APPENDIX G
HYDROLOGY STUDY

O'Day Consultants, Inc.

Hydrology Study for La Costa Town Center Tentative Map

October 2008

HYDROLOGY STUDY

FOR

LA COSTA TOWN SQUARE
TENTATIVE MAP

Job No. 00-1025

Prepared: OCTOBER 2008

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INTRODUCTION

Purpose of Study

This drainage study was prepared to determine proposed runoff quantities for La Costa Town Square (Commercial, Office & Residential) and compare them to the existing runoff quantities.

Scope

This study analyzes the 100-year flow for developed conditions of the site.

Hydrologic Analysis

The proposed developed conditions are shown on the Tentative Maps for the Commercial project, the Residential project and the Office project. The Commercial project proposes a shopping center with more than 20 buildings of varying sizes, along with access roads, storm drain, sewer, water and other utilities. The Residential project proposes 64 single family lots along with streets, utilities and open space. The Office project proposes a pad separated from the Commercial and Residential projects by a large slope to be subdivided into two lots with the construction of two office buildings amounting to 55,000 square feet, storm drain, sewer, water and dry utilities.

The existing condition of the site is vacant land, mostly un-graded except for grading for Rancho Santa Fe Road, La Costa Avenue and borrow & stockpile sites per drawing 409-4B. The site is steep with well-defined drainage courses. Three storm drains enter the site from Rancho Santa Fe Road, as shown on drawing 368-2, sheet 42 and drawing 368-2c, sheets 14 and 15. The site drains to three existing storm drain systems located along La Costa Avenue.

HYDROLOGY

The hydrologic analyses are being performed according to the 2003 San Diego County *Hydrology Manual*. The overall drainage area is less than one square mile and includes junctions of independent drainage systems; therefore, the Rational Method is being used for the analyses. The Rational Method is applicable to a 6-hour storm duration because the procedure uses Intensity-Duration Design Charts that are based on a 6-hour storm duration. In some cases, the 6-hour precipitation must be adjusted based on the ratio of the 6- to 24-hour precipitation. This will be performed where necessary.

Modified Rational Method Description

The modified rational method, as described in the 2003 San Diego County Hydrology Manual, is used to estimate surface runoff flows.

The basic equation: $Q = CIA$

C = runoff coefficient (varies with surface)
I = intensity (varies with time of concentration)
A = area in acres

For the 100-year design storm, the 6-hour rainfall amount is 2.8 inches and the 24-hour rainfall amount is 5.1 inches. *San Diego County Rational-Hydrology Program Package* Version 3.2, developed by CivilCADD/CIVILDESIGN Engineering Software © (2004), was used to determine the rainfall amount, times of concentration, corresponding intensities and flows for the various hydrologic basins within this model. The program was then used to route flows through drainage conveyance structures and confluence basins per the modified rational method.

Program Process

The *Rational-Hydrology* program is a computer-aided design program where the user develops a node link model of the watershed. Developing independent node link models of each interior watershed and linking these submodels together at confluence points create the node link model. The program has the capability of performing calculations for 11 different hydrologic and hydraulic processes. These processes are assigned and printed in the output. They are as follows:

1. Initial sub-area input, top of stream.
2. Street flow through sub-area, includes sub-area runoff.
3. Addition of runoff from sub-area to stream.
4. Street inlet and parallel street and pipeflow and area.
5. Pipeflow travel time (program estimated pipe size).
6. Pipeflow travel time (user-specified pipe size).
7. Improved channel travel - Area add option.
8. Irregular channel travel time - Area add option.
9. User-specified entry of data at a point.
10. Confluence at downstream point in current stream.
11. Confluence of main streams

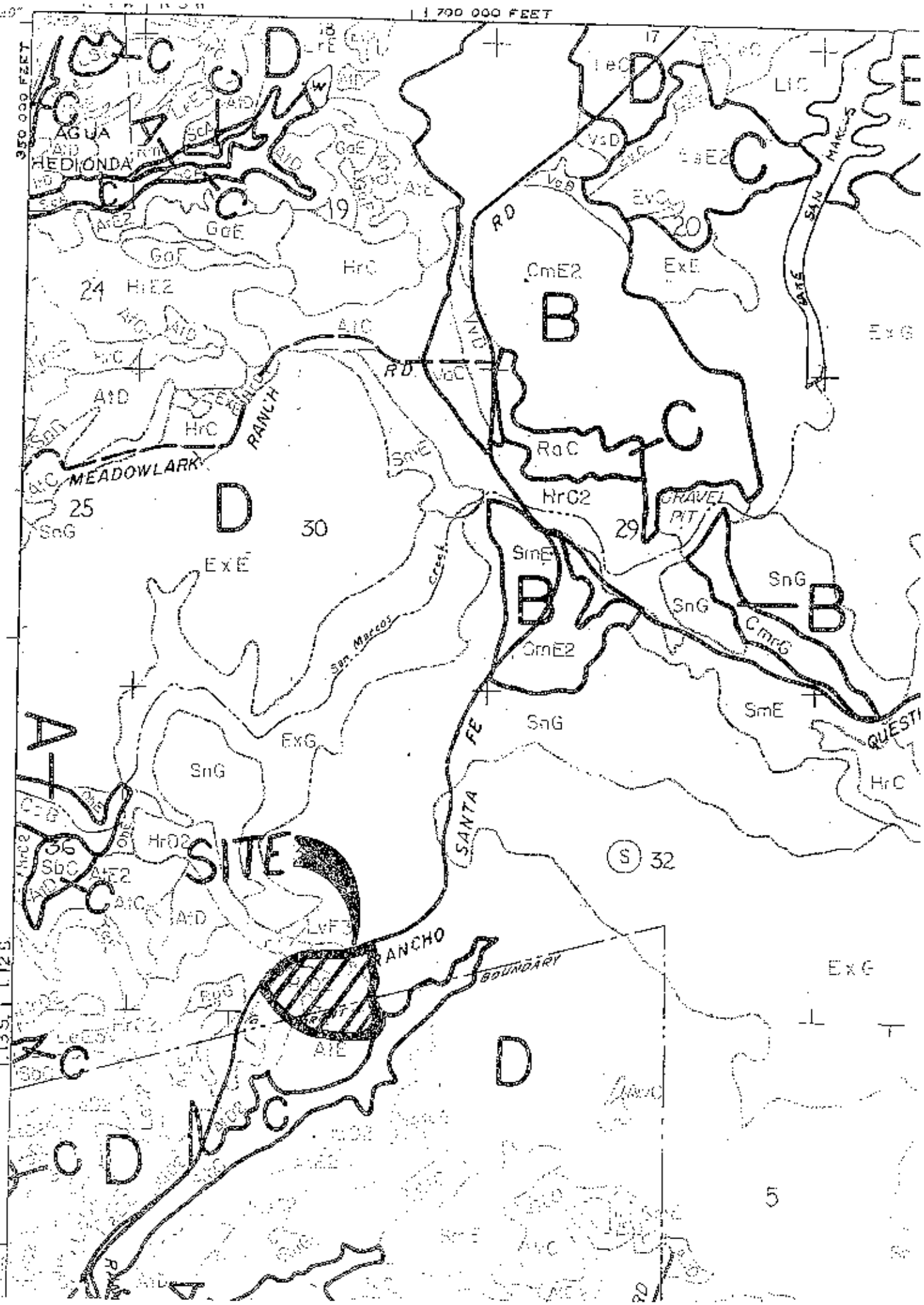
CONCLUSION

The total runoff from the site for the 100-year existing conditions is 220.0 cfs. The total runoff from the site for 100-year proposed conditions is 189.0 cfs (see below table). The runoff to two of the existing storm drain outfall pipes located along La Costa Avenue is reduced, one by use of an on-site detention basin. The runoff to the third existing storm drain outfall pipe is increased, however this flows into a large detention basin built along with the Villages of La Costa project located southeast of the La Costa Avenue/Camino de las Coches intersection. The increased flow was anticipated in the design of the detention basin and is less than the 164.6 cfs originally planned for from this subbasin as part of the Villages of La Costa project.

EXISTING		PROPOSED	
BASIN A	Q = 91.8 CFS	BASIN 1	Q = 128.8 CFS*
BASIN B	Q = 73.4 CFS	BASIN 3	Q = 28.0 CFS
BASIN C	Q = 54.8 CFS	BASIN 2	Q = 32.2 CFS**
TOTAL	Q = 220.0 CFS	TOTAL	Q = 189.0 CFS

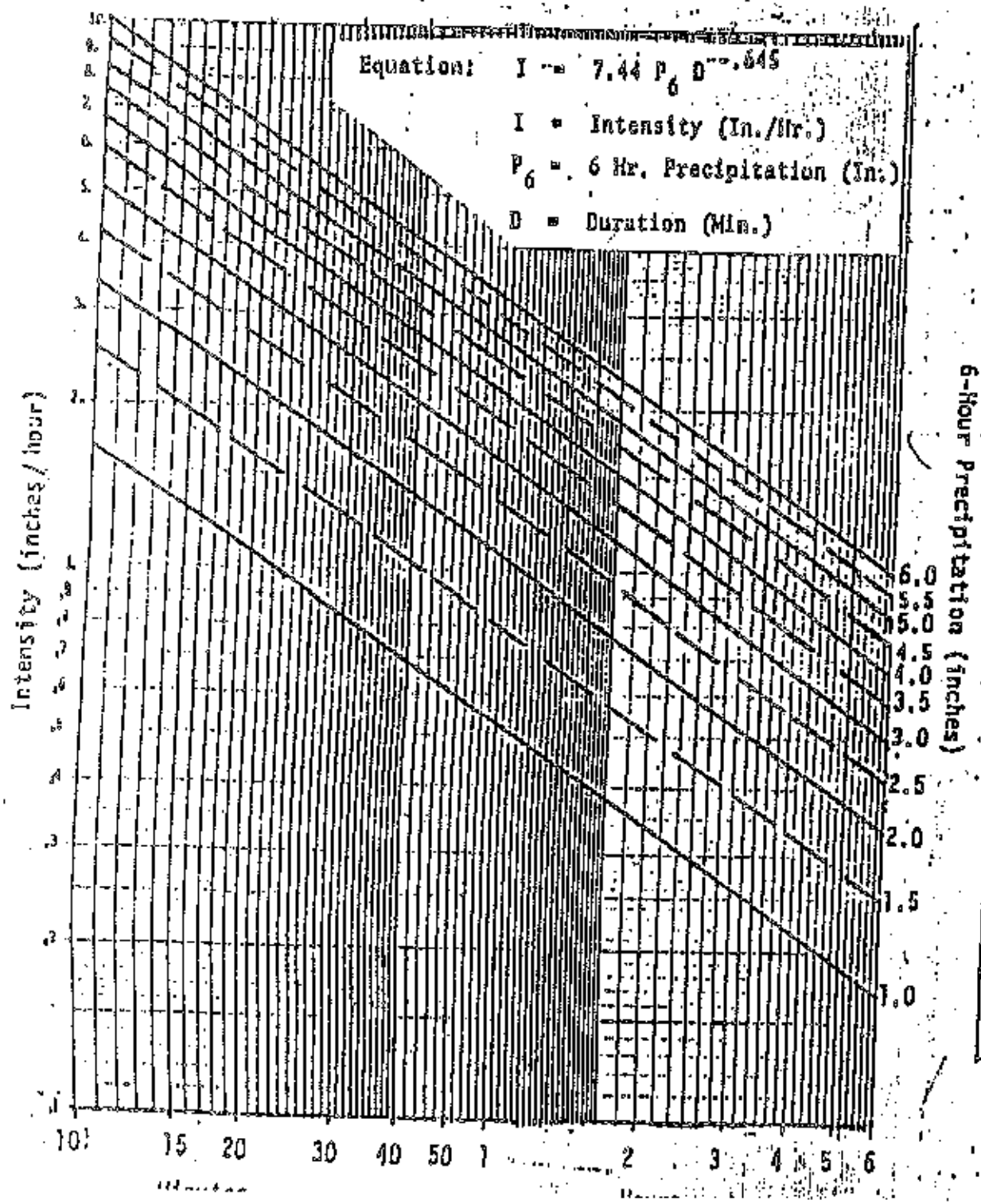
* This flow is ultimately routed into the existing detention basin up-stream from Camino de las Coches. See appendix.

** The 100-year peak developed flow from the Proposed Basin 2 is 136.9 cfs prior to being routed through the proposed on-site detention basin. The flow shown above is the peak outflow from said detention basin.



1 700 000 FEET
350 000 FEET
AGUA
HEDIONDA
MEADOWLARK
RANCH
RD
SAN MARCOS
GRAVEL PIT
San Marcos Creek
SANTA FE
RANCHO
BOUNDARY
SITE
T. 13 S.
T. 12 S.

INTENSITY-DURATION DESIGN CHART



Directions for Application:

1) From precipitation maps determine 6 hr. 24 hr. amounts for the selected frequen These maps are printed in the County Hy Manual (10, 50 and 100 yr. maps include Design and Procedure Manual).

2) Adjust 6 hr. precipitation (if necessar that it is within the range of 45% to 6 the 24 hr. precipitation. (Not applica to Desert)

3) Plot 6 hr. precipitation on the right s of the chart.

4) Draw a line through the point parallel plotted lines.

5) This line is the intensity-duration curv the location being analyzed.

Application Form:

0) Selected Frequency _____ yr.

1) P_6 = _____ in., P_{24} = _____, $\frac{{}^*P_6}{P_{24}}$ = _____

2) Adjusted $^*P_6$ = _____ in.

3) t_c = _____ min.

4) I = _____ in/hr.

*Not Applicable to Desert Region

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

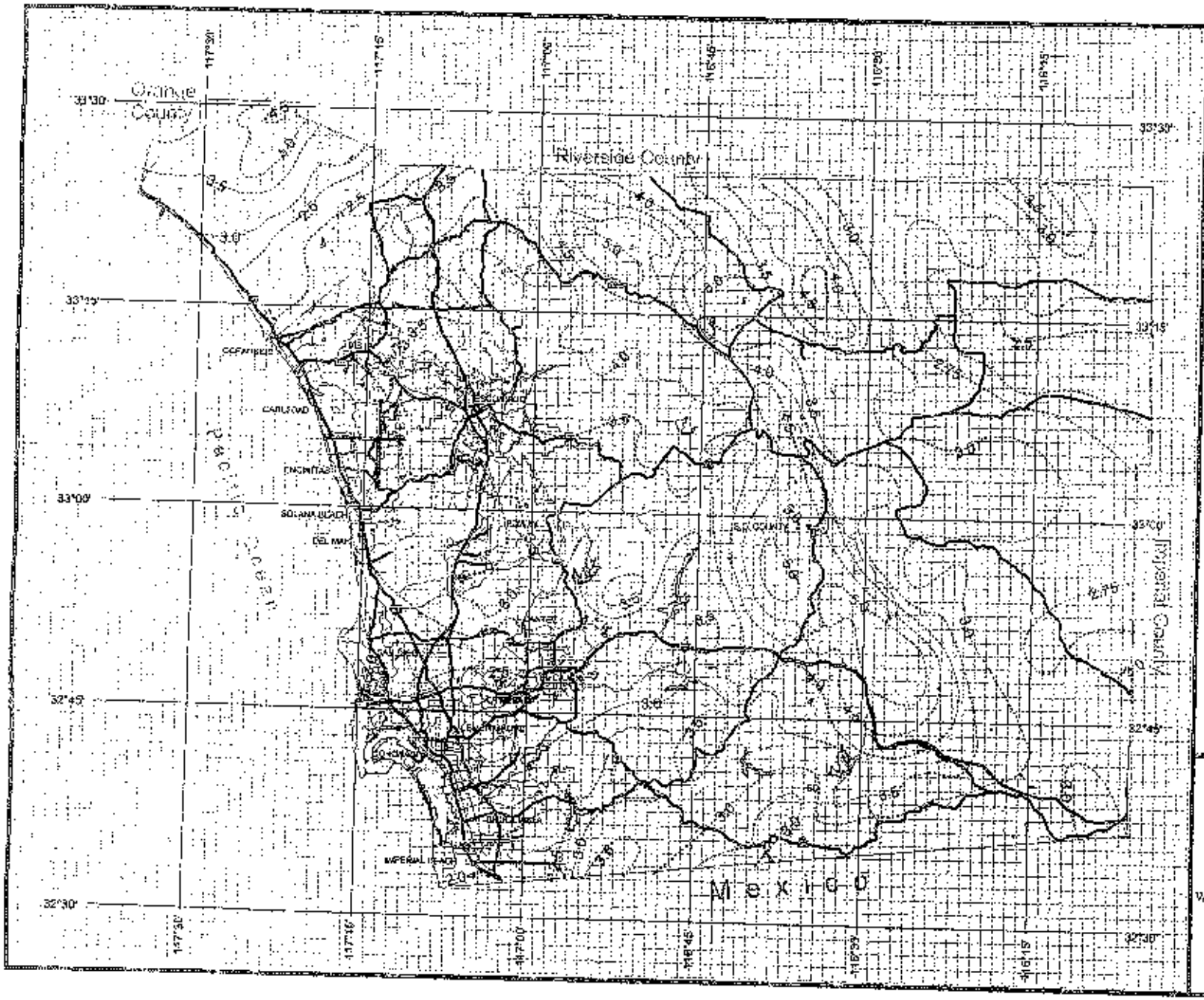
Exhibit 1

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)

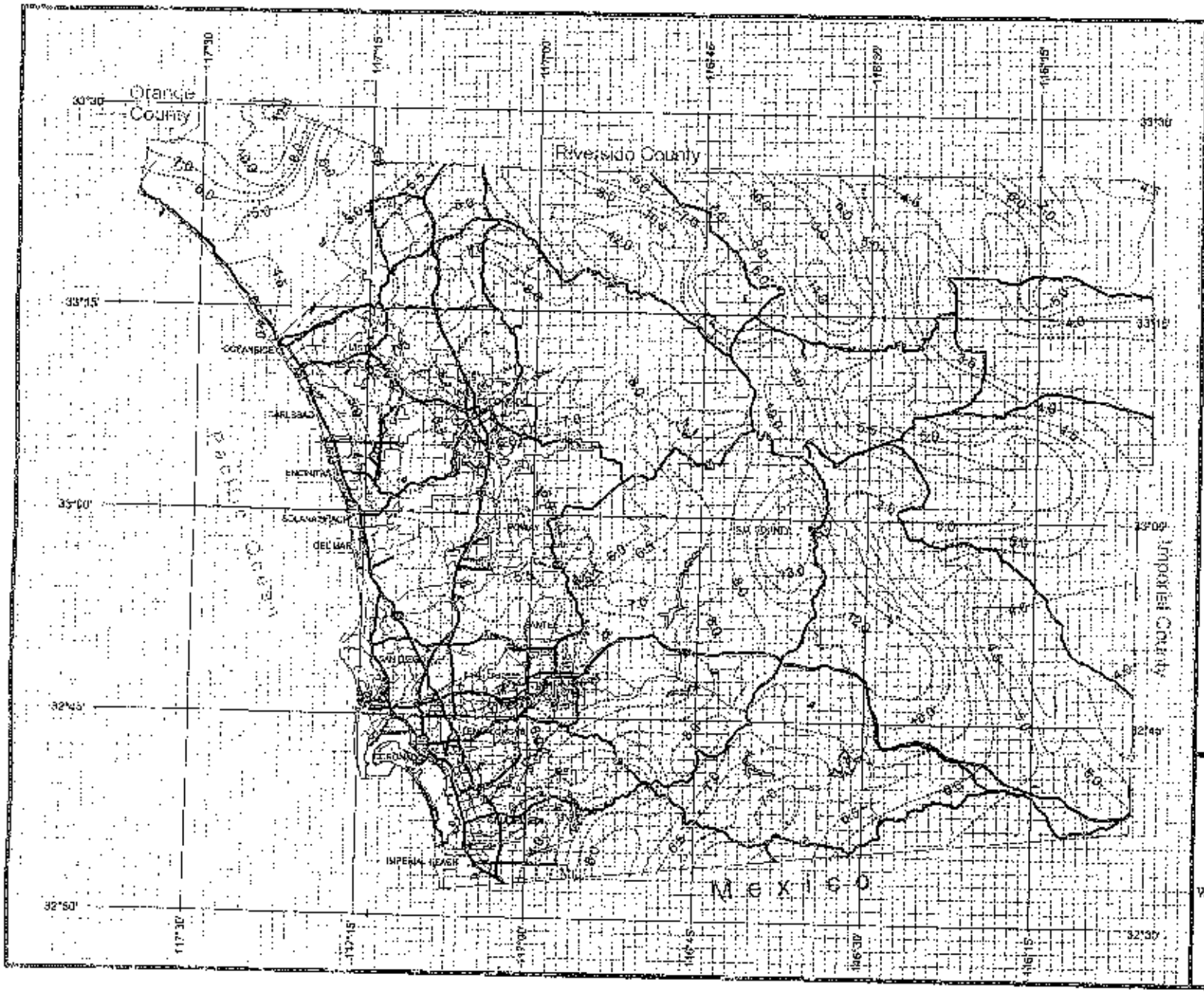


DPW GIS

SDGIS

N
W E
S

3 0 3 Miles



County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

Isopluvial (inches)

