.97	2.07	1.921	|OI	|	|	|	|	2.41
13.667	4.04	2.11	1.934	|OI	|	|	|	|	2.43
13.750	4.11	2.16	1.947	|OI	|	|	|	|	2.44
13.833	4.18	2.20	1.961	|OI	|	|	|	|	2.46
13.917	4.26	2.25	1.975	|OI	|	|	|	|	2.48
14.000	4.35	2.30	1.989	|O I	|	|	|	|	2.49
14.083	4.44	2.34	2.003	|O I	|	|	|	|	2.51
14.167	4.53	2.39	2.017	|O I	|	|	|	|	2.52
14.250	4.63	2.44	2.032	|O I	|	|	|	|	2.54
14.333	4.74	2.49	2.048	|O I	|	|	|	|	2.56
14.417	4.85	2.54	2.063	|O I	|	|	|	|	2.58
14.500	4.98	2.60	2.079	|O I	|	|	|	|	2.60
14.583	5.11	2.65	2.096	|O I	|	|	|	|	2.62
14.667	5.25	2.71	2.113	|O I	|	|	|	|	2.63
14.750	5.41	2.77	2.131	|O I	|	|	|	|	2.66
14.833	5.57	2.83	2.150	|O I	|	|	|	|	2.68
14.917	5.76	2.90	2.169	| O I	|	|	|	|	2.70
15.000	5.96	3.20	2.188	| O I	|	|	|	|	2.72
15.083	6.19	3.51	2.207	| O I	|	|	|	|	2.74
15.167	6.44	3.81	2.225	| O I	|	|	|	|	2.76
15.250	6.73	4.11	2.243	| O I	|	|	|	|	2.78
15.333	7.05	4.41	2.261	| OI	|	|	|	|	2.80
15.417	7.36	4.71	2.280	| O I	|	|	|	|	2.82
15.500	7.43	5.00	2.297	| O I	|	|	|	|	2.84
15.583	7.45	5.26	2.313	| O I	|	|	|	|	2.85
15.667	7.86	5.52	2.329	| O I	|	|	|	|	2.87
15.750	8.61	5.81	2.346	| O I	|	|	|	|	2.89
15.833	9.71	6.17	2.368	| O I	|	|	|	|	2.91
15.917	11.38	6.64	2.397	| O I	|	|	|	|	2.94
16.000	14.48	7.32	2.438	| O | I	|	|	|	|	2.98
16.083	22.73	8.53	2.511	| O |	I|	|	|	|	3.06
16.167	40.79	11.02	2.663	| O|	|	|	| I	|	3.22
16.250	45.92	14.50	2.873	| | O	|	|	|	I	3.45
16.333	26.69	16.84	3.016	| | O	| I	|	|	|	3.60
16.417	14.57	17.25	3.040	| | I O	|	|	|	|	3.63
16.500	9.82	16.71	3.007	| I | O	|	|	|	|	3.59
16.583	8.59	15.90	2.958	| I | O	|	|	|	|	3.54
16.667	7.24	15.04	2.906	| I | O	|	|	|	|	3.48
16.750	6.60	14.17	2.853	| I |O	|	|	|	|	3.43
16.833	6.09	13.33	2.802	| I |O	|	|	|	|	3.37
16.917	5.68	12.53	2.754	| I O	|	|	|	|	3.32
17.000	5.33	11.77	2.708	| I O	|	|	|	|	3.27
17.083	5.05	11.07	2.665	| I O|	|	|	|	|	3.23
17.167	4.80	10.41	2.625	| I O|	|	|	|	|	3.18
17.250	4.58	9.79	2.588	| I O |	|	|	|	|	3.14
17.333	4.39	9.22	2.553	| I O |	|	|	|	|	3.11
17.417	4.22	8.69	2.521	| I O |	|	|	|	|	3.07
17.500	4.07	8.20	2.492	| I O |	|	|	|	|	3.04
17.583	3.94	7.75	2.464	| I O |	|	|	|	|	3.01
17.667	3.81	7.34	2.439	| I O |	|	|	|	|	2.99
17.750	3.70	6.95	2.416	| I O |	|	|	|	|	2.96
17.833	3.60	6.60	2.394	| I O |	|	|	|	|	2.94
17.917	3.50	6.27	2.374	| I O |	|	|	|	|	2.92