DPW GIS

GIS

N
W E
S

3 0 3 Miles

Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS

Land Use		Runoff Coefficient "C"				
			Soil Type			
NRCS Elements	County Elements	% IMPER.	A	B	C	D
Undisturbed Natural Terrain (Natural)	Permanent Open Space	0*	0.20	0.25	0.30	0.35
Low Density Residential (LDR)	Residential, 1.0 DU/A or less	10	0.27	0.32	0.36	0.41
Low Density Residential (LDR)	Residential, 2.0 DU/A or less	20	0.34	0.38	0.42	0.46
Low Density Residential (LDR)	Residential, 2.9 DU/A or less	25	0.38	0.41	0.45	0.49
Medium Density Residential (MDR)	Residential, 4.3 DU/A or less	30	0.41	0.45	0.48	0.52
Medium Density Residential (MDR)	Residential, 7.3 DU/A or less	40	0.48	0.51	0.54	0.57
Medium Density Residential (MDR)	Residential, 10.9 DU/A or less	45	0.52	0.54	0.57	0.60
Medium Density Residential (MDR)	Residential, 14.5 DU/A or less	50	0.55	0.58	0.60	0.63
High Density Residential (HDR)	Residential, 24.0 DU/A or less	65	0.66	0.67	0.69	0.71
High Density Residential (HDR)	Residential, 43.0 DU/A or less	80	0.76	0.77	0.78	0.79
Commercial/Industrial (N. Com)	Neighborhood Commercial	80	0.76	0.77	0.78	0.79
Commercial/Industrial (G. Com)	General Commercial	85	0.80	0.80	0.81	0.82
Commercial/Industrial (O.P. Com)	Office Professional/Commercial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (Limited I.)	Limited Industrial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (General I.)	General Industrial	95	0.87	0.87	0.87	0.87

*The values associated with 0% impervious may be used for direct calculation of the runoff coefficient as described in Section 3.1.2 (representing the pervious runoff coefficient, Cp, for the soil type), or for areas that will remain undisturbed in perpetuity. Justification must be given that the area will remain natural forever (e.g., the area is located in Cleveland National Forest).
DU/A = dwelling units per acre
NRCS = National Resources Conservation Service

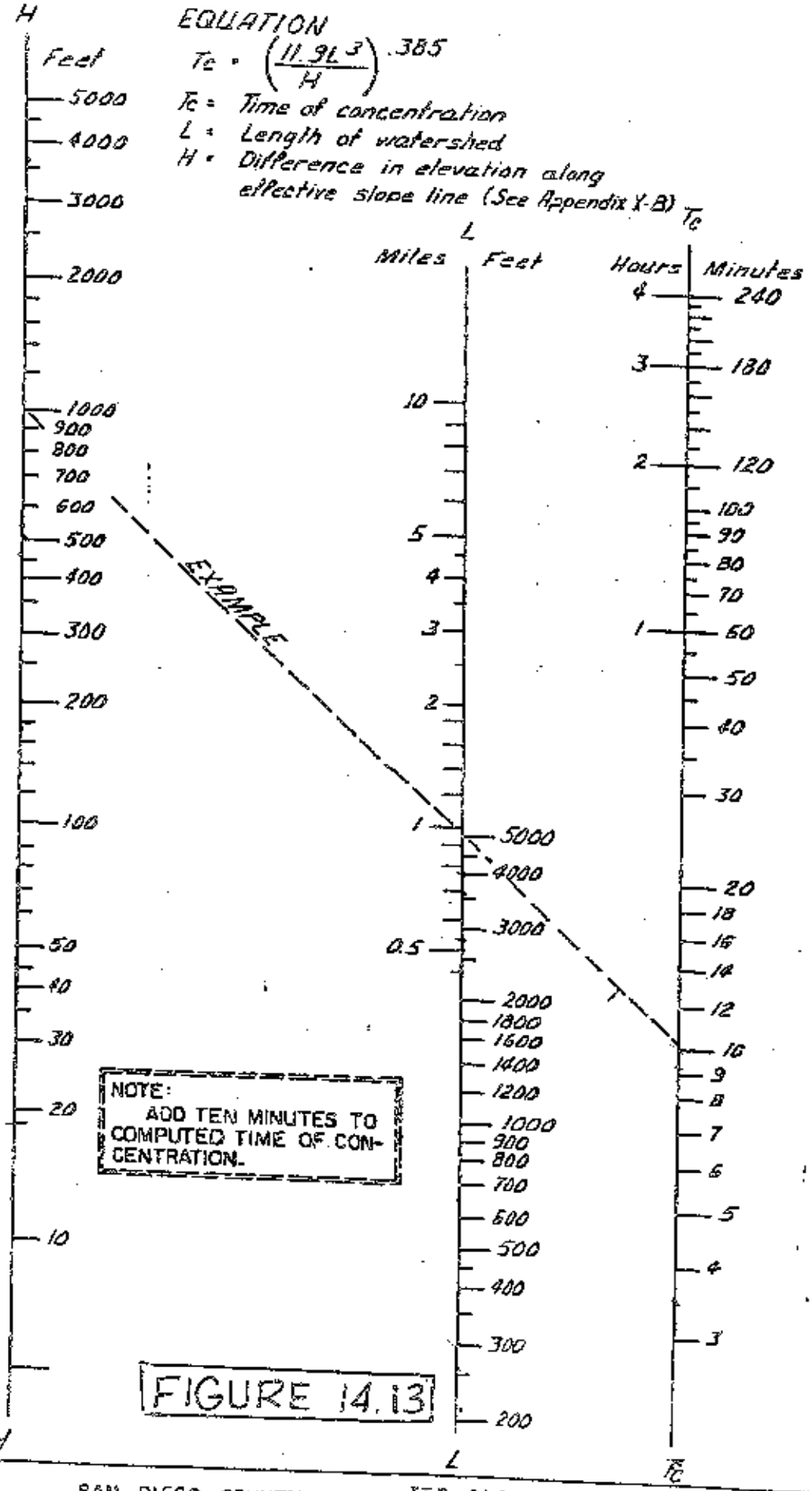


FIGURE 14.13

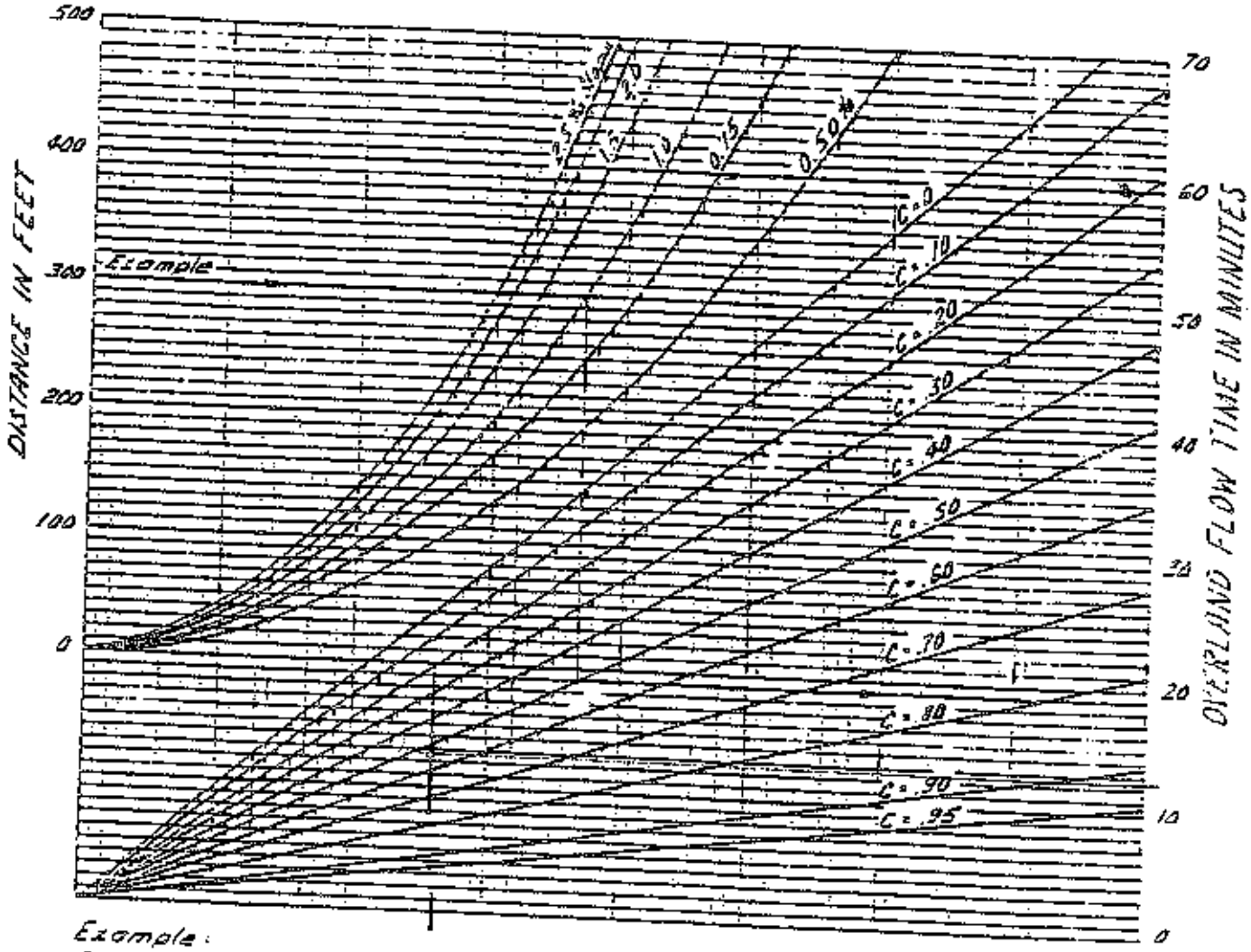
SAN DIEGO COUNTY
DEPARTMENT OF SPECIAL DISTRICT SERVICES
DESIGN MANUAL

III.210

NOMOGRAPH FOR DETERMINATION OF TIME OF CONCENTRATION (T_c) FOR NATURAL WATERSHEDS

APPROVED

URBAN AREAS OVERLAND TIME OF FLOW CURVES



Example:
Given: Length of Flow = 300 ft.
Slope = 1.0 %
Coefficient of Runoff C = .50
Read: Overland Flow time = 19 Minutes

$$T = \frac{1.8(1-C)\sqrt{D}}{\sqrt[3]{S}}$$

SAN DIEGO COUNTY DEPARTMENT OF SPECIAL DISTRICT SERVICES DESIGN MANUAL APPROVED	URBAN AREAS OVERLAND TIME OF FLOW CURVES DATE 12/1/69 APPENDIX X-C

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                San Diego County Rational Hydrology Program

  CIVILCADD/CIVILDESIGN  Engineering Software, (c) 2004   Version 3.2

Rational method hydrology  program based on
San Diego County Flood Control Division 2003 hydrology manual
        Rational Hydrology Study        Date: 08/29/07
------------------------------------------------------------------------
LA COSTA TOWN SQUARE
BASIN A - EXISTING CONDITIONS
G:\ACCTS\001017\1017A.OUT


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

------------------------------------------------------------------------
O'Day Consultants, San Diego, California - S/N 10125
------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0

Map data precipitation entered:
6 hour,  precipitation(inches) =  2.800
24 hour precipitation(inches) =  5.100
Adjusted 6 hour precipitation (inches) =  2.800
P6/P24 =    54.9%
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      100.000 to Point/Station      100.000
**** USER DEFINED FLOW INFORMATION AT A POINT **** PER DWG. 368-2C, SHT. I5
______________________________________________________________________
User specified 'C' value of 0.800 given for subarea
Rainfall intensity (I) =    3.797 for a  100.0 year storm
User specified values are as follows:
TC =  14.00 min.  Rain intensity =       3.80(In/Hr)
Total area =        19.50(Ac.)  Total runoff =     63.50(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      100.000 to Point/Station      311.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =     89.388(CFS)
Depth of flow =   1.482(Ft.), Average velocity =  10.181(Ft/s)
       ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              2.50
        2             10.00              0.00
        3             20.00              2.50
Manning's 'N' friction factor =   0.040
------------------------------------------------------------------
Sub-Channel flow  =     89.389(CFS)
  '       '         flow top width =     11.852(Ft.)
  '       '     velocity=   10.181(Ft/s)
  '       '         area =      8.780(Sq.Ft)
  '       '         Froude number =     2.085
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Upstream point elevation =  383.000(Ft.)
Downstream point elevation =  285.000(Ft.)
Flow length =   840.000(Ft.)
Travel time  =    1.38 min.
Time of concentration =   15.38 min.
Depth of flow =   1.482(Ft.)
Average velocity =  10.181(Ft/s)
Total irregular channel flow =    89.388(CFS)
Irregular channel normal depth above invert elev. =   1.482(Ft.)
Average velocity of channel(s) =  10.181(Ft/s)

Sub-Channel No. 1 critical depth =      1.984(Ft.)
  '      '       '    critical flow top width =     15.875(Ft.)
  '      '       '    critical flow velocity=    5.675(Ft/s)
  '      '       '    critical flow area =     15.751(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.350 given for subarea
Rainfall intensity =      3.575(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =     19.893(CFS) for   15.900(Ac.)
Total runoff =     83.393(CFS)  Total area =       35.40(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      311.000 to Point/Station      312.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
________________________________________________________________________
Upstream point/station elevation =   285.53(Ft.)
Downstream point/station elevation =   282.84(Ft.)
Pipe length  =    55.56(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    83.393(CFS)
Given pipe size =     24.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
    21.270(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =      7.547(Ft.)
 Minor friction loss =     16.412(Ft.)  K-factor =   1.50
Pipe flow velocity =     26.54(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =    15.41 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      311.000 to Point/Station      312.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     35.400(Ac.)
Runoff from this stream =     83.393(CFS)
Time of concentration =   15.41 min.
Rainfall intensity =     3.569(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      401.000 to Point/Station      402.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
User specified 'C' value of 0.350 given for subarea
Time of concentration computed by the
natural watersheds nomograph (App X-A)
TC = [11.9*length(Mi)^3)/(elevation change)]^.385 *60(min/hr) + 10 min.
Initial subarea flow distance  =  240.00(Ft.)
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Highest elevation =  373.00(Ft.)
Lowest elevation =  358.00(Ft.)
Elevation difference =   15.00(Ft.)
TC=[(11.9*0.0455^3)/( 15.00)]^.385=  1.55 + 10 min. =    11.55 min.
Rainfall intensity (I) =    4.300 for a  100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.350
Subarea runoff =      0.090(CFS)
Total initial stream area =        0.060(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      402.000 to Point/Station      403.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
----------------------------------------------------------------------
Estimated mean flow rate at midpoint of channel =      0.873(CFS)
Depth of flow =   0.188(Ft.), Average velocity =   2.458(Ft/s)
       ******* Irregular Channel Data ***********
----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1              0.00              2.00
       2             20.00              0.00
       3             40.00              2.00
Manning's 'N' friction factor =   0.040
----------------------------------------------------------------
Sub-Channel flow =      0.873(CFS)
  '      '        flow top width =      3.769(Ft.)
  '      '    velocity=    2.458(Ft/s)
  '      '        area =      0.355(Sq.Ft)
  '      '        Froude number =     1.411

Upstream point elevation =  358.000(Ft.)
Downstream point elevation =  285.000(Ft.)
Flow length =   710.000(Ft.)
Travel time  =    4.81 min.
Time of concentration =   16.36 min.
Depth of flow =   0.188(Ft.)
Average velocity =   2.458(Ft/s)
Total irregular channel flow =     0.873(CFS)
Irregular channel normal depth above invert elev. =   0.188(Ft.)
Average velocity of channel(s) =   2.458(Ft/s)

Sub-Channel No. 1 critical depth =      0.217(Ft.)
  '      '      '    critical flow top width =      4.336(Ft.)
  '      '      '    critical flow velocity=    1.857(Ft/s)
  '      '      '    critical flow area =      0.470(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.350 given for subarea
Rainfall intensity =      3.435(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      1.250(CFS) for    1.040(Ac.)
Total runoff =      1.340(CFS)  Total area =        1.10(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      403.000 to Point/Station      312.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
----------------------------------------------------------------------
Upstream point/station elevation =   284.98(Ft.)
Downstream point/station elevation =   282.84(Ft.)
Pipe length  =    58.27(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.340(CFS)
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Given pipe size =      18.00(In.)
Calculated individual pipe flow  =     1.340(CFS)
Normal flow depth in pipe =    3.15(In.)
Flow top width inside pipe =   13.67(In.)
Critical Depth =    5.20(In.)
Pipe flow velocity =      6.46(Ft/s)
Travel time through pipe =    0.15 min.
Time of concentration (TC) =    16.51 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      403.000 to Point/Station      312.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.100(Ac.)
Runoff from this stream =      1.340(CFS)
Time of concentration =   16.51 min.
Rainfall intensity =     3.414(In/Hr)
Summary of stream data:

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


1       83.393     15.41                  3.569
2        1.340     16.51                  3.414
Qmax(1) =
           1.000 *    1.000 *    83.393) +
           1.000 *    0.933 *     1.340) + =      84.644
Qmax(2) =
           0.957 *    1.000 *    83.393) +
           1.000 *    1.000 *     1.340) + =      81.110

Total of 2 streams to confluence:
Flow rates before confluence point:
      83.393       1.340
Maximum flow rates at confluence using above data:
       84.644       81.110
Area of streams before confluence:
       35.400        1.100
Results of confluence:
Total flow rate =      84.644(CFS)
Time of concentration =    15.410 min.
Effective stream area after confluence =     36.500(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      312.000 to Point/Station      313.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   282.51(Ft.)
Downstream point/station elevation =   268.22(Ft.)
Pipe length  =   290.95(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    84.644(CFS)
Given pipe size =      24.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
    43.337(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =      40.718(Ft.)
 Minor friction loss =      16.908(Ft.)  K-factor =   1.50
Pipe flow velocity =     26.94(Ft/s)
Travel time through pipe =    0.18 min.
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Time of concentration (TC) =    15.59 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      313.000 to Point/Station      313.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.350 given for subarea
Time of concentration =    15.59 min.
Rainfall intensity =      3.543(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      2.728(CFS) for    2.200(Ac.)
Total runoff =     87.372(CFS)  Total area =       38.70(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      313.000 to Point/Station      313.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.900 given for subarea
Time of concentration =    15.59 min.
Rainfall intensity =      3.543(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.900
Subarea runoff =      4.464(CFS) for    1.400(Ac.)
Total runoff =     91.836(CFS)  Total area =       40.10(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      313.000 to Point/Station      153.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   266.22(Ft.)
Downstream point/station elevation =   265.72(Ft.)
Pipe length  =    21.26(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    91.836(CFS)
Given pipe size =     24.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
    22.906(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =      3.502(Ft.)
 Minor friction loss =     19.904(Ft.)  K-factor =   1.50
Pipe flow velocity =     29.23(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    15.60 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      153.000 to Point/Station      154.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   265.72(Ft.)
Downstream point/station elevation =   264.11(Ft.)
Pipe length  =    72.32(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    91.836(CFS)
Given pipe size =     54.00(In.)
Calculated individual pipe flow  =    91.836(CFS)
Normal flow depth in pipe =   20.74(In.)
Flow top width inside pipe =   52.53(In.)
Critical Depth =   33.71(In.)
Pipe flow velocity =     16.31(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =    15.68 min.
End of computations, total study area =          40.10 (Ac.)
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                San Diego County Rational Hydrology Program

  CIVILCADD/CIVILDESIGN  Engineering Software, (c) 2004   Version 3.2

Rational method hydrology  program based on
San Diego County Flood Control Division 2003 hydrology manual
        Rational Hydrology Study        Date: 08/29/07
------------------------------------------------------------------------
LA COSTA TOWN SQUARE
BASIN B - EXISTING CONDITIONS
G:\ACCTS\001017\1017B.OUT


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

------------------------------------------------------------------------
O'Day Consultants, San Diego, California - S/N 10125
------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0

Map data precipitation entered:
6 hour,  precipitation(inches) =  2.800
24 hour precipitation(inches) =  5.100
Adjusted 6 hour precipitation (inches) =  2.800
P6/P24 =    54.9%
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      200.000 to Point/Station      200.000
**** USER DEFINED FLOW INFORMATION AT A POINT **** PER DWG. 368-2C, SHT. 14
______________________________________________________________________
User specified 'C' value of 0.800 given for subarea
Rainfall intensity (I) =    2.879 for a  100.0 year storm
User specified values are as follows:
TC =  21.50 min.  Rain intensity =       2.88(In/Hr)
Total area =        22.10(Ac.)  Total runoff =     45.40(CFS)


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Process from Point/Station      200.000 to Point/Station      202.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =     60.602(CFS)
Depth of flow =   1.266(Ft.), Average velocity =   7.559(Ft/s)
       ******* Irregular Channel Data ***********
----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1             0.00              2.00
        2            10.00              0.00
        3            20.00              2.00
Manning's 'N' friction factor =   0.040
----------------------------------------------------------------
Sub-Channel flow  =     60.602(CFS)
  '       '        flow top width =     12.662(Ft.)
  '       '     velocity=    7.559(Ft/s)
  '       '        area =      8.017(Sq.Ft)
  '       '        Froude number =     1.674
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Upstream point elevation =  347.000(Ft.)
Downstream point elevation =  261.000(Ft.)
Flow length =  1100.000(Ft.)
Travel time  =    2.43 min.
Time of concentration =   23.93 min.
Depth of flow =   1.266(Ft.)
Average velocity =   7.559(Ft/s)
Total irregular channel flow =    60.602(CFS)
Irregular channel normal depth above invert elev. =   1.266(Ft.)
Average velocity of channel(s) =   7.559(Ft/s)

Sub-Channel No. 1 critical depth =      1.555(Ft.)
  '      '       '    critical flow top width =     15.547(Ft.)
  '      '       '    critical flow velocity=    5.015(Ft/s)
  '      '       '    critical flow area =     12.085(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.350 given for subarea
Rainfall intensity =      2.688(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =     13.922(CFS) for   14.800(Ac.)
Total runoff =     59.322(CFS)  Total area =       36.90(Ac.)