18.000	3.41	5.97	2.356	| I O	|	|	|	|	2.90
18.083	3.32	5.69	2.339	| IO	|	|	|	|	2.88
18.167	3.18	5.43	2.323	| IO	|	|	|	|	2.86
18.250	3.03	5.18	2.308	| IO	|	|	|	|	2.85
18.333	2.92	4.94	2.294	| IO	|	|	|	|	2.83
18.417	2.85	4.72	2.280	|I O	|	|	|	|	2.82
18.500	2.79	4.51	2.268	|I O	|	|	|	|	2.80
18.583	2.73	4.33	2.256	|I O	|	|	|	|	2.79
18.667	2.68	4.15	2.246	|IO	|	|	|	|	2.78
18.750	2.63	3.99	2.236	|IO	|	|	|	|	2.77
18.833	2.58	3.84	2.227	|IO	|	|	|	|	2.76
18.917	2.53	3.70	2.219	|IO	|	|	|	|	2.75
19.000	2.49	3.57	2.211	|IO	|	|	|	|	2.74
19.083	2.45	3.46	2.204	|IO	|	|	|	|	2.74
19.167	2.41	3.35	2.197	|IO	|	|	|	|	2.73
19.250	2.37	3.24	2.191	|IO	|	|	|	|	2.72
19.333	2.34	3.15	2.185	|IO	|	|	|	|	2.72
19.417	2.30	3.06	2.180	|IO	|	|	|	|	2.71
19.500	2.27	2.98	2.175	|IO	|	|	|	|	2.70
19.583	2.24	2.90	2.170	|IO	|	|	|	|	2.70
19.667	2.21	2.88	2.165	|IO	|	|	|	|	2.69
19.750	2.18	2.87	2.161	|O	|	|	|	|	2.69
19.833	2.15	2.85	2.156	|O	|	|	|	|	2.68
19.917	2.12	2.84	2.151	|O	|	|	|	|	2.68
20.000	2.10	2.82	2.146	|O	|	|	|	|	2.67
20.083	2.07	2.80	2.141	|O	|	|	|	|	2.67
20.167	2.05	2.79	2.136	|O	|	|	|	|	2.66
20.250	2.02	2.77	2.131	|O	|	|	|	|	2.65
20.333	2.00	2.75	2.126	|O	|	|	|	|	2.65
20.417	1.98	2.73	2.120	|O	|	|	|	|	2.64
20.500	1.95	2.72	2.115	|O	|	|	|	|	2.64
20.583	1.93	2.70	2.110	|O	|	|	|	|	2.63
20.667	1.91	2.68	2.105	|O	|	|	|	|	2.62
20.750	1.89	2.66	2.099	|O	|	|	|	|	2.62
20.833	1.87	2.65	2.094	|O	|	|	|	|	2.61
20.917	1.86	2.63	2.089	|O	|	|	|	|	2.61
21.000	1.84	2.61	2.083	|O	|	|	|	|	2.60
21.083	1.82	2.59	2.078	|O	|	|	|	|	2.59
21.167	1.80	2.58	2.073	|O	|	|	|	|	2.59
21.250	1.79	2.56	2.067	|O	|	|	|	|	2.58
21.333	1.77	2.54	2.062	|O	|	|	|	|	2.58
21.417	1.75	2.52	2.057	|O	|	|	|	|	2.57
21.500	1.74	2.50	2.051	|O	|	|	|	|	2.56
21.583	1.72	2.49	2.046	|O	|	|	|	|	2.56
21.667	1.71	2.47	2.041	|O	|	|	|	|	2.55
21.750	1.69	2.45	2.036	|O	|	|	|	|	2.55
21.833	1.68	2.43	2.030	|O	|	|	|	|	2.54
21.917	1.67	2.42	2.025	|O	|	|	|	|	2.53
22.000	1.65	2.40	2.020	|O	|	|	|	|	2.53
22.083	1.64	2.38	2.015	|O	|	|	|	|	2.52
22.167	1.63	2.37	2.010	|O	|	|	|	|	2.52
22.250	1.61	2.35	2.005	|O	|	|	|	|	2.51
22.333	1.60	2.33	2.000	|O	|	|	|	|	2.50
22.417	1.59	2.32	1.995	|O	|	|	|	|	2.50
22.500	1.58	2.30	1.990	|O	|	|	|	|	2.49
22.583	1.57	2.28	1.985	|O	|	|	|	|	2.49
22.667	1.55	2.27	1.980	|O	|	|	|	|	2.48