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Process from Point/Station      202.000 to Point/Station      202.000
**** SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------
User specified 'C' value of 0.350 given for subarea
Time of concentration =    23.93 min.
Rainfall intensity =      2.688(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      8.466(CFS) for    9.000(Ac.)
Total runoff =     67.788(CFS)  Total area =       45.90(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      202.000
**** SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------
User specified 'C' value of 0.900 given for subarea
Time of concentration =    23.93 min.
Rainfall intensity =      2.688(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.900
Subarea runoff =      5.563(CFS) for    2.300(Ac.)
Total runoff =     73.351(CFS)  Total area =       48.20(Ac.)
End of computations, total study area =          48.20 (Ac.)
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                San Diego County Rational Hydrology Program

  CIVILCADD/CIVILDESIGN  Engineering Software, (c) 2004   Version 3.2

Rational method hydrology  program based on
San Diego County Flood Control Division 2003 hydrology manual
        Rational Hydrology Study        Date: 08/29/07
------------------------------------------------------------------------
LA COSTA TOWN SQUARE
BASIN C - EXISTING CONDITIONS
G:\ACCTS\001017\1017C.OUT


------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********
------------------------------------------------------------------------
O'Day Consultants, San Diego, California - S/N 10125
------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0

Map data precipitation entered:
6 hour,  precipitation(inches) =  2.800
24 hour precipitation(inches) =  5.100
Adjusted 6 hour precipitation (inches) =  2.800
P6/P24 =    54.9%
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      300.000 to Point/Station      300.000
**** USER DEFINED FLOW INFORMATION AT A POINT **** PER DWG. 368-2, SHT. 42
______________________________________________________________________
User specified 'C' value of 0.800 given for subarea
Rainfall intensity (I) =    3.350 for a  100.0 year storm
User specified values are as follows:
TC =  17.00 min.  Rain intensity =       3.35(In/Hr)
Total area =        10.80(Ac.)  Total runoff =     32.50(CFS)


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Process from Point/Station      300.000 to Point/Station      300.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.350 given for subarea
Time of concentration =    17.00 min.
Rainfall intensity =      3.350(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      1.173(CFS) for    1.000(Ac.)
Total runoff =     33.673(CFS)  Total area =       11.80(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      300.000 to Point/Station      302.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =    308.00(Ft.)
Downstream point elevation =    268.00(Ft.)
Channel length thru subarea  =    600.00(Ft.)
Channel base width      =    1.000(Ft.)
Slope or 'Z' of left channel bank =   2.000
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Slope or 'Z' of right channel bank =   2.000
Estimated mean flow rate at midpoint of channel =     40.664(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =     40.664(CFS)
Depth of flow =   0.900(Ft.), Average velocity =  16.143(Ft/s)
Channel flow top width =    4.599(Ft.)
Flow Velocity =   16.14(Ft/s)
Travel time  =    0.62 min.
Time of concentration =   17.62 min.
Critical depth =      1.672(Ft.)
 Adding area flow to channel
User specified 'C' value of 0.350 given for subarea
Rainfall intensity =      3.274(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =      5.615(CFS) for    4.900(Ac.)
Total runoff =     39.287(CFS)  Total area =       16.70(Ac.)


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Process from Point/Station      302.000 to Point/Station      302.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.350 given for subarea
Time of concentration =    17.62 min.
Rainfall intensity =      3.274(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.350
Subarea runoff =     15.469(CFS) for   13.500(Ac.)
Total runoff =     54.757(CFS)  Total area =       30.20(Ac.)
End of computations, total study area =          30.20 (Ac.)
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San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2004 Version 7.4

Rational method hydrology program based on
San Diego County Flood Control Division 2003 hydrology manual
Rational Hydrology Study Date: 10/21/08

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

Program License Serial Number 5024

Rational hydrology study storm event year is 100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour, precipitation(inches) = 2.800
24 hour precipitation(inches) = 5.100
P6/P24 = 54.9%
San Diego hydrology manual 'C' values used

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Process from Point/Station 1000.000 to Point/Station 1000.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****

User specified 'C' value of 0.710 given for subarea
Rainfall intensity (I) = 2.879(In/Hr) for a 100.0 year storm
User specified values are as follows:
TC = 21.50 min. Rain intensity = 2.88(In/Hr)
Total area = 22.100(Ac.) Total runoff = 45.400(CFS)

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Process from Point/Station 1000.000 to Point/Station 1000.500
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 346.000(Ft.)
Downstream point/station elevation = 336.000(Ft.)
Pipe length = 20.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 45.400(CFS)
Nearest computed pipe diameter = 15.00(In.)
Calculated individual pipe flow = 45.400(CFS)
Normal flow depth in pipe = 12.21(In.)
Flow top width inside pipe = 11.67(In.)
Critical depth could not be calculated.
Pipe flow velocity = 42.43(Ft/s)
Travel time through pipe = 0.01 min.
Time of concentration (TC) = 21.51 min.

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Process from Point/Station     1000.500 to Point/Station     1000.500
**** SUBAREA FLOW ADDITION ****
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =    21.51 min.
Rainfall intensity =      2.879(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.713  CA =     16.142
Subarea runoff =      1.069(CFS) for      0.550(Ac.)
Total runoff =     46.469(CFS)      Total area =      22.650(Ac.)


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Process from Point/Station     1000.500 to Point/Station     1001.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
Upstream point/station elevation =   336.000(Ft.)
Downstream point/station elevation =   333.200(Ft.)
Pipe length  =   140.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    46.469(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    46.469(CFS)
Normal flow depth in pipe =   20.32(In.)
Flow top width inside pipe =   28.05(In.)
Critical Depth =   26.98(In.)
Pipe flow velocity =     13.13(Ft/s)
Travel time through pipe =    0.18 min.
Time of concentration (TC) =    21.69 min.


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Process from Point/Station     1001.000 to Point/Station     1002.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
Upstream point/station elevation =   333.200(Ft.)
Downstream point/station elevation =   331.900(Ft.)
Pipe length  =    65.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    46.469(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    46.469(CFS)
Normal flow depth in pipe =   20.32(In.)
Flow top width inside pipe =   28.05(In.)
Critical Depth =   26.98(In.)
Pipe flow velocity =     13.13(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    21.77 min.


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Process from Point/Station     1000.000 to Point/Station     1002.000
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**** CONFLUENCE OF MAIN STREAMS ****
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      22.650(Ac.)
Runoff from this stream =      46.469(CFS)
Time of concentration =   21.77 min.
Rainfall intensity =      2.857(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1002.500 to Point/Station     1003.000
**** INITIAL AREA EVALUATION ****
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Initial subarea total flow distance  =   60.000(Ft.)
Highest elevation =  336.000(Ft.)
Lowest elevation =  335.600(Ft.)
Elevation difference =    0.400(Ft.) Slope =  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 60.00 (Ft)
for the top area slope value of   1.00 %, in a development type of
 General Commercial
In Accordance With Figure 3-3
Initial Area Time of Concentration =   3.90 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8200)*(  60.000^.5)/(   1.000^(1/3)]=   3.90
Calculated TC of    3.904 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.820
Subarea runoff =      1.875(CFS)
Total initial stream area =        0.310(Ac.)


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Process from Point/Station     1003.000 to Point/Station     1004.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
Upstream point/station elevation =   333.500(Ft.)
Downstream point/station elevation =   332.900(Ft.)
Pipe length  =   120.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     1.875(CFS)
Given pipe size =      8.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
     2.141(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =      2.069(Ft.)
 Minor friction loss =      0.672(Ft.)    K-factor =   1.50
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Pipe flow velocity =       5.37(Ft/s)
Travel time through pipe =     0.37 min.
Time of concentration (TC) =      4.28 min.


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Process from Point/Station     1004.000 to Point/Station     1004.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                          ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =      4.28 min.
Rainfall intensity =       7.377(In/Hr) for a    100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =       0.623
Subarea runoff =       2.722(CFS) for       0.450(Ac.)
Total runoff =       4.598(CFS)       Total area =       0.760(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1004.000 to Point/Station     1005.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =    332.900(Ft.)
Downstream point/station elevation =    332.700(Ft.)
Pipe length  =     40.00(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =      4.598(CFS)
Nearest computed pipe diameter  =      15.00(In.)
Calculated individual pipe flow  =      4.598(CFS)
Normal flow depth in pipe =    10.64(In.)
Flow top width inside pipe =    13.62(In.)
Critical Depth =    10.42(In.)
Pipe flow velocity =       4.94(Ft/s)
Travel time through pipe =     0.13 min.
Time of concentration (TC) =      4.41 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1005.000 to Point/Station     1005.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                          ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =      4.41 min.
Rainfall intensity =       7.377(In/Hr) for a    100.0 year storm
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```
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      0.910
Subarea runoff =      2.117(CFS) for      0.350(Ac.)
Total runoff =      6.715(CFS)      Total area =      1.110(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1005.000 to Point/Station     1006.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   332.700(Ft.)
Downstream point/station elevation =   332.300(Ft.)
Pipe length =    80.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow =     6.715(CFS)
Nearest computed pipe diameter =     18.00(In.)
Calculated individual pipe flow =     6.715(CFS)
Normal flow depth in pipe =   11.79(In.)
Flow top width inside pipe =   17.11(In.)
Critical Depth =   12.02(In.)
Pipe flow velocity =      5.47(Ft/s)
Travel time through pipe =    0.24 min.
Time of concentration (TC) =     4.65 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1006.000 to Point/Station     1006.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial     )
Impervious value, Ai = 0.800
Sub-Area C Value = 0.820
Time of concentration =     4.65 min.
Rainfall intensity =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      1.173
Subarea runoff =      1.936(CFS) for      0.320(Ac.)
Total runoff =      8.651(CFS)      Total area =      1.430(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1006.000 to Point/Station     1007.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   332.300(Ft.)
Downstream point/station elevation =   332.150(Ft.)
Pipe length =    30.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow =     8.651(CFS)
Nearest computed pipe diameter =     18.00(In.)
Calculated individual pipe flow =     8.651(CFS)
Normal flow depth in pipe =   14.53(In.)
Flow top width inside pipe =   14.20(In.)
Critical Depth =   13.65(In.)
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Pipe flow velocity =       5.66(Ft/s)
Travel time through pipe =     0.09 min.
Time of concentration (TC) =      4.74 min.


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Process from Point/Station     1007.000 to Point/Station     1007.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =      4.74 min.
Rainfall intensity =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      1.328
Subarea runoff =      1.149(CFS) for      0.190(Ac.)
Total runoff =      9.800(CFS)      Total area =      1.620(Ac.)


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Process from Point/Station     1007.000 to Point/Station     1002.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   332.150(Ft.)
Downstream point/station elevation =   331.900(Ft.)
Pipe length =    50.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow =     9.800(CFS)
Nearest computed pipe diameter =     21.00(In.)
Calculated individual pipe flow =     9.800(CFS)
Normal flow depth in pipe =   13.45(In.)
Flow top width inside pipe =   20.75(In.)
Critical Depth =   13.99(In.)
Pipe flow velocity =      6.03(Ft/s)
Travel time through pipe =     0.14 min.
Time of concentration (TC) =      4.88 min.


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Process from Point/Station     1002.000 to Point/Station     1002.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.620(Ac.)
Runoff from this stream =      9.800(CFS)
Time of concentration =     4.88 min.
Rainfall intensity =     7.377(In/Hr)
Program is now starting with Main Stream No. 3


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Process from Point/Station     1007.500 to Point/Station     1008.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Initial subarea total flow distance  -  200.000(Ft.)
Highest elevation =  348.000(Ft.)
Lowest elevation =  346.000(Ft.)
Elevation difference =    2.000(Ft.) Slope =  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 60.00 (Ft)
for the top area slope value of   1.00 %, in a development type of
 General Commercial
In Accordance With Figure 3-3
Initial Area Time of Concentration =   3.90 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8200)*(  60.000^.5)/(   1.000^(1/3)]=   3.90
The initial area total distance of  200.00 (FLM) entered leaves a
remaining distance of  140.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   2.07 minutes
for a distance of 140.00 (Ft.) and a slope of  1.00 %
with an elevation difference of   1.40(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    2.066 Minutes
Tt=[(11.9*0.0265^3)/(  1.40)]^.385=  2.07
Total initial area Ti =   3.90 minutes from Figure 3-3 formula plus
  2.07 minutes from the Figure 3-4 formula =   5.97 minutes
Rainfall intensity (I) =      6.580(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.820
Subarea runoff =      3.507(CFS)
Total initial stream area =        0.650(Ac.)


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Process from Point/Station     1008.000 to Point/Station     1009.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   336.800(Ft.)
Downstream point/station elevation =   334.900(Ft.)
Pipe length  -    95.00(Ft.)   Manning's N - 0.011
No. of pipes = 1  Required pipe flow  =     3.507(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     3.507(CFS)
Normal flow depth in pipe =    6.62(In.)
Flow top width inside pipe =   11.94(In.)
Critical Depth =    9.60(In.)
Pipe flow velocity =      7.89(Ft/s)
Travel time through pipe -    0.20 min.
Time of concentration (TC) =     6.17 min.
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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1009.000 to Point/Station     1009.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =     6.17 min.
Rainfall intensity =      6.441(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      0.623
Subarea runoff =      0.507(CFS) for      0.110(Ac.)
Total runoff =      4.014(CFS)      Total area =      0.760(Ac.)


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Process from Point/Station     1009.000 to Point/Station     1010.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   334.900(Ft.)
Downstream point/station elevation =   333.400(Ft.)
Pipe length  =    75.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     4.014(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     4.014(CFS)
Normal flow depth in pipe =    7.22(In.)
Flow top width inside pipe =   11.75(In.)
Critical Depth =   10.19(In.)
Pipe flow velocity =      8.14(Ft/s)
Travel time through pipe =    0.15 min.
Time of concentration (TC) =     6.32 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1010.000 to Point/Station     1010.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =     6.32 min.
Rainfall intensity =      6.340(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      0.738
Subarea runoff =      0.665(CFS) for      0.140(Ac.)
Total runoff =      4.679(CFS)      Total area =      0.900(Ac.)
```

++
Process from Point/Station 1010.000 to Point/Station 1011.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 333.400(Ft.)
Downstream point/station elevation = 332.100(Ft.)
Pipe length = 65.00(Ft.) Manning's N = 0.011
No. of pipes = 1 Required pipe flow = 4.679(CFS)
Nearest computed pipe diameter = 12.00(In.)
Calculated individual pipe flow = 4.679(CFS)
Normal flow depth in pipe = 8.02(In.)
Flow top width inside pipe = 11.30(In.)
Critical Depth = 10.78(In.)
Pipe flow velocity = 8.40(Ft/s)
Travel time through pipe = 0.13 min.
Time of concentration (TC) = 6.45 min.

++
Process from Point/Station 1011.000 to Point/Station 1011.000
**** SUBAREA FLOW ADDITION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type]
(General Commercial)
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration = 6.45 min.
Rainfall intensity = 6.258(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820 CA = 0.820
Subarea runoff = 0.453(CFS) for 0.100(Ac.)
Total runoff = 5.131(CFS) Total area = 1.000(Ac.)

++
Process from Point/Station 1011.000 to Point/Station 1002.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 332.100(Ft.)
Downstream point/station elevation = 321.900(Ft.)
Pipe length = 10.00(Ft.) Manning's N = 0.011
No. of pipes = 1 Required pipe flow = 5.131(CFS)
Nearest computed pipe diameter = 12.00(In.)
Calculated individual pipe flow = 5.131(CFS)
Normal flow depth in pipe = 8.59(In.)
Flow top width inside pipe = 10.82(In.)
Critical Depth = 11.08(In.)
Pipe flow velocity = 8.53(Ft/s)
Travel time through pipe = 0.02 min.
Time of concentration (TC) = 6.47 min.

++
Process from Point/Station 1008.000 to Point/Station 1002.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area = 1.000(Ac.)
Runoff from this stream = 5.131(CFS)
Time of concentration = 6.47 min.
Rainfall intensity = 6.246(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	46.469	21.77	2.857
2	9.800	4.88	7.377
3	5.131	6.47	6.246

```
Qmax(1) =
          1.000 *    1.000 *    46.469) +
          0.387 *    1.000 *     9.800) +
          0.457 *    1.000 *     5.131) + =      52.611
Qmax(2) =
          1.000 *    0.224 *    46.469) +
          1.000 *    1.000 *     9.800) +
          1.000 *    0.754 *     5.131) + =      24.090
Qmax(3) =
          1.000 *    0.297 *    46.469) +
          0.847 *    1.000 *     9.800) +
          1.000 *    1.000 *     5.131) + =      27.246
```

Total of 3 main streams to confluence:
Flow rates before confluence point:
46.469 9.800 5.131
Maximum flow rates at confluence using above data:
52.611 24.090 27.246
Area of streams before confluence:
22.650 1.620 1.000

Results of confluence:
Total flow rate = 52.611(CFS)
Time of concentration = 21.765 min.
Effective stream area after confluence = 25.270(Ac.)

++
Process from Point/Station 1002.000 to Point/Station 1012.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 331.900(Ft.)
Downstream point/station elevation = 330.440(Ft.)
Pipe length = 90.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 52.611(CFS)
Nearest computed pipe diameter = 33.00(In.)
Calculated individual pipe flow = 52.611(CFS)

```
Normal flow depth in pipe =   21.94(In.)
Flow top width inside pipe =   31.16(In.)
Critical Depth =   28.49(In.)
Pipe flow velocity =      12.54(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =    21.89 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1012.000 to Point/Station     1012.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =    21.89 min.
Rainfall intensity =      2.846(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.725  CA =     18.586
Subarea runoff =      0.292(CFS) for      0.360(Ac.)
Total runoff =     52.903(CFS)      Total area =      25.630(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1012.000 to Point/Station     1013.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   330.440(Ft.)
Downstream point/station elevation =   328.500(Ft.)
Pipe length =   120.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    52.903(CFS)
Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =    52.903(CFS)
Normal flow depth in pipe =   22.05(In.)
Flow top width inside pipe =   31.07(In.)
Critical Depth =   28.57(In.)
Pipe flow velocity =      12.54(Ft/s)
Travel time through pipe =    0.15 min.
Time of concentration (TC) =    22.05 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1000.000 to Point/Station     1013.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     25.630(Ac.)
Runoff from this stream =     52.903(CFS)
Time of concentration =   22.05 min.
Rainfall intensity =     2.833(In/Hr)
Program is now starting with Main Stream No. 2
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1017.500 to Point/Station     1018.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                          ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Initial subarea total flow distance  =  100.000(Ft.)
Highest elevation =  339.000(Ft.)
Lowest elevation =  337.500(Ft.)
Elevation difference =    1.500(Ft.) Slope =  1.500 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 75.00 (Ft)
for the top area slope value of   1.50 %, in a development type of
 General Commercial
In Accordance With Figure 3-3
Initial Area Time of Concentration =   3.81 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8200)*(  75.000^.5)/(   1.500^(1/3)]=   3.81
The initial area total distance of  100.00 (Ft.) entered leaves a
remaining distance of   25.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   0.47 minutes
for a distance of  25.00 (Ft.) and a slope of  1.50 %
with an elevation difference of   0.38(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    0.469 Minutes
Tt=[(11.9*0.0047^3)/(  0.38)]^.385=  0.47
Total initial area Ti =   3.81 minutes from Figure 3-3 formula plus
  0.47 minutes from the Figure 3-4 formula =   4.28 minutes
Calculated TC of    4.282 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.820
Subarea runoff =      3.690(CFS)
Total initial stream area =        0.610(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1018.000 to Point/Station     1019.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   333.000(Ft.)
Downstream point/station elevation =   332.080(Ft.)
Pipe length  =    50.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     3.690(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     3.690(CFS)
Normal flow depth in pipe =    7.02(In.)
Flow top width inside pipe =   11.83(In.)
Critical Depth =    9.83(In.)
```

```
Pipe flow velocity =       7.73(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =      4.39 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1019.000 to Point/Station     1019.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =      4.39 min.
Rainfall intensity =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      0.615
Subarea runoff =      0.847(CFS) for      0.140(Ac.)
Total runoff =      4.537(CFS)      Total area =      0.750(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1019.000 to Point/Station     1020.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   332.080(Ft.)
Downstream point/station elevation =   330.880(Ft.)
Pipe length =    65.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow =     4.537(CFS)
Nearest computed pipe diameter =     12.00(In.)
Calculated individual pipe flow =     4.537(CFS)
Normal flow depth in pipe =    8.06(In.)
Flow top width inside pipe =   11.27(In.)
Critical Depth =   10.67(In.)
Pipe flow velocity =      8.08(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =     4.52 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1020.000 to Point/Station     1020.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =     4.52 min.
Rainfall intensity =      7.377(In/Hr) for a   100.0 year storm
```

```
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      0.681
Subarea runoff -      0.484(CFS) for      0.080(Ac.)
Total runoff =      5.021(CFS)      Total area =      0.830(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1020.000 to Point/Station     1017.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   330.880(Ft.)
Downstream point/station elevation =   330.050(Ft.)
Pipe length  =    45.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     5.021(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     5.021(CFS)
Normal flow depth in pipe =    8.72(In.)
Flow top width inside pipe =   10.70(In.)
Critical Depth =   11.02(In.)
Pipe flow velocity =      8.21(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =     4.62 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1018.000 to Point/Station     1017.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      0.830(Ac.)
Runoff from this stream =      5.021(CFS)
Time of concentration =    4.62 min.
Rainfall intensity =     7.377(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1013.500 to Point/Station     1014.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                        ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Initial subarea total flow distance  =  110.000(Ft.)
Highest elevation =  343.500(Ft.)
Lowest elevation =  340.500(Ft.)
Elevation difference =    3.000(Ft.) Slope =  2.727 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 85.00 (Ft.)
for the top area slope value of   2.72 %, in a development type of
 General Commercial
In Accordance With Figure 3-3
Initial Area Time of Concentration =   3.33 minutes
```