22.750	1.54	2.25	1.975	|O	|	|	|	|	2.48
22.833	1.53	2.23	1.970	|O	|	|	|	|	2.47
22.917	1.52	2.22	1.965	|O	|	|	|	|	2.46
23.000	1.51	2.20	1.960	|O	|	|	|	|	2.46
23.083	1.50	2.19	1.956	|O	|	|	|	|	2.45
23.167	1.49	2.17	1.951	|O	|	|	|	|	2.45
23.250	1.48	2.15	1.946	|O	|	|	|	|	2.44
23.333	1.47	2.14	1.942	|O	|	|	|	|	2.44
23.417	1.46	2.12	1.937	|O	|	|	|	|	2.43
23.500	1.45	2.11	1.933	|O	|	|	|	|	2.43
23.583	1.44	2.09	1.928	|O	|	|	|	|	2.42
23.667	1.43	2.08	1.924	IO	|	|	|	|	2.42
23.750	1.42	2.06	1.919	IO	|	|	|	|	2.41
23.833	1.42	2.05	1.915	IO	|	|	|	|	2.41
23.917	1.41	2.04	1.910	IO	|	|	|	|	2.40
24.000	1.40	2.02	1.906	IO	|	|	|	|	2.40

Remaining water in basin = 1.33 (Ac.Ft)

**********HYDROGRAPH DATA**********

Number of intervals = 421
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 17.250 (CFS)
Total volume = 4.936 (Ac.Ft)

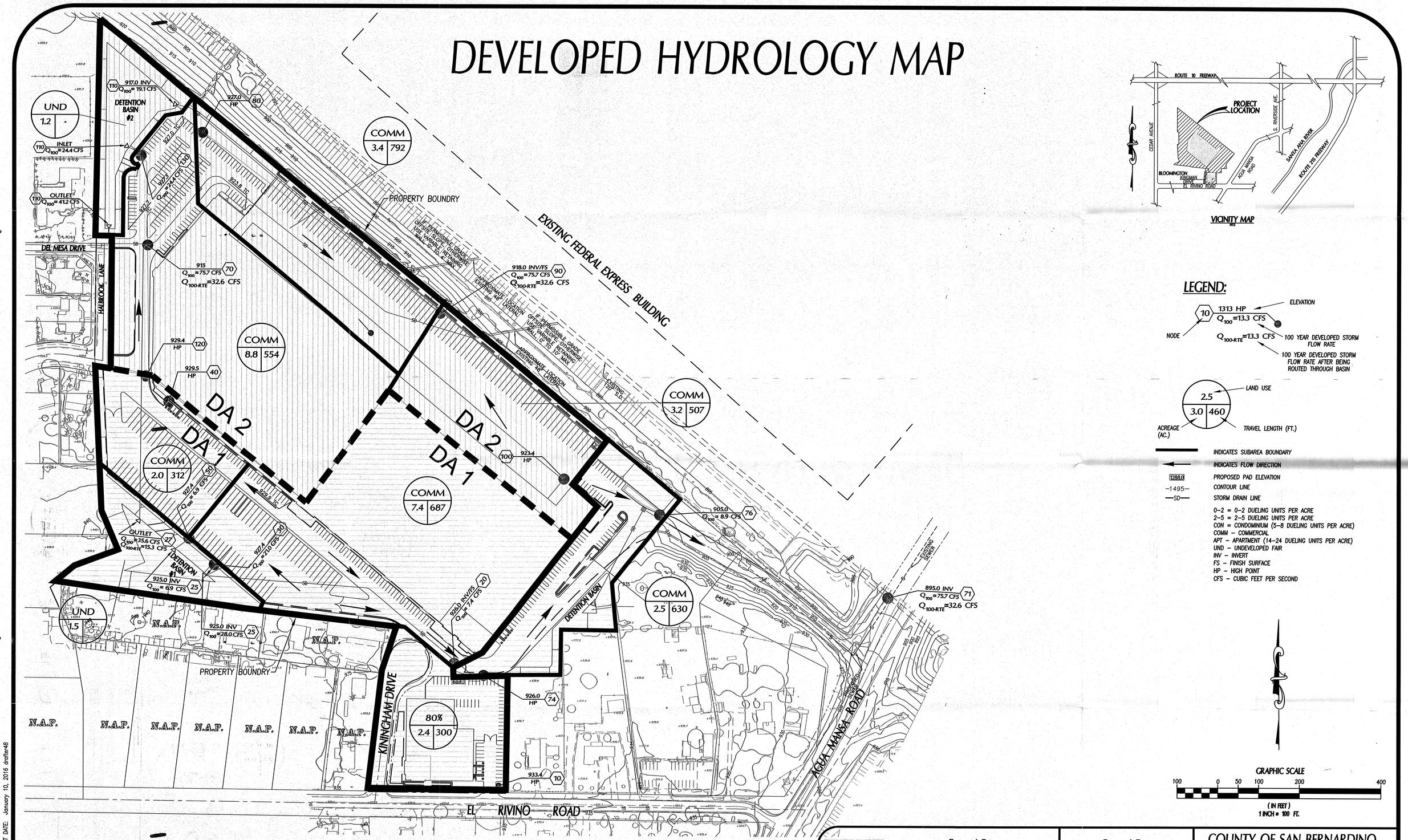
Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