```
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8200)*(  85.000^.5)/(   2.720^(1/3)]=   3.33
The initial area total distance of  110.00 (Ft.) entered leaves a
remaining distance of   25.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   0.37 minutes
for a distance of  25.00 (Ft.) and a slope of  2.72 %
with an elevation difference of   0.68(Ft.) from the end of the top area
Tt = [11.9*Length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    0.373 Minutes
Tt=[(11.9*0.0047^3)/(  0.68)]^.385=  0.37
Total initial area Ti =   3.33 minutes from Figure 3-3 formula plus
  0.37 minutes from the Figure 3-4 formula =   3.70 minutes
Calculated TC of    3.702 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.820
Subarea runoff =      0.726(CFS)
Total initial stream area =        0.120(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1014.000 to Point/Station     1015.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   335.000(Ft.)
Downstream point/station elevation =   332.690(Ft.)
Pipe length  =    70.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     0.726(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.726(CFS)
Normal flow depth in pipe =    3.36(In.)
Flow top width inside pipe =    5.96(In.)
Critical Depth =    5.14(In.)
Pipe flow velocity =      6.42(Ft/s)
Travel time through pipe =    0.18 min.
Time of concentration (TC) =     3.88 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1015.000 to Point/Station     1016.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                          ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =     3.88 min.
Rainfall intensity =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      0.303
Subarea runoff =      1.512(CFS) for      0.250(Ac.)
Total runoff =      2.238(CFS)      Total area =       0.370(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1015.000 to Point/Station     1016.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   332.690(Ft.)
Downstream point/station elevation =   331.040(Ft.)
Pipe length =    50.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     2.238(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     2.238(CFS)
Normal flow depth in pipe =    5.18(In.)
Flow top width inside pipe =    8.90(In.)
Critical Depth =    8.04(In.)
Pipe flow velocity =      8.50(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =     3.98 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1016.000 to Point/Station     1016.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =     3.98 min.
Rainfall intensity =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      0.861
Subarea runoff =      4.114(CFS) for      0.680(Ac.)
Total runoff =      6.352(CFS)      Total area =      1.050(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1016.000 to Point/Station     1017.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   331.040(Ft.)
Downstream point/station elevation =   330.050(Ft.)
Pipe length =    30.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     6.352(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     6.352(CFS)
Normal flow depth in pipe =    8.34(In.)
Flow top width inside pipe =   11.05(In.)
Critical depth could not be calculated.
Pipe flow velocity =     10.89(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =     4.03 min.
```

++
Process from Point/Station 1014.000 to Point/Station 1017.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 2 in normal stream number 2
Stream flow area = 1.050(Ac.)
Runoff from this stream = 6.352(CFS)
Time of concentration = 4.03 min.
Rainfall intensity = 7.377(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	5.021	4.62	7.377
2	6.352	4.03	7.377

```
Qmax(1) =
          1.000 *    1.000 *     5.021) +
          1.000 *    1.000 *     6.352) + =      11.373
Qmax(2) =
          1.000 *    0.873 *     5.021) +
          1.000 *    1.000 *     6.352) + =      10.733
```

Total of 2 streams to confluence:
Flow rates before confluence point:
5.021 6.352
Maximum flow rates at confluence using above data:
11.373 10.733
Area of streams before confluence:
0.830 1.050
Results of confluence:
Total flow rate = 11.373(CFS)
Time of concentration = 4.615 min.
Effective stream area after confluence = 1.880(Ac.)

++
Process from Point/Station 1017.000 to Point/Station 1013.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 330.050(Ft.)
Downstream point/station elevation = 328.500(Ft.)
Pipe length = 120.00(Ft.) Manning's N = 0.011
No. of pipes = 1 Required pipe flow = 11.373(CFS)
Nearest computed pipe diameter = 18.00(In.)
Calculated individual pipe flow = 11.373(CFS)
Normal flow depth in pipe = 12.25(In.)
Flow top width inside pipe = 16.79(In.)
Critical Depth = 15.45(In.)
Pipe flow velocity = 8.88(Ft/s)
Travel time through pipe = 0.23 min.
Time of concentration (TC) = 4.84 min.

++
Process from Point/Station 1018.000 to Point/Station 1013.000

```
**** CONFLUENCE OF MAIN STREAMS ****
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =       1.880(Ac.)
Runoff from this stream =      11.373(CFS)
Time of concentration =     4.84 min.
Rainfall intensity =      7.277(In/Hr)
Summary of stream data:

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


1        52.903      22.05                 2.833
2        11.373       4.84                 7.277
Qmax(1) =
          1.000 *     1.000 *     52.903) +
          0.384 *     1.000 *     11.373) + =       57.270
Qmax(2) =
          1.000 *     0.220 *     52.903) +
          1.000 *     1.000 *     11.373) + =       22.988

Total of 2 main streams to confluence:
Flow rates before confluence point:
      52.903       11.372
Maximum flow rates at confluence using above data:
       57.270       22.988
Area of streams before confluence:
       25.630        1.880


Results of confluence:
Total flow rate =      57.270(CFS)
Time of concentration =     22.047 min.
Effective stream area after confluence  =      27.510(Ac.)


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Process from Point/Station      1013.000 to Point/Station      1021.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
Upstream point/station elevation =    328.500(Ft.)
Downstream point/station elevation =    327.100(Ft.)
Pipe length =     70.00(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     57.270(CFS)
Nearest computed pipe diameter  =      30.00(In.)
Calculated individual pipe flow  =     57.270(CFS)
Normal flow depth in pipe =    24.23(In.)
Flow top width inside pipe =    23.54(In.)
Critical Depth =    28.48(In.)
Pipe flow velocity =      13.47(Ft/s)
Travel time through pipe =     0.09 min.
Time of concentration (TC) =     22.13 min.


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```

```
Process from Point/Station     1021.000 to Point/Station     1021.000
**** SUBAREA FLOW ADDITION ****
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =    22.13 min.
Rainfall intensity =      2.826(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.732  CA =     20.349
Subarea runoff =      0.234(CFS) for      0.270(Ac.)
Total runoff =     57.505(CFS)      Total area =      27.780(Ac.)

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Process from Point/Station     1021.000 to Point/Station     1022.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
Upstream point/station elevation =   327.100(Ft.)
Downstream point/station elevation =   323.300(Ft.)
Pipe length  =   190.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    57.505(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    57.505(CFS)
Normal flow depth in pipe =   24.38(In.)
Flow top width inside pipe =   23.42(In.)
Critical depth could not be calculated.
Pipe flow velocity =     13.47(Ft/s)
Travel time through pipe =    0.24 min.
Time of concentration (TC) =    22.37 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1000.000 to Point/Station     1022.000
**** CONFLUENCE OF MAIN STREAMS ****
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     27.780(Ac.)
Runoff from this stream =     57.505(CFS)
Time of concentration =   22.37 min.
Rainfall intensity =     2.807(In/Hr)
Program is now starting with Main Stream No. 2

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1022.500 to Point/Station     1023.000
**** INITIAL AREA EVALUATION ****
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
```

```
Decimal fraction soil group D = 1.000
{COMMERCIAL area type                          }
{General Commercial     }
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Initial subarea total flow distance  =   80.000(Ft.)
Highest elevation =  349.000(Ft.)
Lowest elevation =  348.000(Ft.)
Elevation difference =    1.000(Ft.) Slope =  1.250 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 60.00 (Ft)
for the top area slope value of   1.25 %, in a development type of
 General Commercial
In Accordance With Figure 3-3
Initial Area Time of Concentration =   3.62 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8200)*(  60.000^.5)/(   1.250^(1/3)]=   3.62
The initial area total distance of   80.00 (Ft.) entered leaves a
remaining distance of   20.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   0.42 minutes
for a distance of  20.00 (Ft.) and a slope of  1.25 %
with an elevation difference of   0.25(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    0.424 Minutes
Tt=[(11.9*0.0038^3)/(  0.25)]^.385=  0.42
Total initial area Ti =   3.62 minutes from Figure 3-3 formula plus
  0.42 minutes from the Figure 3-4 formula =   4.05 minutes
Calculated TC of    4.048 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.820
Subarea runoff =      1.149(CFS)
Total initial stream area =        0.190(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1023.000 to Point/Station     1024.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   343.000(Ft.)
Downstream point/station elevation =   342.000(Ft.)
Pipe length  =    30.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     1.149(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     1.149(CFS)
Normal flow depth in pipe =    4.66(In.)
Flow top width inside pipe =    4.99(In.)
Critical depth could not be calculated.
Pipe flow velocity =      7.02(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =     4.12 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1023.000 to Point/Station     1024.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
```

```
Along Main Stream number: 2 in normal stream number 1
Stream flow area =       0.190(Ac.)
Runoff from this stream =       1.149(CFS)
Time of concentration =     4.12 min.
Rainfall intensity =      7.377(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      1025.000 to Point/Station      1026.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                          ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Initial subarea total flow distance  =    90.000(Ft.)
Highest elevation =  373.000(Ft.)
Lowest elevation =  372.000(Ft.)
Elevation difference =     1.000(Ft.) Slope =  1.11% %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 60.00 (Ft)
for the top area slope value of    1.11 %, in a development type of
 General Commercial
In Accordance With Figure 3-3
Initial Area Time of Concentration =    3.77 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8200)*(  60.000^.5)/(   1.110^(1/3)]=    3.77
The initial area total distance of    90.00 (Ft.) entered leaves a
remaining distance of    30.00 (Ft.)
Using Figure 3-4, the travel time for this distance is    0.61 minutes
for a distance of  30.00 (Ft.) and a slope of  1.11 %
with an elevation difference of    0.33(Ft.) from the end of the top area
Tt = [(11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =     0.606 Minutes
Tt=[(11.9*0.0057^3)/(  0.33)]^.385=  0.61
Total initial area Ti =    3.77 minutes from Figure 3-3 formula plus
  0.61 minutes from the Figure 3-4 formula =    4.38 minutes
Calculated TC of     4.377 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =       7.377(In/Hr) for a    100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.820
Subarea runoff =       0.263(CFS)
Total initial stream area =         0.060(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      1026.000 to Point/Station      1024.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
________________________________________________________________________
Top of street segment elevation =    372.000(Ft.)
End of street segment elevation =    348.000(Ft.)
Length of street segment  =    220.000(Ft.)
Height of curb above gutter flowline  =     6.0(In.)
```

```
Width of half street (curb to crown)  =  30.000(Ft.)
Distance from crown to crossfall grade break  =   1.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.080
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(In.)
 Manning's N in gutter =  0.0130
 Manning's N from gutter to grade break =  0.0130
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      0.960(CFS)
Depth of flow =   0.157(Ft.), Average velocity =   6.512(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   1.896(Ft.)
Flow velocity =   6.51(Ft/s)
Travel time =    0.56 min.     TC =    4.94  min.
 Adding area flow to street
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                        ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Rainfall intensity =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      0.221
Subarea runoff =      1.270(CFS) for      0.210(Ac.)
Total runoff =      1.633(CFS)      Total area =      0.270(Ac.)
Street flow at end of street =      1.633(CFS)
Half street flow at end of street =      1.633(CFS)
Depth of Flow =   0.191(Ft.), Average velocity =   7.423(Ft/s)
Flow width (from curb towards crown)=   2.325(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1025.000 to Point/Station     1024.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.270(Ac.)
Runoff from this stream =      1.633(CFS)
Time of concentration =    4.94 min.
Rainfall intensity =     7.377(In/Hr)
Summary of stream data:

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


1        1.149      4.12                 7.377
2        1.633      4.94                 7.377
Qmax(1) =
         1.000 *    1.000 *      1.149) +
```

```
        1.000 *    0.834 *     1.633) + =        2.511
Qmax(2) =
        1.000 *    1.000 *     1.149) +
        1.000 *    1.000 *     1.633) + =        2.783

Total of 2 streams to confluence:
Flow rates before confluence point:
      1.149       1.633
Maximum flow rates at confluence using above data:
      2.511       2.783
Area of streams before confluence:
      0.190       0.270
Results of confluence:
Total flow rate =      2.783(CFS)
Time of concentration =     4.940 min.
Effective stream area after confluence =      0.460(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1024.000 to Point/Station     1029.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =    342.000(Ft.)
Downstream point/station elevation =    341.000(Ft.)
Pipe length  =     60.00(Ft.)    Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     2.783(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.783(CFS)
Normal flow depth in pipe =     6.08(In.)
Flow top width inside pipe =    12.00(In.)
Critical Depth =     8.58(In.)
Pipe flow velocity =      6.96(Ft/s)
Travel time through pipe =     0.14 min.
Time of concentration (TC) =     5.08 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1029.000 to Point/Station     1029.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =     5.08 min.
Rainfall intensity =      7.299(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      0.943
Subarea runoff =      4.100(CFS) for      0.690(Ac.)
Total runoff =      6.883(CFS)      Total area =      1.150(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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Process from Point/Station      1029.000 to Point/Station      1022.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________________
Upstream point/station elevation =    341.000(Ft.)
Downstream point/station elevation =    329.300(Ft.)
Pipe length  =     60.00(Ft.)    Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =      6.883(CFS)
Nearest computed pipe diameter  =       9.00(In.)
Calculated individual pipe flow  =      6.883(CFS)
Normal flow depth in pipe =     5.27(In.)
Flow top width inside pipe =     8.97(In.)
Critical depth could not be calculated.
Pipe flow velocity =      25.57(Ft/s)
Travel time through pipe =     0.04 min.
Time of concentration (TC) =      5.12 min.


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      1023.000 to Point/Station      1022.000
**** CONFLUENCE OF MAIN STREAMS ****
_____________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =       1.150(Ac.)
Runoff from this stream =       6.883(CFS)
Time of concentration =     5.12 min.
Rainfall intensity =      7.263(In/Hr)
Summary of stream data:

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


1        57.505      22.37                 2.807
2         6.883       5.12                 7.263
Qmax(1) =
          1.000 *     1.000 *     57.505) +
          0.386 *     1.000 *      6.883) + =       60.165
Qmax(2) =
          1.000 *     0.229 *     57.505) +
          1.000 *     1.000 *      6.883) + =       20.052

Total of 2 main streams to confluence:
Flow rates before confluence point:
      57.505       6.883
Maximum flow rates at confluence using above data:
       60.165       20.052
Area of streams before confluence:
       27.780        1.150


Results of confluence:
Total flow rate =      60.165(CFS)
Time of concentration =     22.369 min.
Effective stream area after confluence  =      28.930(Ac.)
```

++
Process from Point/Station 1022.000 to Point/Station 1022.000
**** SUBAREA FLOW ADDITION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type]
(General Commercial)
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
The area added to the existing stream causes a
a lower flow rate of Q = 59.899(CFS)
therefore the upstream flow rate of Q = 60.165(CFS) is being used
Time of concentration = 22.37 min.
Rainfall intensity = 2.807(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.736 CA = 21.341
Subarea runoff = 0.000(CFS) for 0.060(Ac.)
Total runoff = 60.165(CFS) Total area = 28.990(Ac.)

++
Process from Point/Station 1022.000 to Point/Station 1030.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 323.300(Ft.)
Downstream point/station elevation = 321.000(Ft.)
Pipe length = 115.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 60.165(CFS)
Nearest computed pipe diameter = 33.00(In.)
Calculated individual pipe flow = 60.165(CFS)
Normal flow depth in pipe = 22.41(In.)
Flow top width inside pipe = 30.81(In.)
Critical Depth = 29.88(In.)
Pipe flow velocity = 14.00(Ft/s)
Travel time through pipe = 0.14 min.
Time of concentration (TC) = 22.51 min.

++
Process from Point/Station 1000.000 to Point/Station 1030.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area = 28.990(Ac.)
Runoff from this stream = 60.165(CFS)
Time of concentration = 22.51 min.
Rainfall intensity = 2.796(In/Hr)
Program is now starting with Main Stream No. 2

++
Process from Point/Station 101.000 to Point/Station 102.000
**** INITIAL AREA EVALUATION ****

```
User specified 'C' value of 0.350 given for subarea
Initial subarea total flow distance  =  850.000(Ft.)
Highest elevation =  420.000(Ft.)
Lowest elevation =  388.000(Ft.)
Elevation difference =   32.000(Ft.) Slope =  3.765 %
Top of Initial Area Slope adjusted by User to  0.000 %
Bottom of Initial Area Slope adjusted by User to  0.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 50.00 (Ft)
for the top area slope value of   0.00 %, in a development type of
 General Commercial
The initial area total distance of  850.00 (Ft.) entered leaves a
remaining distance of  800.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   1.#J minutes
for a distance of 800.00 (Ft.) and a slope of  0.00 % .
with an elevation difference of   0.00(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    1.#IO Minutes
Tt=[(11.9*0.1515^3)/(  0.00)]^.385=  1.#J
Rainfall intensity (I) =      2.796(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.350
Subarea runoff =      0.724(CFS)
Total initial stream area =        0.740(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** CONFLUENCE OF MINOR STREAMS ****
```

```
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      0.740(Ac.)
Runoff from this stream =      0.724(CFS)
Time of concentration =   22.53 min.
Rainfall intensity =     2.796(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      102.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
```

```
User specified 'C' value of 0.800 given for subarea
Rainfall intensity (I) =      3.632(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =  15.00 min.  Rain intensity =      3.63(In/Hr)
Total area =       19.500(Ac.)  Total runoff =    63.500(CFS)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      102.000
**** CONFLUENCE OF MINOR STREAMS ****
```

```
Along Main Stream number: 2 in normal stream number 2
Stream flow area =     19.500(Ac.)
Runoff from this stream =     63.500(CFS)
Time of concentration =   15.00 min.
Rainfall intensity =     3.632(In/Hr)
```

Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	0.724	22.52	2.796
2	63.500	15.00	3.632

```
Qmax(1) =
          1.000 *    1.000 *     0.724) +
          0.770 *    1.000 *    63.500) + =      49.603
Qmax(2) =
          1.000 *    0.666 *     0.724) +
          1.000 *    1.000 *    63.500) + =      63.983

Total of 2 streams to confluence:
Flow rates before confluence point:
       0.724       63.500
Maximum flow rates at confluence using above data:
       49.603       63.983
Area of streams before confluence:
        0.740       19.500
Results of confluence:
Total flow rate =      63.983(CFS)
Time of concentration =     15.000 min.
Effective stream area after confluence =      20.240(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       102.000 to Point/Station       103.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =    379.070(Ft.)
Downstream point/station elevation =    368.330(Ft.)
Pipe length  =    294.03(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     63.983(CFS)
Given pipe size =      36.00(In.)
Calculated individual pipe flow  =     63.983(CFS)
Normal flow depth in pipe =    18.05(In.)
Flow top width inside pipe =    36.00(In.)
Critical Depth =    30.82(In.)
Pipe flow velocity =      18.05(Ft/s)
Travel time through pipe =     0.27 min.
Time of concentration (TC) =     15.27 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       103.000 to Point/Station       118.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =    368.000(Ft.)
Downstream point/station elevation =    355.330(Ft.)
Pipe length  =    242.98(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     63.983(CFS)
Given pipe size =      36.00(In.)
Calculated individual pipe flow  =     63.983(CFS)
Normal flow depth in pipe =    16.28(In.)
```

```
Flow top width inside pipe =    35.83(In.)
Critical Depth =    30.82(In.)
Pipe flow velocity =      20.61(Ft/s)
Travel time through pipe =     0.20 min.
Time of concentration (TC) =     15.47 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       102.000 to Point/Station       118.000
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      20.240(Ac.)
Runoff from this stream =      63.983(CFS)
Time of concentration =    15.47 min.
Rainfall intensity =      3.561(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       201.000 to Point/Station       202.000
**** INITIAL AREA EVALUATION ****
____________________________________________________________________________
User specified 'C' value of 0.490 given for subarea
Initial subarea total flow distance  =  100.000(Ft.)
Highest elevation =  383.500(Ft.)
Lowest elevation =  382.500(Ft.)
Elevation difference =     1.000(Ft.) Slope =  1.000 %
Top of Initial Area Slope adjusted by User to  0.000 %
Bottom of Initial Area Slope adjusted by User to  0.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 50.00 (Ft)
for the top area slope value of   0.00 %, in a development type of
 General Commercial
The initial area total distance of  100.00 (Ft.) entered leaves a
remaining distance of   50.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   1.#J minutes
for a distance of  50.00 (Ft.) and a slope of  0.00 %
with an elevation difference of   0.00(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    1.#IO Minutes
Tt=[(11.9*0.0095^3)/(  0.00)]^.385=  1.#J
Rainfall intensity (I) =      3.561(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.490
Subarea runoff =      0.209(CFS)
Total initial stream area =        0.120(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       202.000 to Point/Station       203.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
____________________________________________________________________________
Top of street segment elevation =   382.000(Ft.)
End of street segment elevation =   371.500(Ft.)
Length of street segment  =   985.000(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  =  16.500(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 [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =    0.020
Gutter width =    1.500(Ft.)
Gutter hike from flowline =  1.500(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 =       3.468(CFS)
Depth of flow =    0.326(Ft.), Average velocity =   2.465(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  11.556(Ft.)
Flow velocity =    2.47(Ft/s)
Travel time =    6.66 min.     TC =   22.13  min.
 Adding area flow to street
User specified 'C' value of 0.490 given for subarea
Rainfall intensity =       2.826(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.490  CA =       2.357
Subarea runoff =       6.452(CFS) for       4.590(Ac.)
Total runoff =       6.662(CFS)       Total area =       4.010(Ac.)
Street flow at end of street =       6.662(CFS)
Half street flow at end of street =       6.662(CFS)
Depth of flow =    0.394(Ft.), Average velocity =   2.890(Ft/s)
Flow width (from curb towards crown)=  14.946(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       203.000 to Point/Station       203.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.490 given for subarea
Time of concentration =    22.13 min.
Rainfall intensity =       2.826(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.490  CA =       3.445
Subarea runoff =       3.075(CFS) for       2.220(Ac.)
Total runoff =       9.736(CFS)       Total area =       7.030(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       203.000 to Point/Station       204.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   366.530(Ft.)
Downstream point/station elevation =   362.400(Ft.)
Pipe length  =    82.52(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.736(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     9.736(CFS)
Normal flow depth in pipe =    8.07(In.)
Flow top width inside pipe =   17.99(In.)
Critical Depth =   14.41(In.)
Pipe flow velocity =     12.67(Ft/s)
Travel time through pipe =    0.11 min.
```

```
Time of concentration (TC) =     22.24 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       204.000 to Point/Station       204.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.350 given for subarea
The area added to the existing stream causes a
a lower flow rate of Q =       7.246(CFS)
therefore the upstream flow rate of Q =       9.736(CFS) is being used
Time of concentration =     22.24 min.
Rainfall intensity =       2.818(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.350  CA =       2.573
Subarea runoff =       0.000(CFS) for       0.320(Ac.)
Total runoff =       9.736(CFS)       Total area =       7.360(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       204.000 to Point/Station       118.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =    362.150(Ft.)
Downstream point/station elevation =    355.330(Ft.)
Pipe length =     32.24(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow =      9.736(CFS)
Given pipe size =      18.00(In.)
Calculated individual pipe flow =      9.736(CFS)
Normal flow depth in pipe =     5.48(In.)
Flow top width inside pipe =    16.56(In.)
Critical Depth =    14.64(In.)
Pipe flow velocity =      21.39(Ft/s)
Travel time through pipe =     0.03 min.
Time of concentration (TC) =     22.26 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       204.000 to Point/Station       118.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =       7.360(Ac.)
Runoff from this stream =       9.736(CFS)
Time of concentration =    22.26 min.
Rainfall intensity =      2.816(In/Hr)
Summary of stream data:

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


1        63.983      15.47                 3.563
2         9.736      22.26                 2.816
Qmax(1) =
          1.000 *     1.000 *     63.983) +
          1.000 *     0.695 *      9.736) + =       70.748
```

```
Qmax(2) =
        0.791 *    1.000 *    63.983) +
        1.000 *    1.000 *     9.736) + =      60.328

Total of 2 streams to confluence:
Flow rates before confluence point:
      63.983        9.736
Maximum flow rates at confluence using above data:
       70.748       60.328
Area of streams before confluence:
       20.240        7.350
Results of confluence:
Total flow rate =      70.748(CFS)
Time of concentration =     15.468 min.
Effective stream area after confluence =     27.590(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       118.000 to Point/Station      1030.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =    355.000(Ft.)
Downstream point/station elevation =    321.000(Ft.)
Pipe length  =    111.52(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     70.748(CFS)
Given pipe size =      36.00(In.)
Calculated individual pipe flow  =     70.748(CFS)
Normal flow depth in pipe =    10.69(In.)
Flow top width inside pipe =    32.90(In.)
Critical Depth =    22.01(In.)
Pipe flow velocity =      40.22(Ft/s)
Travel time through pipe =     0.05 min.
Time of concentration (TC) =     15.51 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       118.000 to Point/Station      1030.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      27.590(Ac.)
Runoff from this stream =      70.748(CFS)
Time of concentration =    15.51 min.
Rainfall intensity =      3.554(In/Hr)
Summary of stream data:

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


1       60.165      22.51                 2.796
2       70.748      15.51                 3.554
Qmax(1) =
        1.000 *    1.000 *    60.165) +
        0.787 *    1.000 *    70.748) + =      115.820
Qmax(2) =
```

```
        1.000 *    0.689 *    60.165) +
        1.000 *    1.000 *    70.748) + =     112.222

Total of 2 main streams to confluence:
Flow rates before confluence point:
      60.165      70.748
Maximum flow rates at confluence using above data:
      115.820      112.222
Area of streams before confluence:
       28.990       27.590


Results of confluence:
Total flow rate =     115.820(CFS)
Time of concentration =     22.506 min.
Effective stream area after confluence  =     56.580(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1030.000 to Point/Station     1031.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------
Upstream point/station elevation =    321.000(Ft.)
Downstream point/station elevation =    320.700(Ft.)
Pipe length  =     30.00(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    115.820(CFS)
Nearest computed pipe diameter  =     45.00(In.)
Calculated individual pipe flow  =    115.820(CFS)
Normal flow depth in pipe =    35.25(In.)
Flow top width inside pipe =    37.08(In.)
Critical Depth =    29.06(In.)
Pipe flow velocity =     12.47(Ft/s)
Travel time through pipe =     0.04 min.
Time of concentration (TC) =     22.55 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1031.000 to Point/Station     1031.000
**** SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
The area added to the existing stream causes a
a lower flow rate of Q =     211.502(CFS)
Therefore the upstream flow rate of Q =     115.820(CFS) is being used
Time of concentration =     22.55 min.
Rainfall intensity =      2.793(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.703  CA =     39.928
Subarea runoff =      0.000(CFS) for      0.190(Ac.)
Total runoff =     115.820(CFS)      Total area =      56.770(Ac.)
```

++
Process from Point/Station 1031.000 to Point/Station 1032.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 320.700(Ft.)
Downstream point/station elevation = 318.900(Ft.)
Pipe length = 180.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 115.820(CFS)
Nearest computed pipe diameter = 45.00(In.)
Calculated individual pipe flow = 115.820(CFS)
Normal flow depth in pipe = 35.25(In.)
Flow top width inside pipe = 37.08(In.)
Critical Depth = 39.06(In.)
Pipe flow velocity = 12.47(Ft/s)
Travel time through pipe = 0.24 min.
Time of concentration (TC) = 22.79 min.

++
Process from Point/Station 1032.000 to Point/Station 1033.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 318.500(Ft.)
Downstream point/station elevation = 318.500(Ft.)
Pipe length = 80.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 115.820(CFS)
Nearest computed pipe diameter = 51.00(In.)
Calculated individual pipe flow = 115.820(CFS)
Normal flow depth in pipe = 40.50(In.)
Flow top width inside pipe = 41.24(In.)
Critical Depth = 38.53(In.)
Pipe flow velocity = 9.59(Ft/s)
Travel time through pipe = 0.14 min.
Time of concentration (TC) = 22.93 min.

++
Process from Point/Station 1035.000 to Point/Station 1036.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 318.500(Ft.)
Downstream point/station elevation = 318.200(Ft.)
Pipe length = 60.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 115.820(CFS)
Nearest computed pipe diameter = 51.00(In.)
Calculated individual pipe flow = 115.820(CFS)
Normal flow depth in pipe = 40.50(In.)
Flow top width inside pipe = 41.24(In.)
Critical Depth = 38.53(In.)
Pipe flow velocity = 9.59(Ft/s)
Travel time through pipe = 0.10 min.
Time of concentration (TC) = 23.03 min.

++

```
Process from Point/Station     1036.000 to Point/Station     1036.000
**** SUBAREA FLOW ADDITION ****
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
The area added to the existing stream causes a
a lower flow rate of Q =    115.406(CFS)
therefore the upstream flow rate of Q =    115.820(CFS) is being used
Time of concentration =    23.03 min.
Rainfall intensity =      2.755(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.708  CA =      11.896
Subarea runoff =      0.000(CFS) for      2.400(Ac.)
Total runoff =    115.820(CFS)      Total area =      59.170(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1036.000 to Point/Station     1037.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
Upstream point/station elevation =   318.200(Ft.)
Downstream point/station elevation =   317.550(Ft.)
Pipe length =   130.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow =   115.820(CFS)
Nearest computed pipe diameter =     51.00(In.)
Calculated individual pipe flow =   115.820(CFS)
Normal flow depth in pipe =   40.50(In.)
Flow top width inside pipe =   41.24(In.)
Critical Depth =   38.53(In.)
Pipe flow velocity =      9.59(Ft/s)
Travel time through pipe =    0.23 min.
Time of concentration (TC) =    23.26 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1037.000 to Point/Station     1038.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
Upstream point/station elevation =   317.550(Ft.)
Downstream point/station elevation =   317.000(Ft.)
Pipe length =   110.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow =   115.820(CFS)
Nearest computed pipe diameter =     51.00(In.)
Calculated individual pipe flow =   115.820(CFS)
Normal flow depth in pipe =   40.50(In.)
Flow top width inside pipe =   41.24(In.)
Critical Depth =   38.53(In.)
Pipe flow velocity =      9.59(Ft/s)
Travel time through pipe =    0.19 min.
Time of concentration (TC) =    23.45 min.
```

++
Process from Point/Station 1039.000 to Point/Station 1039.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 317.000(Ft.)
Downstream point/station elevation = 316.500(Ft.)
Pipe length = 45.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 115.820(CFS)
Nearest computed pipe diameter = 45.00(In.)
Calculated individual pipe flow = 115.820(CFS)
Normal flow depth in pipe = 33.66(In.)
Flow top width inside pipe = 39.08(In.)
Critical Depth = 39.06(In.)
Pipe flow velocity = 13.08(Ft/s)
Travel time through pipe = 0.06 min.
Time of concentration (TC) = 23.50 min.

++
Process from Point/Station 1039.000 to Point/Station 1039.000
**** SUBAREA FLOW ADDITION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type]
(General Commercial)
Impervious value, Ai = 0.850
Sub Area C Value = 0.820
Time of concentration = 23.50 min.
Rainfall intensity = 2.719(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.710 CA = 42.773
Subarea runoff = 0.463(CFS) for 1.070(Ac.)
Total runoff = 116.283(CFS) Total area = 60.240(Ac.)

++
Process from Point/Station 1039.000 to Point/Station 170.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 316.500(Ft.)
Downstream point/station elevation = 294.250(Ft.)
Pipe length = 70.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 116.283(CFS)
Nearest computed pipe diameter = 24.00(In.)
Calculated individual pipe flow = 116.283(CFS)
Normal flow depth in pipe = 18.00(In.)
Flow top width inside pipe = 20.78(In.)
Critical depth could not be calculated.
Pipe flow velocity = 46.02(Ft/s)
Travel time through pipe = 0.03 min.
Time of concentration (TC) = 23.53 min.

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       170.000 to Point/Station       170.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.350 given for subarea
The area added to the existing stream causes a
a lower flow rate of Q =     57.897(CFS)
therefore the upstream flow rate of Q =    116.283(CFS) is being used
Time of concentration =    23.53 min.
Rainfall intensity =      2.717(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.350  CA =     21.311
Subarea runoff =      0.000(CFS) for      0.650(Ac.)
Total runoff =    116.283(CFS)      Total area =      60.890(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       170.000 to Point/Station       142.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   294.250(Ft.)
Downstream point/station elevation =   277.540(Ft.)
Pipe length  =    55.84(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   116.283(CFS)
Given pipe size =     42.00(In.)
Calculated individual pipe flow  =   116.283(CFS)
Normal flow depth in pipe =   13.10(In.)
Flow top width inside pipe =   38.92(In.)
Critical Depth =   38.67(In.)
Pipe flow velocity =     45.35(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =    23.55 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       142.000 to Point/Station       143.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   277.210(Ft.)
Downstream point/station elevation =   275.910(Ft.)
Pipe length  =    29.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   116.283(CFS)
Given pipe size =     42.00(In.)
Calculated individual pipe flow  =   116.283(CFS)
Normal flow depth in pipe =   22.13(In.)
Flow top width inside pipe =   41.94(In.)
Critical Depth =   38.67(In.)
Pipe flow velocity =     23.62(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =    23.57 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       143.000 to Point/Station       143.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.350 given for subarea
```

```
The area added to the existing stream causes a
a lower flow rate of Q =     58.533(CFS)
therefore the upstream flow rate of Q =    116.283(CFS) is being used
Time of concentration =    23.57 min.
Rainfall intensity =      2.714(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.350  CA =     21.570
Subarea runoff =      0.000(CFS) for      0.740(Ac.)
Total runoff =    116.283(CFS)      Total area =      61.630(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      143.000 to Point/Station      144.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****.
____________________________________________________________________________
Upstream point/station elevation =   275.910(Ft.)
Downstream point/station elevation =   275.100(Ft.)
Pipe length  =    18.08(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   116.283(CFS)
Given pipe size =     42.00(In.)
Calculated individual pipe flow  =   116.283(CFS)
Normal flow depth in pipe =   22.13(In.)
Flow top width inside pipe =   41.94(In.)
Critical Depth =   38.67(In.)
Pipe flow velocity =     22.62(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    23.58 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      144.000 to Point/Station      211.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
____________________________________________________________________________
Upstream point/station elevation =   274.560(Ft.)
Downstream point/station elevation =   268.050(Ft.)
Pipe length  =   271.70(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   116.283(CFS)
Given pipe size =     48.00(In.)
Calculated individual pipe flow  =   116.283(CFS)
Normal flow depth in pipe =   24.66(In.)
Flow top width inside pipe =   47.98(In.)
Critical Depth =   39.04(In.)
Pipe flow velocity =     17.89(Ft/s)
Travel time through pipe =    0.25 min.
Time of concentration (TC) =    23.84 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      144.000 to Point/Station      211.000
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     61.630(Ac.)
Runoff from this stream =    116.283(CFS)
Time of concentration =   23.84 min.
Rainfall intensity =     2.694(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       207.000 to Point/Station       208.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.490 given for subarea
Initial subarea total flow distance  =  100.000(Ft.)
Highest elevation =  336.200(Ft.)
Lowest elevation =  332.700(Ft.)
Elevation difference =    3.500(Ft.) Slope =  3.500 %
Top of Initial Area Slope adjusted by User to  0.000 %
Bottom of Initial Area Slope adjusted by User to  0.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 50.00 (Ft)
for the top area slope value of   0.00 %, in a development type of
 General Commercial
The initial area total distance of  100.00 (Ft.) entered leaves a
remaining distance of   50.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   1.#J minutes
for a distance of  50.00 (Ft.) and a slope of  0.00 %
with an elevation difference of   0.00(Ft.) from the end of the top area
Tc = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 -    1.#IO Minutes
Tc=[(11.9*0.0095^3)/(  0.00)]^.385=  1.#C
Rainfall intensity (I) =      2.694(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.490
Subarea runoff =      0.198(CFS)
Total initial stream area =        0.150(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       208.000 to Point/Station       209.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   332.400(Ft.)
End of street segment elevation =   307.000(Ft.)
Length of street segment  =   515.000(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  =  16.500(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 [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(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 =      1.754(CFS)
Depth of flow =   0.220(Ft.), Average velocity =   3.787(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   6.260(Ft.)
Flow velocity =   3.79(Ft/s)
Travel time =    2.27 min.     TC =   25.10  min.
 Adding area flow to street
```

```
User specified 'C' value of 0.490 given for subarea
Rainfall intensity =      2.541(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.490  CA =      1.264
Subarea runoff =      3.034(CFS) for      2.430(Ac.)
Total runoff =      3.212(CFS)      Total area =      2.580(Ac.)
Street flow at end of street =      3.212(CFS)
Half street flow at end of street =      3.212(CFS)
Depth of flow =   0.259(Ft.), Average velocity =   4.341(Ft/s)
Flow width (from curb towards crown)=   8.177(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      209.000 to Point/Station      209.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
User specified 'C' value of 0.490 given for subarea
Time of concentration =    26.10 min.
Rainfall intensity =      2.547(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.490  CA =      1.552
Subarea runoff =      1.494(CFS) for      1.200(Ac.)
Total runoff =      4.706(CFS)      Total area =      3.780(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      209.000 to Point/Station      210.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =   297.600(Ft.)
Downstream point/station elevation =   274.200(Ft.)
Pipe length =    48.15(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow =     4.706(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow =     4.706(CFS)
Normal flow depth in pipe =    3.09(In.)
Flow top width inside pipe =   13.58(In.)
Critical Depth =   10.00(In.)
Pipe flow velocity =     23.27(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =    26.14 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      210.000 to Point/Station      211.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =   273.900(Ft.)
Downstream point/station elevation =   269.200(Ft.)
Pipe length =     9.95(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow =     4.706(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow =     4.706(CFS)
Normal flow depth in pipe =    3.13(In.)
Flow top width inside pipe =   13.65(In.)
Critical Depth =   10.00(In.)
Pipe flow velocity =     22.87(Ft/s)
```

```
Travel time through pipe =     0.01 min.
Time of concentration (TC) =     26.15 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       210.000 to Point/Station       211.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =       3.780(Ac.)
Runoff from this stream =       4.706(CFS)
Time of concentration =    26.15 min.
Rainfall intensity =      2.538(In/Hr)
Summary of stream data:

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


1       116.283      23.84                 2.694
2         4.706      26.15                 2.538
Qmax(1) =
          1.000 *     1.000 *    116.283) +
          1.000 *     0.912 *      4.706) + =      120.573
Qmax(2) =
          0.942 *     1.000 *    116.283) +
          1.000 *     1.000 *      4.706) + =      114.259

Total of 2 streams to confluence:
Flow rates before confluence point:
     116.283        4.706
Maximum flow rates at confluence using above data:
      120.573       114.259
Area of streams before confluence:
       61.630         3.780
Results of confluence:
Total flow rate =     120.573(CFS)
Time of concentration =     23.838 min.
Effective stream area after confluence =      65.410(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       211.000 to Point/Station       152.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =    268.000(Ft.)
Downstream point/station elevation =    267.000(Ft.)
Pipe length  =     43.68(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    120.573(CFS)
Given pipe size =      48.00(In.)
Calculated individual pipe flow  =    120.573(CFS)
Normal flow depth in pipe =    25.17(In.)
Flow top width inside pipe =    47.94(In.)
Critical Depth =    39.64(In.)
Pipe flow velocity =      18.08(Ft/s)
Travel time through pipe =     0.04 min.
Time of concentration (TC) =     23.88 min.
```

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Process from Point/Station       152.000 to Point/Station       153.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   266.500(Ft.)
Downstream point/station elevation =   266.000(Ft.)
Pipe length  =    20.67(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   120.573(CFS)
Given pipe size =     54.00(In.)
Calculated individual pipe flow  =   120.573(CFS)
Normal flow depth in pipe =   26.28(In.)
Flow top width inside pipe =   53.73(In.)
Critical Depth =   38.77(In.)
Pipe flow velocity =     17.41(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =    23.90 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       152.000 to Point/Station       153.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      65.410(Ac.)
Runoff from this stream =    120.573(CFS)
Time of concentration =   23.90 min.
Rainfall Intensity =     2.690(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       301.000 to Point/Station       302.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.490 given for subarea
Initial subarea total flow distance  =   55.000(Ft.)
Highest elevation =  383.500(Ft.)
Lowest elevation =  382.900(Ft.)
Elevation difference =    0.600(Ft.) Slope =  1.091 %
Top of Initial Area Slope adjusted by User to  0.000 %
Bottom of Initial Area Slope adjusted by User to  0.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 50.00 (Ft)
for the top area slope value of   0.00 %, in a development type of
 General Commercial
The initial area total distance of   55.00 (Ft.) entered leaves a
remaining distance of    5.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   1.$J minutes
for a distance of   5.00 (Ft.) and a slope of  0.00 %
with an elevation difference of   0.00(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    1.$IO Minutes
Tt-[(11.9*0.0009^3)/(  0.00)]^.385=  1.$J
Rainfall Intensity (I) =      2.690(In/Hr) for a   100.0 year storm
```

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Effective runoff coefficient used for area (Q=KCIA) is C = 0.490
Subarea runoff =       0.105(CFS)
Total initial stream area =        0.080(Ac.)


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Process from Point/Station      302.000 to Point/Station      303.000
**** STREET FLOW TRAVEL TIME - SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   381.200(Ft.)
End of street segment elevation =   374.700(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  =  16.500(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 [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(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 =       0.769(CFS)
Depth of flow =   0.293(Ft.), Average velocity =   2.117(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   5.405(Ft.)
Flow velocity =   2.12(Ft/s)
Travel time =    2.91 min.     TC =   26.81  min.
 Adding area flow to street
User specified 'C' value of 0.490 given for subarea
Rainfall intensity =      2.497(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.490  CA =      0.608
Subarea runoff =      1.412(CFS) for      1.160(Ac.)
Total runoff =      1.517(CFS)      Total area =       1.240(Ac.)
Street flow at end of street =      1.517(CFS)
Half street flow at end of street =      1.517(CFS)
Depth of flow =   0.243(Ft.), Average velocity =   2.455(Ft/s)
Flow width (from curb towards crown)=   7.394(Ft.)


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Process from Point/Station      303.000 to Point/Station      304.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   374.700(Ft.)
End of street segment elevation =   313.900(Ft.)
Length of street segment  =   630.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  17.000(Ft.)
Distance from crown to crossfall grade break  =  15.500(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 [1] side(s) of the street
```

```
Distance from curb to property line  =  13.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(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 =      2.655(CFS)
Depth of flow =   0.226(Ft.), Average velocity =   5.319(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   6.541(Ft.)
Flow velocity =   5.32(Ft/s)
Travel time =    1.97 min.     TC =   28.78  min.
 Adding area flow to street
User specified 'C' value of 0.490 given for subarea
Rainfall intensity =      2.385(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCiA) is C = 0.490  CA =      1.553
Subarea runoff =      2.188(CFS) for      1.930(Ac.)
Total runoff =      3.705(CFS)      Total area =       3.170(Ac.)
Street flow at end of street =      3.705(CFS)
Half street flow at end of street =      3.705(CFS)
Depth of flow =   0.247(Ft.), Average velocity =   5.734(Ft/s)
Flow width (from curb towards crown)=   7.582(Ft.)