****

HYDROLOGY EXHIBITS

DEVELOPED HYDROLOGY MAP



VICINITY MAP

LEGEND:

- 10 — NODE
- 1313 HP — ELEVATION
- Q_{100}=13.3 CFS — 100 YEAR DEVELOPED STORM FLOW RATE
- $Q_{100\text{-}RTE}$=13.3 CFS — 100 YEAR DEVELOPED STORM FLOW RATE AFTER BEING ROUTED THROUGH BASIN
- 2.5 — LAND USE
- 3.0 — ACREAGE (AC.)
- 460 — TRAVEL LENGTH (FT.)
- INDICATES SUBAREA BOUNDARY
- INDICATES FLOW DIRECTION
- 1288.0 — PROPOSED PAD ELEVATION
- –1495– CONTOUR LINE
- —SD— STORM DRAIN LINE

0–2 = 0–2 DUELING UNITS PER ACRE
2–5 = 2–5 DUELING UNITS PER ACRE
CON = CONDOMINIUM (5–8 DUELING UNITS PER ACRE)
COMM – COMMERCIAL
APT – APARTMENT (14–24 DUELING UNITS PER ACRE)
UND – UNDEVELOPED FAIR
INV – INVERT
FS – FINISH SURFACE
HP – HIGH POINT
CFS – CUBIC FEET PER SECOND

GRAPHIC SCALE
100 0 50 100 200 400
(IN FEET)
1 INCH = 100 FT.