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Process from Point/Station      304.000 to Point/Station      305.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   305.500(Ft.)
Downstream point/station elevation =   299.630(Ft.)
Pipe length  =    42.23(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.705(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     3.705(CFS)
Normal flow depth in pipe =    3.74(In.)
Flow top width inside pipe =   14.61(In.)
Critical Depth =    8.82(In.)
Pipe flow velocity =     13.95(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =    28.84 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      304.000 to Point/Station      305.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 3
Stream flow area =      3.170(Ac.)
Runoff from this stream =      3.705(CFS)
Time of concentration =   28.84 min.
Rainfall intensity =     2.383(In/Hr)


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Process from Point/Station      306.000 to Point/Station      307.000
```

```
**** INITIAL AREA EVALUATION ****
User specified 'C' value of 0.490 given for subarea
Initial subarea total flow distance  =   35.000(Ft.)
Highest elevation =  377.300(Ft.)
Lowest elevation =  376.200(Ft.)
Elevation difference =    1.100(Ft.) Slope =  3.143 %
Top of Initial Area Slope adjusted by User to  0.000 %
Bottom of Initial Area Slope adjusted by User to  0.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 50.00 (Ft)
for the top area slope value of   0.00 %, in a development type of
 General Commercial
The initial area total distance of   35.00 (Ft.) entered leaves a
remaining distance of    0.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   1.#J minutes
for a distance of   0.00 (Ft.) and a slope of  0.00 %
with an elevation difference of   0.00(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    1.#IO Minutes
Tc=[(11.9*0.0000^3)/(  0.00)]^.385=  1.#J
Rainfall intensity (I) =      2.383(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.490
Subarea runoff =      0.012(CFS)
Total initial stream area =        0.010(Ac.)


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Process from Point/Station      307.000 to Point/Station      308.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
Top of street segment elevation =   376.200(Ft.)
End of street segment elevation =   326.700(Ft.)
Length of street segment  =   495.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  17.000(Ft.)
Distance from crown to crossfall grade break  =  15.500(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 [1] side(s) of the street
Distance from curb to property line  =  13.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter lip from flowline =  1.500(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 =      0.698(CFS)
Depth of flow =   0.155(Ft.), Average velocity =   4.335(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   2.997(Ft.)
Flow velocity =   4.33(Ft/s)
Travel time =    1.90 min.     TC =   30.74  min.
 Adding area flow to street
User specified 'C' value of 0.490 given for subarea
Rainfall intensity =      2.287(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
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(Q=KCIA) is C = 0.490  CA =      0.647
Subarea runoff =      1.467(CFS) for      1.310(Ac.)
Total runoff =      1.479(CFS)      Total area =      1.320(Ac.)
Street flow at end of street =      1.479(CFS)
Half street flow at end of street =      1.479(CFS)
Depth of flow =   0.192(Ft.), Average velocity =   4.860(Ft/s)
Flow width (from curb towards crown)=   4.827(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      308.000 to Point/Station      308.000
**** SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------
User specified 'C' value of 0.490 given for subarea
Time of concentration =    30.74 min.
Rainfall intensity =      2.287(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.490  CA =      1.142
Subarea runoff =      1.132(CFS) for      1.010(Ac.)
Total runoff =      2.611(CFS)      Total area =      2.330(Ac.)


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Process from Point/Station      308.000 to Point/Station      309.000
**** IMPROVED CHANNEL TRAVEL TIME ****
----------------------------------------------------------------------
Upstream point elevation =   326.100(Ft.)
Downstream point elevation =   318.200(Ft.)
Channel length thru subarea  =    90.000(Ft.)
Channel base width      =    0.000(Ft.)
Slope or 'Z' of left channel bank =  65.000
Slope or 'Z' of right channel bank =  65.000
Manning's 'N'    = 0.015
Maximum depth of channel  =    0.500(Ft.)
Flow(q) thru subarea =      2.611(CFS)
Depth of flow =   0.100(Ft.), Average velocity =   3.991(Ft/s)
Channel flow top width =   13.040(Ft.)
Flow Velocity =    3.99(Ft/s)
Travel time  =    0.38 min.
Time of concentration =   31.11 min.
Critical depth =      0.158(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      309.000 to Point/Station      309.000
**** SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------
User specified 'C' value of 0.490 given for subarea
Time of concentration =    31.11 min.
Rainfall intensity =      2.269(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.490  CA =      1.215
Subarea runoff =      0.146(CFS) for      0.150(Ac.)
Total runoff =      2.757(CFS)      Total area =      2.480(Ac.)


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Process from Point/Station      309.000 to Point/Station      310.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------
Top of street segment elevation =   318.200(Ft.)
End of street segment elevation =   312.500(Ft.)
Length of street segment  =    40.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  17.000(Ft.)
Distance from crown to crossfall grade break  =  15.500(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 [1] side(s) of the street
Distance from curb to property line  =  13.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(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 =      2.935(CFS)
Depth of flow =   0.219(Ft.), Average velocity =   6.414(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   6.215(Ft.)
Flow velocity =   6.41(Ft/s)
Travel time =    0.10 min.     TC =   31.22  min.
 Adding area flow to street
User specified 'C' value of 0.490 given for subarea
Rainfall intensity =      2.264(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.490  CA =      1.372
Subarea runoff =      0.349(CFS) for      0.320(Ac.)
Total runoff =      3.106(CFS)      Total area =      2.800(Ac.)
Street flow at end of street =      3.106(CFS)
Half street flow at end of street =      3.106(CFS)
Depth of flow =   0.223(Ft.), Average velocity =   6.494(Ft/s)
Flow width (from curb towards crown)=   6.380(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      310.000 to Point/Station      305.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
----------------------------------------------------------------------
Upstream point/station elevation =   300.730(Ft.)
Downstream point/station elevation =   299.630(Ft.)
Pipe length  =     7.41(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.106(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     3.106(CFS)
Normal flow depth in pipe =    3.38(In.)
Flow top width inside pipe =   14.05(In.)
Critical Depth =    8.04(In.)
Pipe flow velocity =     13.55(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    31.23 min.


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Process from Point/Station       310.000 to Point/Station       305.000
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =       2.800(Ac.)
Runoff from this stream =       3.106(CFS)
Time of concentration =    31.23 min.
Rainfall intensity =      2.263(In/Hr)
Summary of stream data:

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


1         3.705      28.84                 2.383
2         3.106      31.23                 2.263
Qmax(1) =
          1.000 *     1.000 *      3.705) +
          1.000 *     0.923 *      3.106) + =        6.573
Qmax(2) =
          0.950 *     1.000 *      3.705) +
          1.000 *     1.000 *      3.106) + =        6.626

Total of 2 streams to confluence:
Flow rates before confluence point:
        3.705        3.106
Maximum flow rates at confluence using above data:
        6.573        6.626
Area of streams before confluence:
        2.170        2.800
Results of confluence:
Total flow rate =       6.626(CFS)
Time of concentration =     31.227 min.
Effective stream area after confluence =       5.970(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       305.000 to Point/Station       311.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
____________________________________________________________________________
Upstream point/station elevation =    299.300(Ft.)
Downstream point/station elevation =    286.030(Ft.)
Pipe length  =    141.46(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =      6.626(CFS)
Given pipe size =      18.00(In.)
Calculated individual pipe flow  =      6.626(CFS)
Normal flow depth in pipe =     5.54(In.)
Flow top width inside pipe =    16.62(In.)
Critical Depth =    11.94(In.)
Pipe flow velocity =      14.33(Ft/s)
Travel time through pipe =     0.16 min.
Time of concentration (TC) =     31.39 min.


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Process from Point/Station       305.000 to Point/Station       311.000
**** CONFLUENCE OF MINOR STREAMS ****
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Along Main Stream number: 2 in normal stream number 1
Stream flow area =       5.970(Ac.)
Runoff from this stream =       6.626(CFS)
Time of concentration =   31.39 min.
Rainfall intensity =     2.256(In/Hr)


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Process from Point/Station      420.000 to Point/Station      421.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.350 given for subarea
Initial subarea total flow distance  =  115.000(Ft.)
Highest elevation =  383.000(Ft.)
Lowest elevation =  372.000(Ft.)
Elevation difference =   11.000(Ft.) Slope =  9.565 %
Top of Initial Area Slope adjusted by User to  0.000 %
Bottom of Initial Area Slope adjusted by User to  0.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 50.00 (Ft)
for the top area slope value of   0.00 %, in a development type of
 General Commercial
The initial area total distance of  115.00 (Ft.) entered leaves a
remaining distance of   65.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   1.40 minutes
for a distance of  65.00 (Ft.) and a slope of  0.00 %
with an elevation difference of   0.00(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    1.#IO Minutes
Tt=[(11.9*0.0123^3)/(  0.00)]^.385=  1.#J
Rainfall intensity (I) =      2.256(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.350
Subarea runoff =       0.008(CFS)
Total initial stream area =        0.010(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      421.000 to Point/Station      422.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   372.000(Ft.)
Downstream point elevation =   292.500(Ft.)
Channel length thru subarea  =   870.000(Ft.)
Channel base width      =    1.000(Ft.)
Slope or 'Z' of left channel bank =   1.000
Slope or 'Z' of right channel bank =   1.000
Estimated mean flow rate at midpoint of channel =      0.276(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      0.276(CFS)
Depth of flow =   0.060(Ft.), Average velocity =   4.315(Ft/s)
Channel flow top width =    1.121(Ft.)
Flow Velocity =    4.31(Ft/s)
Travel time  =    3.36 min.
Time of concentration =   34.75 min.
Critical depth =      0.127(Ft.)
```

```
 Adding area flow to channel
User specified 'C' value of 0.350 given for subarea
Rainfall intensity =      2.112(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.350  CA =      0.241
Subarea runoff =      0.502(CFS) for      0.680(Ac.)
Total runoff =      0.510(CFS)      Total area =      0.690(Ac.)
Depth of flow =   0.087(Ft.), Average velocity =   5.377(Ft/s)
Critical depth =      0.188(Ft.)


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Process from Point/Station      422.000 to Point/Station      311.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   286.560(Ft.)
Downstream point/station elevation =   286.030(Ft.)
Pipe length  =    52.51(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.510(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     0.510(CFS)
Normal flow depth in pipe =    2.69(In.)
Flow top width inside pipe =   12.84(In.)
Critical Depth =    3.16(In.)
Pipe flow velocity =      3.08(Ft/s)
Travel time through pipe =    0.28 min.
Time of concentration (TC) =    35.04 min.


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Process from Point/Station      422.000 to Point/Station      311.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.690(Ac.)
Runoff from this stream =      0.510(CFS)
Time of concentration =   35.04 min.
Rainfall intensity =     2.101(In/Hr)
Summary of stream data:

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


1         6.626      31.39                 2.256
2         0.510      35.04                 2.101
Qmax(1) =
          1.000 *    1.000 *      6.626) +
          1.000 *    0.896 *      0.510) + =        7.083
Qmax(2) =
          0.932 *    1.000 *      6.626) +
          1.000 *    1.000 *      0.510) + =        6.683

Total of 2 streams to confluence:
Flow rates before confluence point:
       6.626        0.510
Maximum flow rates at confluence using above data:
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        7.083          6.683
Area of streams before confluence:
        5.970          0.690
Results of confluence:
Total flow rate =       7.083(CFS)
Time of concentration =    31.392 min.
Effective stream area after confluence =       6.660(Ac.)


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Process from Point/Station       311.000 to Point/Station       312.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   285.530(Ft.)
Downstream point/station elevation =   282.840(Ft.)
Pipe length  =    53.56(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.083(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     7.083(CFS)
Normal flow depth in pipe =    6.12(In.)
Flow top width inside pipe =   20.92(In.)
Critical Depth =   11.34(In.)
Pipe flow velocity =     11.23(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    31.47 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       311.000 to Point/Station       312.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =       6.660(Ac.)
Runoff from this stream =       7.083(CFS)
Time of concentration =   31.47 min.
Rainfall intensity =     2.252(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       401.000 to Point/Station       402.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.350 given for subarea
Initial subarea total flow distance  =  295.000(Ft.)
Highest elevation =  375.500(Ft.)
Lowest elevation =  356.000(Ft.)
Elevation difference =   19.500(Ft.) Slope =  6.610 %
Top of Initial Area Slope adjusted by User to  0.000 %
Bottom of Initial Area Slope adjusted by User to  0.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 50.00 (Ft)
for the top area slope value of   0.00 %, in a development type of
 General Commercial
The initial area total distance of  295.00 (Ft.) entered leaves a
remaining distance of  245.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   1.43 minutes
for a distance of 245.00 (Ft.) and a slope of  0.00 %
```

```
with an elevation difference of   0.00(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    1.#IO Minutes
Tt=[(11.9*0.0464^3)/(  0.00)]^.385=  1.#J
Rainfall intensity (I) =      2.252(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.350
Subarea runoff =      0.236(CFS)
Total initial stream area =        0.300(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      402.000 to Point/Station      403.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   286.000(Ft.)
Downstream point elevation =   283.000(Ft.)
Channel length thru subarea  =   710.000(Ft.)
Channel base width      =    1.000(Ft.)
Slope or 'Z' of left channel bank =   1.000
Slope or 'Z' of right channel bank =   1.000
Estimated mean flow rate at midpoint of channel =      0.532(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      0.532(CFS)
Depth of flow =   0.087(Ft.), Average velocity =   5.619(Ft/s)
Channel flow top width =    1.174(Ft.)
Flow Velocity =    5.62(Ft/s)
Travel time  =    2.11 min.
Time of concentration =   33.38 min.
Critical depth =      0.193(Ft.)
 Adding area flow to channel
User specified 'C' value of 0.350 given for subarea
Rainfall intensity =      2.160(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.350  CA =      0.367
Subarea runoff =      0.557(CFS) for      0.750(Ac.)
Total runoff =      0.794(CFS)      Total area =       1.050(Ac.)
Depth of flow =   0.111(Ft.), Average velocity =   6.458(Ft/s)
Critical depth =      0.246(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      403.000 to Point/Station      312.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   284.980(Ft.)
Downstream point/station elevation =   282.840(Ft.)
Pipe length  =    58.27(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.794(CFS)
Given pipe size =     18.00(In.)
Calculated individual pipe flow  =     0.794(CFS)
Normal flow depth in pipe =    2.44(In.)
Flow top width inside pipe =   12.32(In.)
Critical Depth =    3.97(In.)
Pipe flow velocity =      5.53(Ft/s)
Travel time through pipe =    0.18 min.
Time of concentration (TC) =    33.76 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       403.000 to Point/Station       312.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =       1.050(Ac.)
Runoff from this stream =       0.794(CFS)
Time of concentration =   33.76 min.
Rainfall intensity =     2.153(In/Hr)
Summary of stream data:

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


1        7.083      31.47                 2.252
2        0.794      33.76                 2.153
Qmax(1) =
         1.000 *    1.000 *     7.083) +
         1.000 *    0.932 *     0.794) + =        7.823
Qmax(2) =
         0.956 *    1.000 *     7.083) +
         1.000 *    1.000 *     0.794) + =        7.564

Total of 2 streams to confluence:
Flow rates before confluence point:
       7.083       0.794
Maximum flow rates at confluence using above data:
        7.823        7.564
Area of streams before confluence:
        6.660        1.050
Results of confluence:
Total flow rate =       7.823(CFS)
Time of concentration =    31.474 min.
Effective stream area after confluence =       7.710(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       312.000 to Point/Station       313.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   282.510(Ft.)
Downstream point/station elevation =   268.220(Ft.)
Pipe length  =   290.95(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.823(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow  =     7.823(CFS)
Normal flow depth in pipe =    6.41(In.)
Flow top width inside pipe =   21.24(In.)
Critical Depth =   11.94(In.)
Pipe flow velocity =     12.61(Ft/s)
Travel time through pipe =    0.42 min.
Time of concentration (TC) =    31.89 min.
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       312.000 to Point/Station       313.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =       7.710(Ac.)
Runoff from this stream =       7.823(CFS)
Time of concentration =   31.89 min.
Rainfall Intensity =     2.233(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       314.000 to Point/Station       320.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.490 given for subarea
Initial subarea total flow distance  =   20.000(Ft.)
Highest elevation =  316.700(Ft.)
Lowest elevation =  312.500(Ft.)
Elevation difference =    4.200(Ft.) Slope = 21.000 %
Top of Initial Area Slope adjusted by User to  0.000 %
Bottom of Initial Area Slope adjusted by User to  0.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 50.00 (Ft.)
for the top area slope value of   0.00 %, in a development type of
 General Commercial
The initial area total distance of   20.00 (Ft.) entered leaves a
remaining distance of    0.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   1.#J minutes
for a distance of   0.00 (Ft.) and a slope of  0.00 %
with an elevation difference of   0.00(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    1.#IO Minutes
Tc=[(11.9*0.0000^3)/(  0.00)]^.385=  1.#J
Rainfall intensity (I) =       2.233(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.490
Subarea runoff =       0.011(CFS)
Total initial stream area =        0.010(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       310.000 to Point/Station       315.000
**** STREET FLOW TRAVEL TIME - SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   312.500(Ft.)
End of street segment elevation =   295.500(Ft.)
Length of street segment  =   250.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  17.000(Ft.)
Distance from crown to crossfall grade break  =  15.500(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 [1] side(s) of the street
Distance from curb to property line  =  13.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(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 =      0.476(CFS)
Depth of flow =   0.146(Ft.), Average velocity =   3.527(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   2.527(Ft.)
Flow velocity =   3.53(Ft/s)
Travel time =    1.18 min.     TC =   33.07  min.
 Adding area flow to street
User specified 'C' value of 0.490 given for subarea
Rainfall intensity =      2.181(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.490  CA =      0.461
Subarea runoff =      0.994(CFS) for      0.930(Ac.)
Total runoff =      1.005(CFS)      Total area =      0.940(Ac.)
Street flow at end of street =      1.005(CFS)
Half street flow at end of street =      1.005(CFS)
Depth of flow =   0.182(Ft.), Average velocity =   3.846(Ft/s)
Flow width (from curb towards crown) =   4.358(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      315.000 to Point/Station      315.000
**** SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------
User specified 'C' value of 0.490 given for subarea
Time of concentration =    33.07 min.
Rainfall intensity =      2.181(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.490  CA =      0.789
Subarea runoff =      0.716(CFS) for      0.670(Ac.)
Total runoff =      1.721(CFS)      Total area =      1.610(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      315.000 to Point/Station      316.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------
Top of street segment elevation =   295.500(Ft.)
End of street segment elevation =   278.400(Ft.)
Length of street segment  =   200.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(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 [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(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 =      1.876(CFS)
Depth of flow =   0.209(Ft.), Average velocity =   4.768(Ft/s)
```

```
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   5.675(Ft.)
Flow velocity =   4.77(Ft/s)
Travel time =    0.70 min.     TC =   33.77  min.
 Adding area flow to street
User specified 'C' value of 0.490 given for subarea
Rainfall intensity =      2.152(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.490  CA =      0.931
Subarea runoff =      0.283(CFS) for      0.290(Ac.)
Total runoff =      2.003(CFS)      Total area =       1.900(Ac.)
Street flow at end of street =      2.003(CFS)
Half street flow at end of street =      2.003(CFS)
Depth of flow =   0.212(Ft.), Average velocity =   4.835(Ft/s)
Flow width (from curb towards crown)=   5.857(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      316.000 to Point/Station      316.000
**** SUBAREA FLOW ADDITION ****
____________________________________________________________________________
User specified 'C' value of 0.350 given for subarea
The area added to the existing stream causes a
a lower flow rate of Q =      1.702(CFS)
therefore the upstream flow rate of Q =      2.003(CFS) is being used
Time of concentration =    33.77 min.
Rainfall intensity =      2.152(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.350  CA =      0.791
Subarea runoff =      0.000(CFS) for      0.360(Ac.)
Total runoff =      2.003(CFS)      Total area =       2.260(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      316.000 to Point/Station      313.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
____________________________________________________________________________
Upstream point/station elevation =   268.320(Ft.)
Downstream point/station elevation =   268.220(Ft.)
Pipe length =     5.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow =     2.003(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow =     2.003(CFS)
Normal flow depth in pipe =    4.07(In.)
Flow top width inside pipe =   18.02(In.)
Critical Depth =    5.89(In.)
Pipe flow velocity =      5.67(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    33.79 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      316.000 to Point/Station      313.000
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      2.260(Ac.)
```

```
Runoff from this stream =       2.003(CFS)
Time of concentration =    33.79 min.
Rainfall intensity =      2.151(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       317.000 to Point/Station       318.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
User specified 'C' value of 0.900 given for subarea
Initial subarea total flow distance  =   50.000(Ft.)
Highest elevation =  321.700(Ft.)
Lowest elevation =  321.000(Ft.)
Elevation difference =    0.700(Ft.) Slope =  1.400 %
Top of Initial Area Slope adjusted by User to  0.000 %
Bottom of Initial Area Slope adjusted by User to  0.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 50.00 (Ft)
for the top area slope value of   0.00 %, in a development type of
 General Commercial
The initial area total distance of   50.00 (Ft.) entered leaves a
remaining distance of    0.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   1.#J minutes
for a distance of   0.00 (Ft.) and a slope of  0.00 %
with an elevation difference of   0.00(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    1.#TO Minutes
Tt=[(11.9*0.0000^3)/(  0.00)]^.385=  1.#J
Rainfall intensity (I) =      2.151(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.900
Subarea runoff =       0.019(CFS)
Total initial stream area =        0.010(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       318.000 to Point/Station       319.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   321.000(Ft.)
End of street segment elevation =   278.400(Ft.)
Length of street segment  =   840.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  20.000(Ft.)
Distance from crown to crossfall grade break  =  18.500(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 [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.500(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 =      0.695(CFS)
Depth of flow =   0.171(Ft.), Average velocity =   3.201(Ft/s)
Streetflow hydraulics at midpoint of street travel:
```

```
Halfstreet flow width =   3.821(Ft.)
Flow velocity =   3.20(Ft/s)
Travel time =    4.37 min.      TC =   38.16  min.
 Adding area flow to street
User specified 'C' value of 0.900 given for subarea
Rainfall intensity =      1.989(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.900  CA =      0.738
Subarea runoff =      1.468(CFS) for      0.810(Ac.)
Total runoff =      1.468(CFS)      Total area =       0.820(Ac.)
Street flow at end of street =      1.468(CFS)
Half street flow at end of street =      1.468(CFS)
Depth of flow =   0.209(Ft.), Average velocity =   3.685(Ft/s)
Flow width (from curb towards crown)=   5.719(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      319.000 to Point/Station      313.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =   268.550(Ft.)
Downstream point/station elevation =   268.220(Ft.)
Pipe length =    31.25(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow =     1.468(CFS)
Given pipe size =     24.00(In.)
Calculated individual pipe flow =     1.468(CFS)
Normal flow depth in pipe =    4.09(In.)
Flow top width inside pipe =   18.05(In.)
Critical Depth =    5.02(In.)
Pipe flow velocity =      4.13(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =    38.29 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      319.000 to Point/Station      313.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 3
Stream flow area =      0.820(Ac.)
Runoff from this stream =      1.468(CFS)
Time of concentration =   38.29 min.
Rainfall intensity =     1.989(In/Hr)
Summary of stream data:

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


1        7.823      31.89                2.233
2        2.003      33.79                2.151
3        1.468      38.29                1.985
Qmax(1) =
         1.000 *    1.000 *     7.823) +
         1.000 *    0.944 *     2.003) +
         1.000 *    0.833 *     1.468) + =      10.936
Qmax(2) =
```

```
          0.963 *     1.000 *      7.823) -
          1.000 *     1.000 *      2.003) +
          1.000 *     0.882 *      1.468) + =       10.835
Qmax(3) =
          0.889 *     1.000 *      7.823) +
          0.923 *     1.000 *      2.003) +
          1.000 *     1.000 *      1.468) + =       10.269

Total of 3 streams to confluence:
Flow rates before confluence point:
       7.823        2.003        1.468
Maximum flow rates at confluence using above data:
       10.936       10.835       10.269
Area of streams before confluence:
        7.710        2.260        0.820
Results of confluence:
Total flow rate =      10.936(CFS)
Time of concentration =     31.292 min.
Effective stream area after confluence =      10.790(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       316.000 to Point/Station       153.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =    266.220(Ft.)
Downstream point/station elevation =    265.720(Ft.)
Pipe length  =     21.26(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     10.936(CFS)
Given pipe size =      24.00(In.)
Calculated individual pipe flow  =     10.936(CFS)
Normal flow depth in pipe =     9.26(In.)
Flow top width inside pipe =    23.36(In.)
Critical Depth =    14.23(In.)
Pipe flow velocity =       9.78(Ft/s)
Travel time through pipe =     0.04 min.
Time of concentration (TC) =     31.93 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       316.000 to Point/Station       153.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      10.790(Ac.)
Runoff from this stream =      10.936(CFS)
Time of concentration =    31.93 min.
Rainfall intensity =      2.231(In/Hr)
Summary of stream data:

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


1       120.573      23.90                 2.690
2        10.936      31.93                 2.231
```

```
Qmax(1) =
          1.000 *    1.000 *   120.573) +
          1.000 *    0.748 *    10.936) + =      128.759
Qmax(2) =
          0.830 *    1.000 *   120.573) +
          1.000 *    1.000 *    10.936) + =      110.960

Total of 2 main streams to confluence:
Flow rates before confluence point:
     120.573      10.936
Maximum flow rates at confluence using above data:
      128.759      110.960
Area of streams before confluence:
       65.410       10.790


Results of confluence:
Total flow rate =     128.759(CFS)
Time of concentration =     23.898 min.
Effective stream area after confluence  =      76.200(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       153.000 to Point/Station       154.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________
Upstream point/station elevation =    265.720(Ft.)
Downstream point/station elevation =    264.110(Ft.)
Pipe length  =     72.32(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    128.759(CFS)
Given pipe size =      36.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
     8.813(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =       2.694(Ft.)
 Minor friction loss =       7.729(Ft.)     K-factor =    1.50
Pipe flow velocity =      18.22(Ft/s)
Travel time through pipe =     0.07 min.
Time of concentration (TC) =     23.96 min.
End of computations, total study area =          76.200 (Ac.)
```

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2004 Version 7.4

Rational method hydrology program based on
San Diego County Flood Control Division 2003 hydrology manual
Rational Hydrology Study Date: 11/14/08

LCTS2
Bain 2 of La Costa Town Square

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

Program License Serial Number 6014

Rational hydrology study storm event year is 100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour, precipitation(inches) = 2.800
24 hour precipitation(inches) = 5.100
P6/P24 = 54.9%
San Diego hydrology manual 'C' values used

++
Process from Point/Station 2000.000 to Point/Station 2001.000
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type]
(General Commercial)
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Initial subarea total flow distance = 80.000(Ft.)
Highest elevation = 335.500(Ft.)
Lowest elevation = 332.800(Ft.)
Elevation difference = 1.700(Ft.) Slope = 2.125 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 75.00 (Ft)
for the top area slope value of 2.13 %, in a development type of
General Commercial
In Accordance With Figure 3-3
Initial Area Time of Concentration = 3.39 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8200)*(75.000^.5)/(2.130^(1/3)]= 3.39
The initial area total distance of 80.00 (Ft.) entered leaves a

```
remaining distance of    5.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   0.12 minutes
for a distance of   5.00 (Ft.) and a slope of  2.13 %
with an elevation difference of   0.11(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    0.119 Minutes
Tt=[(11.9*0.0009^3)/(  0.11)]^.385=  0.12
Total initial area Ti =   3.39 minutes from Figure 3-3 formula plus
  0.12 minutes from the Figure 3-4 formula =   3.51 minutes
Calculated TC of    3.511 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.820
Subarea runoff =      0.423(CFS)
Total initial stream area =        0.070(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2001.000 to Point/Station     2002.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   329.000(Ft.)
Downstream point/station elevation =   328.600(Ft.)
Pipe length  =    20.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     0.423(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.423(CFS)
Normal flow depth in pipe =    2.83(In.)
Flow top width inside pipe =    5.99(In.)
Critical Depth =    3.38(In.)
Pipe flow velocity =      4.66(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =     3.58 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2002.000 to Point/Station     2002.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                          ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =     3.58 min.
Rainfall intensity =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      0.115
Subarea runoff =      0.423(CFS) for      0.070(Ac.)
Total runoff =      0.847(CFS)      Total area =       0.140(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2002.000 to Point/Station     2003.000
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**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________
Upstream point/station elevation =    328.600(Ft.)
Downstream point/station elevation =    328.100(Ft.)
Pipe length  =    25.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     0.847(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.847(CFS)
Normal flow depth in pipe =    4.46(In.)
Flow top width inside pipe =    5.24(In.)
Critical Depth =    5.43(In.)
Pipe flow velocity =      5.41(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =     3.66 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2003.000 to Point/Station     2003.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                        ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =     3.66 min.
Rainfall intensity =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      0.172
Subarea runoff =      0.423(CFS) for      0.070(Ac.)
Total runoff =      1.270(CFS)      Total area =      0.240(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2003.000 to Point/Station     2004.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________
Upstream point/station elevation =    328.100(Ft.)
Downstream point/station elevation =    327.700(Ft.)
Pipe length  =    20.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     1.270(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.270(CFS)
Normal flow depth in pipe =    4.28(In.)
Flow top width inside pipe =    8.99(In.)
Critical Depth =    6.23(In.)
Pipe flow velocity =      6.13(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =     3.71 min.


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Process from Point/Station     2004.000 to Point/Station     2004.000
**** SUBAREA FLOW ADDITION ****
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```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =      3.71 min.
Rainfall intensity =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      0.213
Subarea runoff =      0.302(CFS) for      0.050(Ac.)
Total runoff =      1.573(CFS)      Total area =      0.260(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2004.000 to Point/Station     2006.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =    327.700(Ft.)
Downstream point/station elevation =    325.800(Ft.)
Pipe length =     95.00(Ft.)    Manning's N = 0.011
No. of pipes = 1  Required pipe flow =     1.573(CFS)
Nearest computed pipe diameter =      9.00(In.)
Calculated individual pipe flow =     1.573(CFS)
Normal flow depth in pipe =     4.86(In.)
Flow top width inside pipe =     8.97(In.)
Critical Depth =     6.93(In.)
Pipe flow velocity =      6.46(Ft/s)
Travel time through pipe =     0.25 min.
Time of concentration (TC) =      3.96 min.


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Process from Point/Station     2006.000 to Point/Station     2006.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =      3.96 min.
Rainfall intensity =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      0.508
Subarea runoff =      2.178(CFS) for      0.360(Ac.)
Total runoff =      3.751(CFS)      Total area =      0.620(Ac.)


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Process from Point/Station     2006.000 to Point/Station     2007.000
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**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________
Upstream point/station elevation =   325.800(Ft.)
Downstream point/station elevation =   325.400(Ft.)
Pipe length  =    20.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     3.751(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     3.751(CFS)
Normal flow depth in pipe =    6.91(In.)
Flow top width inside pipe =   11.86(In.)
Critical Depth =    9.89(In.)
Pipe flow velocity =      8.01(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =     4.00 min.


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Process from Point/Station     2007.000 to Point/Station     2007.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                          ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =     4.00 min.
Rainfall intensity =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      0.574
Subarea runoff =      0.484(CFS) for      0.080(Ac.)
Total runoff =      4.235(CFS)      Total area =       0.700(Ac.)


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Process from Point/Station     2007.000 to Point/Station     2007.500
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________
Upstream point/station elevation =   325.400(Ft.)
Downstream point/station elevation =   323.900(Ft.)
Pipe length  =    75.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     4.235(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     4.235(CFS)
Normal flow depth in pipe =    7.48(In.)
Flow top width inside pipe =   11.63(In.)
Critical Depth =   10.40(In.)
Pipe flow velocity =      8.23(Ft/s)
Travel time through pipe =    0.15 min.
Time of concentration (TC) =     4.15 min.


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Process from Point/Station     2007.500 to Point/Station     2007.500
**** SUBAREA FLOW ADDITION ****
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Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =      4.15 min.
Rainfall intensity =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      0.623
Subarea runoff =      0.363(CFS) for      0.060(Ac.)
Total runoff =      4.598(CFS)      Total area =      0.760(Ac.)


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Process from Point/Station     2007.500 to Point/Station     2008.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =    323.900(Ft.)
Downstream point/station elevation =    321.500(Ft.)
Pipe length  =    120.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     4.598(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     4.598(CFS)
Normal flow depth in pipe =    7.91(In.)
Flow top width inside pipe =    11.38(In.)
Critical Depth =    10.72(In.)
Pipe flow velocity =      8.37(Ft/s)
Travel time through pipe =    0.24 min.
Time of concentration (TC) =     4.39 min.


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Process from Point/Station     2008.000 to Point/Station     2008.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =      4.39 min.
Rainfall intensity =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      0.951
Subarea runoff =      2.420(CFS) for      0.400(Ac.)
Total runoff =      7.017(CFS)      Total area =      1.160(Ac.)


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Process from Point/Station     2008.000 to Point/Station     2009.000
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**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
Upstream point/station elevation =   321.500(Ft.)
Downstream point/station elevation =   320.200(Ft.)
Pipe length  =    65.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     7.017(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     7.017(CFS)
Normal flow depth in pipe =    8.81(In.)
Flow top width inside pipe =   14.77(In.)
Critical Depth =   12.74(In.)
Pipe flow velocity =      9.37(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =     4.51 min.

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Process from Point/Station     2009.000 to Point/Station     2009.000
**** SUBAREA FLOW ADDITION ****
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =     4.51 min.
Rainfall intensity =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      1.123
Subarea runoff =      1.270(CFS) for      0.210(Ac.)
Total runoff =      8.288(CFS)      Total area =      1.370(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2009.000 to Point/Station     2010.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
Upstream point/station elevation =   320.200(Ft.)
Downstream point/station elevation =   318.400(Ft.)
Pipe length  =    60.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     8.288(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     8.288(CFS)
Normal flow depth in pipe =    8.60(In.)
Flow top width inside pipe =   14.84(In.)
Critical Depth =   13.56(In.)
Pipe flow velocity =     11.37(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =     4.60 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2010.000 to Point/Station     2010.000
**** SUBAREA FLOW ADDITION ****
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```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =      4.60 min.
Rainfall intensity =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      1.279
Subarea runoff =      1.149(CFS) for      0.190(Ac.)
Total runoff =      9.437(CFS)      Total area =      1.560(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2010.000 to Point/Station     2011.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   318.400(Ft.)
Downstream point/station elevation =   316.750(Ft.)
Pipe length  =    55.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     9.437(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     9.437(CFS)
Normal flow depth in pipe =    9.36(In.)
Flow top width inside pipe =   14.53(In.)
Critical Depth =   14.03(In.)
Pipe flow velocity =     11.70(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =     4.67 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2011.000 to Point/Station     2011.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =      4.67 min.
Rainfall intensity =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      1.427
Subarea runoff =      1.089(CFS) for      0.180(Ac.)
Total runoff =     10.526(CFS)      Total area =      1.740(Ac.)


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Process from Point/Station     2011.000 to Point/Station     2012.000
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**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________________
Upstream point/station elevation =    316.750(Ft.)
Downstream point/station elevation =    315.850(Ft.)
Pipe length  =     30.00(Ft.)    Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     10.526(CFS)
Nearest computed pipe diameter  =      15.00(In.)
Calculated individual pipe flow  =     10.526(CFS)
Normal flow depth in pipe =    10.11(In.)
Flow top width inside pipe =    14.06(In.)
Critical depth could not be calculated.
Pipe flow velocity =      11.96(Ft/s)
Travel time through pipe =     0.04 min.
Time of concentration (TC) =      4.72 min.


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Process from Point/Station      2012.000 to Point/Station      2013.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________________
Upstream point/station elevation =    315.850(Ft.)
Downstream point/station elevation =    314.250(Ft.)
Pipe length  =     80.00(Ft.)    Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     10.526(CFS)
Nearest computed pipe diameter  =      15.00(In.)
Calculated individual pipe flow  =     10.526(CFS)
Normal flow depth in pipe =    11.98(In.)
Flow top width inside pipe =    12.04(In.)
Critical depth could not be calculated.
Pipe flow velocity =      10.03(Ft/s)
Travel time through pipe =     0.13 min.
Time of concentration (TC) =      4.85 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      2013.000 to Point/Station      2013.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
(COMMERCIAL area type                          )
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =      4.85 min.
Rainfall intensity =       7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =       1.673
Subarea runoff =       1.815(CFS) for       0.300(Ac.)
Total runoff =      12.341(CFS)       Total area =       2.040(Ac.)


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Process from Point/Station      2013.000 to Point/Station      2014.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
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Upstream point/station elevation =   314.250(Ft.)
Downstream point/station elevation =   313.850(Ft.)
Pipe length  =    20.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =    12.341(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    12.341(CFS)
Normal flow depth in pipe =   11.13(In.)
Flow top width inside pipe =   17.49(In.)
Critical Depth =   15.93(In.)
Pipe flow velocity =     10.76(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =     4.88 min.


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Process from Point/Station     2000.000 to Point/Station     2014.000
**** CONFLUENCE OF MAIN STREAMS ****
--------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      2.040(Ac.)
Runoff from this stream =     12.341(CFS)
Time of concentration =    4.88 min.
Rainfall intensity =     7.377(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station     2015.000 to Point/Station     2015.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
--------------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                        ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Rainfall intensity (I) =      7.377(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =   5.00 min.  Rain intensity =       7.38(In/Hr)
Total area =        0.170(Ac.)  Total runoff =     1.030(CFS)


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Process from Point/Station     2015.000 to Point/Station     2016.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
--------------------------------------------------------------------------
Upstream point/station elevation =   316.300(Ft.)
Downstream point/station elevation =   315.650(Ft.)
Pipe length  =    65.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     1.030(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.030(CFS)
Normal flow depth in pipe =    4.64(In.)
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Flow top width inside pipe =     9.00(In.)
Critical Depth =     5.59(In.)
Pipe flow velocity =       4.48(Ft/s)
Travel time through pipe =     0.24 min.
Time of concentration (TC) =      5.24 min.


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Process from Point/Station     2016.000 to Point/Station     2016.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                          ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =      5.24 min.
Rainfall intensity =       7.156(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =       0.312
Subarea runoff =       1.200(CFS) for       0.210(Ac.)
Total runoff =       2.230(CFS)       Total area =       0.380(Ac.)


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Process from Point/Station     2016.000 to Point/Station     2017.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =    315.650(Ft.)
Downstream point/station elevation =    314.950(Ft.)
Pipe length =     70.00(Ft.)    Manning's N = 0.011
No. of pipes = 1  Required pipe flow =      2.230(CFS)
Nearest computed pipe diameter =      12.00(In.)
Calculated individual pipe flow =      2.230(CFS)
Normal flow depth in pipe =     6.21(In.)
Flow top width inside pipe =    11.99(In.)
Critical Depth =     7.66(In.)
Pipe flow velocity =       5.44(Ft/s)
Travel time through pipe =     0.21 min.
Time of concentration (TC) =      5.46 min.


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Process from Point/Station     2017.000 to Point/Station     2017.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                          ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub Area C Value = 0.820
```

```
Time of concentration =      5.46 min.
Rainfall intensity =      6.973(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      0.951
Subarea runoff =      4.403(CFS) for      0.780(Ac.)
Total runoff =      6.633(CFS)      Total area =      1.160(Ac.)


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Process from Point/Station     2017.000 to Point/Station     2017.500
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   314.950(Ft.)
Downstream point/station elevation =   314.330(Ft.)
Pipe length =    62.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow =     6.633(CFS)
Nearest computed pipe diameter =     15.00(In.)
Calculated individual pipe flow =     6.633(CFS)
Normal flow depth in pipe =   10.80(In.)
Flow top width inside pipe =   13.47(In.)
Critical Depth =   12.43(In.)
Pipe flow velocity =      7.01(Ft/s)
Travel time through pipe =    0.15 min.
Time of concentration (TC) =     5.60 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2017.500 to Point/Station     2017.500
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial)
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =     5.60 min.
Rainfall intensity =      6.854(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      1.189
Subarea runoff =      1.517(CFS) for      0.290(Ac.)
Total runoff =      8.150(CFS)      Total area =      1.450(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2017.500 to Point/Station     2014.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   314.330(Ft.)
Downstream point/station elevation =   313.850(Ft.)
Pipe length =    48.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow =     8.150(CFS)
Nearest computed pipe diameter =     18.00(In.)
Calculated individual pipe flow =     8.150(CFS)
Normal flow depth in pipe =   10.64(In.)
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```
Flow top width inside pipe =    17.70(In.)
Critical Depth =    13.26(In.)
Pipe flow velocity =       7.50(Ft/s)
Travel time through pipe =     0.11 min.
Time of concentration (TC) =      5.71 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2015.000 to Point/Station     2014.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =       1.450(Ac.)
Runoff from this stream =       8.150(CFS)
Time of concentration =     5.71 min.
Rainfall intensity =      6.771(In/Hr)
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2018.000 to Point/Station     2018.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Rainfall intensity (I) =       7.377(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =    5.00 min.  Rain intensity =       7.38(In/Hr)
Total area =        0.140(Ac.)  Total runoff =     0.850(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2018.000 to Point/Station     2019.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =    319.350(Ft.)
Downstream point/station elevation =    317.650(Ft.)
Pipe length  =     85.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     0.850(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.850(CFS)
Normal flow depth in pipe =     4.48(In.)
Flow top width inside pipe =     5.22(In.)
Critical Depth =     5.44(In.)
Pipe flow velocity =       5.41(Ft/s)
Travel time through pipe =     0.26 min.
Time of concentration (TC) =      5.26 min.