PLOT DATE: January 10, 2016 drafter48

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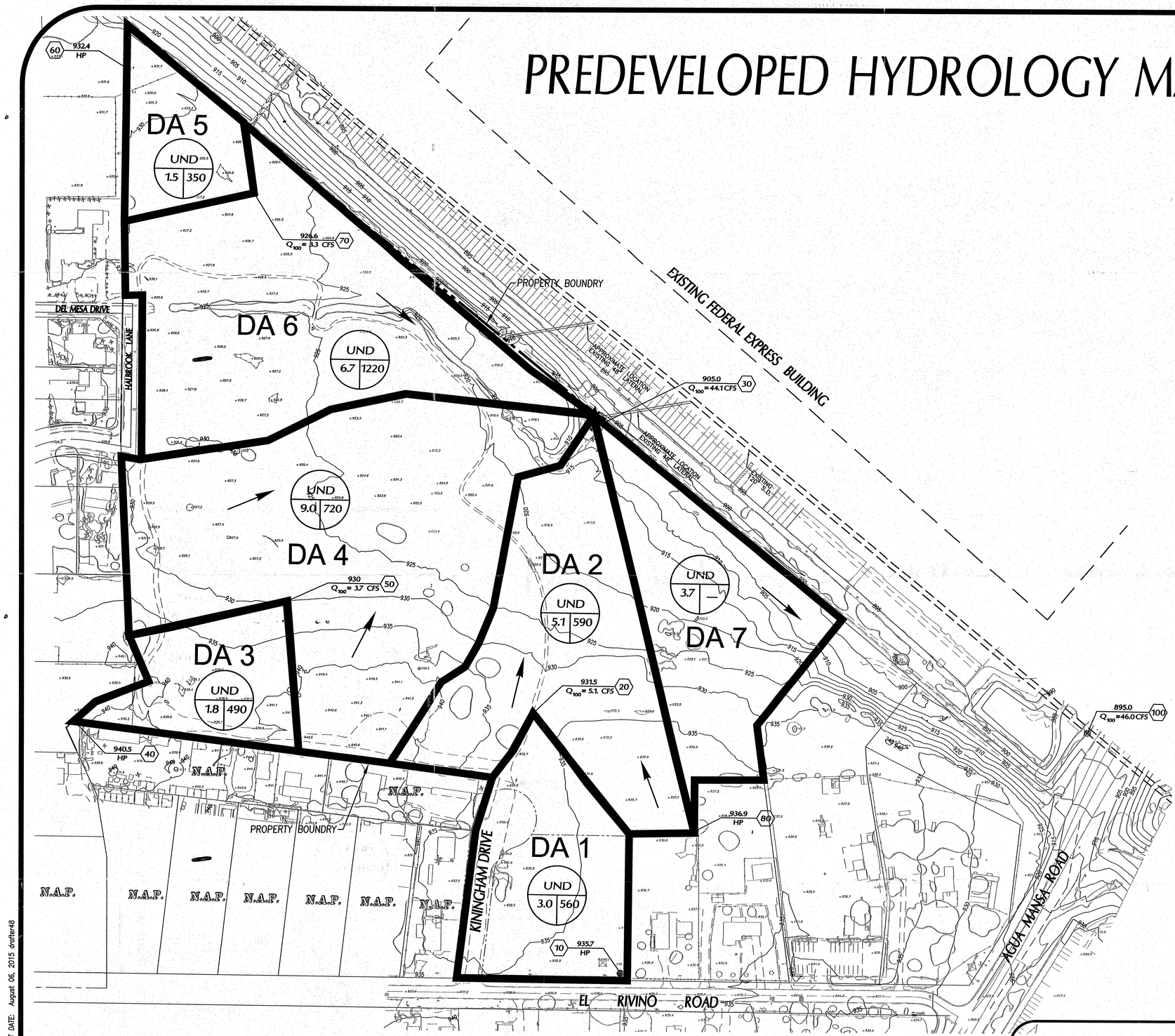
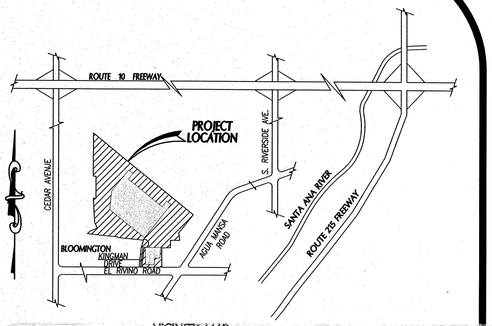
COUNTY OF SAN BERNARDINO

DEVELOPED HYDROLOGY MAP SITE MAP

Filename: I:\Lansing Compies\Agua Mansa\DWG's\ENTITLEMENT\EXHIBITS\DEVELOPED HYDROLOGY MAP.dwg

PREDEVELOPED HYDROLOGY MAP





VICINITY MAP

LEGEND:

10 — 1313 HP — ELEVATION
Q_{100}=13.3 CFS — 100 YEAR DEVELOPED STORM FLOW RATE
NODE

2.5 — LAND USE
3.0 — ACREAGE (AC.)
460 — TRAVEL LENGTH (FT.)

INDICATES SUBAREA BOUNDARY
INDICATES FLOW DIRECTION
1288.0 — PROPOSED PAD ELEVATION
–1495– — CONTOUR LINE
—SD— — STORM DRAIN LINE

0–2 = 0–2 DUELING UNITS PER ACRE
2–5 = 2–5 DUELING UNITS PER ACRE
CON = CONDOMINIUM (5–8 DUELING UNITS PER ACRE)
COMM – COMMERCIAL
APT – APARTMENT (14–24 DUELING UNITS PER ACRE)
UND – UNDEVELOPED FAIR
INV – INVERT
FS – FINISH SURFACE
HP – HIGH POINT
CFS – CUBIC FEET PER SECOND

GRAPHIC SCALE
100 0 50 100 200 400
(IN FEET)
1 INCH = 100 FT.

PLOT DATE: August 06, 2015 drafter48

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PREDEVELOPED HYDROLOGY MAP SITE MAP

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