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Process from Point/Station     2019.000 to Point/Station     2019.000
**** SUBAREA FLOW ADDITION ****
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =     5.26 min.
Rainfall intensity =      7.138(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      0.402
Subarea runoff =      2.018(CFS) for      0.350(Ac.)
Total runoff =      2.868(CFS)      Total area =      0.490(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2019.000 to Point/Station     2020.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
Upstream point/station elevation =   317.650(Ft.)
Downstream point/station elevation =   316.350(Ft.)
Pipe length =    65.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow =     2.868(CFS)
Nearest computed pipe diameter =     12.00(In.)
Calculated individual pipe flow =     2.868(CFS)
Normal flow depth in pipe =    5.87(In.)
Flow top width inside pipe =   12.00(In.)
Critical Depth =    8.71(In.)
Pipe flow velocity =      7.51(Ft/s)
Travel time through pipe =    0.14 min.
Time of concentration (TC) =     5.41 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2020.000 to Point/Station     2020.000
**** SUBAREA FLOW ADDITION ****
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =     5.41 min.
Rainfall intensity =      7.015(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      0.541
Subarea runoff =      0.928(CFS) for      0.170(Ac.)
Total runoff =      3.796(CFS)      Total area =      0.660(Ac.)
```

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Process from Point/Station     2020.000 to Point/Station     2021.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   316.350(Ft.)
Downstream point/station elevation =   314.850(Ft.)
Pipe length  =    75.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     3.796(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     3.796(CFS)
Normal flow depth in pipe =    6.96(In.)
Flow top width inside pipe =   11.85(In.)
Critical Depth =    9.95(In.)
Pipe flow velocity =      8.04(Ft/s)
Travel time through pipe =    0.16 min.
Time of concentration (TC) =     5.56 min.


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Process from Point/Station     2021.000 to Point/Station     2021.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =     5.56 min.
Rainfall intensity =      6.888(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      0.648
Subarea runoff =      0.665(CFS) for      0.130(Ac.)
Total runoff =      4.462(CFS)      Total area =      0.790(Ac.)


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Process from Point/Station     2021.000 to Point/Station     2014.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   314.850(Ft.)
Downstream point/station elevation =   313.850(Ft.)
Pipe length  =    50.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     4.462(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     4.462(CFS)
Normal flow depth in pipe =    7.75(In.)
Flow top width inside pipe =   11.48(In.)
Critical Depth =   10.60(In.)
Pipe flow velocity =      8.32(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =     5.66 min.


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Process from Point/Station      2018.000 to Point/Station      2014.000
**** CONFLUENCE OF MAIN STREAMS ****
____________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =       0.790(Ac.)
Runoff from this stream =       4.462(CFS)
Time of concentration =     5.66 min.
Rainfall intensity =      6.809(In/Hr)
Summary of stream data:

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


1        12.341       4.88                  7.377
2         8.150       5.71                  6.771
3         4.462       5.66                  6.809
Qmax(1) =
          1.000 *     1.000 *     12.341) +
          1.000 *     0.854 *      8.150) +
          1.000 *     0.862 *      4.462) + =       23.150
Qmax(2) =
          0.918 *     1.000 *     12.341) +
          1.000 *     1.000 *      8.150) +
          0.995 *     1.000 *      4.462) + =       23.914
Qmax(3) =
          0.923 *     1.000 *     12.341) +
          1.000 *     0.991 *      8.150) +
          1.000 *     1.000 *      4.462) + =       23.932

Total of 3 main streams to confluence:
Flow rates before confluence point:
      12.341        8.150        4.462
Maximum flow rates at confluence using above data:
       23.150       23.914       23.932
Area of streams before confluence:
        2.040        1.450        0.790


Results of confluence:
Total flow rate =      23.932(CFS)
Time of concentration =      5.662 min.
Effective stream area after confluence  =       4.280(Ac.)


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Process from Point/Station      2014.000 to Point/Station      2022.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
____________________________________________________________________________
Upstream point/station elevation =    313.850(Ft.)
Downstream point/station elevation =    312.150(Ft.)
Pipe length  =     88.00(Ft.)    Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     23.932(CFS)
Nearest computed pipe diameter  =      21.00(In.)
Calculated individual pipe flow  =     23.932(CFS)
Normal flow depth in pipe =    15.62(In.)
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```
Flow top width inside pipe =    18.32(In.)
Critical depth could not be calculated.
Pipe flow velocity =      12.47(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =      5.78 min.


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Process from Point/Station     2022.000 to Point/Station     2022.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      4.280(Ac.)
Runoff from this stream =      23.932(CFS)
Time of concentration =    5.78 min.
Rainfall intensity =     6.722(In/Hr)


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Process from Point/Station     2023.000 to Point/Station     2023.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Rainfall intensity (I) =      7.377(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =   5.00 min.  Rain Intensity =       7.38(In/Hr)
Total area =        0.210(Ac.)  Total runoff =     1.270(CFS)


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Process from Point/Station     2023.000 to Point/Station     2024.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   320.300(Ft.)
Downstream point/station elevation =   317.600(Ft.)
Pipe length =    90.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow =     1.270(CFS)
Nearest computed pipe diameter =      9.00(In.)
Calculated individual pipe flow =     1.270(CFS)
Normal flow depth in pipe =    3.82(In.)
Flow top width inside pipe =    8.90(In.)
Critical Depth =    6.22(In.)
Pipe flow velocity =      7.12(Ft/s)
Travel time through pipe =    0.21 min.
Time of concentration (TC) =     5.21 min.


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Process from Point/Station     2024.000 to Point/Station     2024.000
**** SUBAREA FLOW ADDITION ****
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```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =      5.21 min.
Rainfall intensity =      7.183(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      0.353
Subarea runoff =      1.263(CFS) for      0.220(Ac.)
Total runoff =      2.533(CFS)      Total area =      0.430(Ac.)


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Process from Point/Station     2024.000 to Point/Station     2025.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------
Upstream point/station elevation =   317.600(Ft.)
Downstream point/station elevation =   315.650(Ft.)
Pipe length =    65.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow =     2.533(CFS)
Nearest computed pipe diameter =      9.00(In.)
Calculated individual pipe flow =     2.533(CFS)
Normal flow depth in pipe =    5.80(In.)
Flow top width inside pipe =    8.62(In.)
Critical Depth =    8.34(In.)
Pipe flow velocity =      8.41(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =     5.34 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2025.000 to Point/Station     2025.000
**** SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =      5.34 min.
Rainfall intensity =      7.071(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      0.558
Subarea runoff =      1.410(CFS) for      0.250(Ac.)
Total runoff =      3.943(CFS)      Total area =      0.680(Ac.)


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Process from Point/Station     2025.000 to Point/Station     2026.000
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**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________
Upstream point/station elevation =   315.650(Ft.)
Downstream point/station elevation =   313.700(Ft.)
Pipe length  =    65.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     3.943(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     3.943(CFS)
Normal flow depth in pipe =    6.29(In.)
Flow top width inside pipe =   11.99(In.)
Critical Depth =   10.11(In.)
Pipe flow velocity =      9.47(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =     5.45 min.


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Process from Point/Station     2026.000 to Point/Station     2026.000
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =     5.45 min.
Rainfall intensity =      6.975(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      0.746
Subarea runoff =      1.262(CFS) for      0.230(Ac.)
Total runoff =      5.205(CFS)      Total area =      0.910(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2026.000 to Point/Station     2027.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_____________________________________________________________
Upstream point/station elevation =   313.700(Ft.)
Downstream point/station elevation =   312.350(Ft.)
Pipe length  =    45.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     5.205(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     5.205(CFS)
Normal flow depth in pipe =    7.49(In.)
Flow top width inside pipe =   11.62(In.)
Critical Depth =   11.12(In.)
Pipe flow velocity =     10.09(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =     5.53 min.


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Process from Point/Station     2027.000 to Point/Station     2027.000
**** SUBAREA FLOW ADDITION ****
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Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =      5.53 min.
Rainfall intensity =      6.914(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      0.959
Subarea runoff =      1.429(CFS) for      0.260(Ac.)
Total runoff =      6.634(CFS)      Total area =      1.170(Ac.)


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Process from Point/Station     2027.000 to Point/Station     2022.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   312.350(Ft.)
Downstream point/station elevation =   312.150(Ft.)
Pipe length  -     7.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  -     6.634(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     6.634(CFS)
Normal flow depth in pipe =    9.18(In.)
Flow top width inside pipe =   10.18(In.)
Critical depth could not be calculated.
Pipe flow velocity =     10.30(Ft/s)
Travel time through pipe -    0.01 min.
Time of concentration (TC) =     5.54 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2023.000 to Point/Station     2022.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.170(Ac.)
Runoff from this stream =      6.634(CFS)
Time of concentration =    5.54 min.
Rainfall intensity =     6.905(In/Hr)
Summary of stream data:

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


1       23.932      5.78                6.722
2        6.634      5.54                6.905
Qmax(1) =
         1.000 *    1.000 *    23.932) +
         0.973 *    1.000 *     6.634) + =      30.390
Qmax(2) =
         1.000 *    0.959 *    23.932) +
```

```
        1.000 *     1.000 *      6.634) + =       29.589

Total of 2 streams to confluence:
Flow rates before confluence point:
      23.932        6.634
Maximum flow rates at confluence using above data:
       30.390        29.589
Area of streams before confluence:
        4.280        1.170
Results of confluence:
Total flow rate =      30.390(CFS)
Time of concentration =      5.775 min.
Effective stream area after confluence =       5.450(Ac.)


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Process from Point/Station      2022.000 to Point/Station      2028.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =    312.350(Ft.)
Downstream point/station elevation =    311.450(Ft.)
Pipe length  =     35.00(Ft.)    Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     30.390(CFS)
Nearest computed pipe diameter  =      24.00(In.)
Calculated individual pipe flow  =     30.390(CFS)
Normal flow depth in pipe -    16.29(In.)
Flow top width inside pipe =    22.41(In.)
Critical Depth =    22.41(In.)
Pipe flow velocity =      13.38(Ft/s)
Travel time through pipe =     0.04 min.
Time of concentration (TC) =      5.82 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      2028.000 to Point/Station      2028.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration -      5.82 min.
Rainfall intensity =      6.690(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      5.273
Subarea runoff =      4.882(CFS) for      0.980(Ac.)
Total runoff =     35.272(CFS)      Total area =      6.430(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      2028.000 to Point/Station      2029.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
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Upstream point/station elevation =    312.450(Ft.)
Downstream point/station elevation =    289.000(Ft.)
Pipe length  =     70.00(Ft.)    Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     35.272(CFS)
Nearest computed pipe diameter  =      15.00(In.)
Calculated individual pipe flow  =     35.272(CFS)
Normal flow depth in pipe =    10.29(In.)
Flow top width inside pipe =    13.92(In.)
Critical depth could not be calculated.
Pipe flow velocity =      39.27(Ft/s)
Travel time through pipe =     0.03 min.
Time of concentration (TC) =      5.85 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      2001.000 to Point/Station      2029.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =       6.430(Ac.)
Runoff from this stream =      35.272(CFS)
Time of concentration =     5.85 min.
Rainfall intensity =      6.668(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      2030.000 to Point/Station      2030.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                        ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Rainfall intensity (I) =       7.377(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =    5.00 min.  Rain intensity =       7.38(In/Hr)
Total area =        0.300(Ac.)  Total runoff =      1.810(CFS)


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Process from Point/Station      2030.000 to Point/Station      2031.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =    332.000(Ft.)
Downstream point/station elevation =    330.600(Ft.)
Pipe length  =     70.00(Ft.)    Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =      1.810(CFS)
Nearest computed pipe diameter  =       9.00(In.)
Calculated individual pipe flow  =      1.810(CFS)
Normal flow depth in pipe =     5.31(In.)
Flow top width inside pipe =     8.85(In.)
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Critical Depth =     7.39(In.)
Pipe flow velocity =       6.67(Ft/s)
Travel time through pipe =     0.17 min.
Time of concentration (TC) =      5.17 min.


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Process from Point/Station      2031.000 to Point/Station      2031.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                          ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =      5.17 min.
Rainfall intensity =       7.216(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =       0.795
Subarea runoff =       3.929(CFS) for       0.670(Ac.)
Total runoff =       5.739(CFS)       Total area =       0.970(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      2031.000 to Point/Station      2032.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =    330.600(Ft.)
Downstream point/station elevation =    329.200(Ft.)
Pipe length  =     70.00(Ft.)    Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =      5.739(CFS)
Nearest computed pipe diameter  =      12.00(In.)
Calculated individual pipe flow  =      5.739(CFS)
Normal flow depth in pipe =     9.47(In.)
Flow top width inside pipe =     9.79(In.)
Critical Depth =    11.37(In.)
Pipe flow velocity =       8.84(Ft/s)
Travel time through pipe =     0.14 min.
Time of concentration (TC) =      5.31 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      2032.000 to Point/Station      2032.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                          ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =      5.31 min.
```

```
Rainfall intensity =      7.097(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      1.615
Subarea runoff =      5.725(CFS) for      1.000(Ac.)
Total runoff =     11.464(CFS)      Total area =       1.970(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2032.000 to Point/Station     2033.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   329.200(Ft.)
Downstream point/station elevation =   328.000(Ft.)
Pipe length  =    60.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =    11.464(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    11.464(CFS)
Normal flow depth in pipe =   10.61(In.)
Flow top width inside pipe =   17.71(In.)
Critical Depth =   15.50(In.)
Pipe flow velocity =     10.59(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =     5.40 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2033.000 to Point/Station     2033.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                          ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =     5.40 min.
Rainfall intensity =      7.096(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      1.771
Subarea runoff =      0.964(CFS) for      0.190(Ac.)
Total runoff =     12.427(CFS)      Total area =       2.160(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2033.000 to Point/Station     2034.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   328.000(Ft.)
Downstream point/station elevation =   326.900(Ft.)
Pipe length  =    55.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =    12.427(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    12.427(CFS)
Normal flow depth in pipe =   11.18(In.)
Flow top width inside pipe =   17.46(In.)
```

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Critical Depth =    15.96(In.)
Pipe flow velocity =      10.77(Ft/s)
Travel time through pipe =     0.09 min.
Time of concentration (TC) =      5.49 min.


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Process from Point/Station     2034.000 to Point/Station     2034.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                          ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =      5.49 min.
Rainfall intensity =      6.946(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      2.304
Subarea runoff =      3.578(CFS) for      0.550(Ac.)
Total runoff =     16.005(CFS)      Total area =       2.810(Ac.)


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Process from Point/Station     2034.000 to Point/Station     2035.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =    326.900(Ft.)
Downstream point/station elevation =    326.500(Ft.)
Pipe length  =     20.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     16.005(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     16.005(CFS)
Normal flow depth in pipe =    13.50(In.)
Flow top width inside pipe =    15.59(In.)
Critical Depth =    17.09(In.)
Pipe flow velocity =      11.26(Ft/s)
Travel time through pipe =     0.03 min.
Time of concentration (TC) =      5.52 min.


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Process from Point/Station     2030.000 to Point/Station     2035.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      2.810(Ac.)
Runoff from this stream =     16.005(CFS)
Time of concentration =     5.52 min.
Rainfall intensity =     6.922(In/Hr)


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Process from Point/Station     2035.000 to Point/Station     2035.000
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**** USER DEFINED FLOW INFORMATION AT A POINT ****
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Rainfall intensity (I) =      7.377(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =   5.00 min.  Rain intensity =      7.38(In/Hr)
Total area =        0.190(Ac.)  Total runoff =     1.150(CFS)

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Process from Point/Station     2036.000 to Point/Station     2037.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
Upstream point/station elevation =   328.700(Ft.)
Downstream point/station elevation =   327.100(Ft.)
Pipe length  =    80.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     1.150(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.150(CFS)
Normal flow depth in pipe =    4.05(In.)
Flow top width inside pipe =    8.95(In.)
Critical Depth =    5.91(In.)
Pipe flow velocity =      5.97(Ft/s)
Travel time through pipe =    0.22 min.
Time of concentration (TC) =     5.22 min.

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Process from Point/Station     2037.000 to Point/Station     2037.000
**** SUBAREA FLOW ADDITION ****
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =     5.22 min.
Rainfall intensity =      7.172(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      0.508
Subarea runoff =      2.496(CFS) for      0.420(Ac.)
Total runoff =      3.646(CFS)      Total area =       0.620(Ac.)

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Process from Point/Station     2037.000 to Point/Station     2035.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
```

```
Upstream point/station elevation =    327.100(Ft.)
Downstream point/station elevation =    326.500(Ft.)
Pipe length  =    30.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     3.646(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     3.646(CFS)
Normal flow depth in pipe =    6.79(In.)
Flow top width inside pipe =    11.90(In.)
Critical Depth =    9.78(In.)
Pipe flow velocity =      7.96(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =     5.29 min.


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Process from Point/Station     2036.000 to Point/Station     2035.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.620(Ac.)
Runoff from this stream =      3.646(CFS)
Time of concentration =    5.29 min.
Rainfall intensity =     7.117(In/Hr)
Summary of stream data:

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


1       16.005      5.52                6.922
2        3.646      5.29                7.117
Qmax(1) =
         1.000 *    1.000 *    16.005) +
         0.973 *    1.000 *     3.646) + =      19.551
Qmax(2) =
         1.000 *    0.958 *    16.005) +
         1.000 *    1.000 *     3.646) + =      18.976

Total of 2 streams to confluence:
Flow rates before confluence point:
      16.005       3.646
Maximum flow rates at confluence using above data:
       19.551       18.976
Area of streams before confluence:
        2.810        0.620
Results of confluence:
Total flow rate =     19.551(CFS)
Time of concentration =     5.519 min.
Effective stream area after confluence =      3.430(Ac.)


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Process from Point/Station     2035.000 to Point/Station     2038.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------
Upstream point/station elevation =    326.500(Ft.)
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Downstream point/station elevation =   323.600(Ft.)
Pipe length  =   145.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =    19.551(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    19.551(CFS)
Normal flow depth in pipe =   13.43(In.)
Flow top width inside pipe =   20.17(In.)
Critical Depth =   19.03(In.)
Pipe flow velocity =     12.05(Ft/s)
Travel time through pipe =    0.20 min.
Time of concentration (TC) =     5.72 min.


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Process from Point/Station     2030.000 to Point/Station     2038.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      3.430(Ac.)
Runoff from this stream =     19.551(CFS)
Time of concentration =    5.72 min.
Rainfall intensity =     6.764(In/Hr)


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Process from Point/Station     2039.000 to Point/Station     2039.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                        ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Rainfall intensity (I) =      7.377(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =   5.00 min.  Rain intensity =       7.38(In/Hr)
Total area =        0.330(Ac.)  Total runoff =     2.000(CFS)


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Process from Point/Station     2039.000 to Point/Station     2038.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   326.900(Ft.)
Downstream point/station elevation =   323.600(Ft.)
Pipe length  =   165.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     2.000(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     2.000(CFS)
Normal flow depth in pipe =    6.67(In.)
Flow top width inside pipe =    8.69(In.)
Critical Depth =    7.71(In.)
Pipe flow velocity =      6.82(Ft/s)
Travel time through pipe =    0.40 min.
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Time of concentration (TC) =      5.40 min.

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Process from Point/Station     2038.000 to Point/Station     2038.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                          ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =      5.40 min.
Rainfall intensity =      7.017(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      0.640
Subarea runoff =      2.488(CFS) for      0.450(Ac.)
Total runoff =      4.488(CFS)      Total area =      0.780(Ac.)


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Process from Point/Station     2039.000 to Point/Station     2038.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.780(Ac.)
Runoff from this stream =      4.488(CFS)
Time of concentration =     5.40 min.
Rainfall intensity =     7.017(In/Hr)
Summary of stream data:

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


1       19.551      5.72                 6.764
2        4.488      5.40                 7.017
Qmax(1) =
         1.000 *    1.000 *    19.551) +
         0.964 *    1.000 *     4.488) + =      23.878
Qmax(2) =
         1.000 *    0.945 *    19.551) +
         1.000 *    1.000 *     4.488) + =      22.958

Total of 2 streams to confluence:
Flow rates before confluence point:
      19.551       4.488
Maximum flow rates at confluence using above data:
       23.878       22.958
Area of streams before confluence:
        3.430        0.780
Results of confluence:
Total flow rate =      23.878(CFS)
Time of concentration =      5.720 min.
```

Effective stream area after confluence = 4.210(Ac.)

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Process from Point/Station 2038.000 to Point/Station 2040.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 323.600(Ft.)
Downstream point/station elevation = 322.500(Ft.)
Pipe length = 55.00(Ft.) Manning's N = 0.011
No. of pipes = 1 Required pipe flow = 23.878(CFS)
Nearest computed pipe diameter = 21.00(In.)
Calculated individual pipe flow = 23.878(CFS)
Normal flow depth in pipe = 15.61(In.)
Flow top width inside pipe = 18.35(In.)
Critical depth could not be calculated.
Pipe flow velocity = 12.46(Ft/s)
Travel time through pipe = 0.07 min.
Time of concentration (TC) = 5.79 min.

++
Process from Point/Station 2040.000 to Point/Station 2041.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 322.500(Ft.)
Downstream point/station elevation = 320.200(Ft.)
Pipe length = 135.00(Ft.) Manning's N = 0.011
No. of pipes = 1 Required pipe flow = 23.878(CFS)
Nearest computed pipe diameter = 21.00(In.)
Calculated individual pipe flow = 23.878(CFS)
Normal flow depth in pipe = 15.61(In.)
Flow top width inside pipe = 18.35(In.)
Critical depth could not be calculated.
Pipe flow velocity = 12.46(Ft/s)
Travel time through pipe = 0.15 min.
Time of concentration (TC) = 5.95 min.

++
Process from Point/Station 2041.000 to Point/Station 2041.000
**** SUBAREA FLOW ADDITION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type]
(General Commercial)
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration = 5.95 min.
Rainfall intensity = 6.596(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820 CA = 4.658
Subarea runoff = 6.846(CFS) for 1.470(Ac.)
Total runoff = 30.724(CFS) Total area = 5.680(Ac.)

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Process from Point/Station     2041.000 to Point/Station     2042.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   320.200(Ft.)
Downstream point/station elevation =   318.800(Ft.)
Pipe length  =    30.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =    30.724(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    30.724(CFS)
Normal flow depth in pipe =   18.16(In.)
Flow top width inside pipe =   20.39(In.)
Critical Depth =   22.48(In.)
Pipe flow velocity =     12.04(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =     6.07 min.


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Process from Point/Station     2030.000 to Point/Station     2042.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      5.680(Ac.)
Runoff from this stream =     30.724(CFS)
Time of concentration =    6.07 min.
Rainfall intensity =     6.509(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2044.000 to Point/Station     2044.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Rainfall intensity (I) =      7.377(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =   5.00 min.  Rain intensity =       7.38(In/Hr)
Total area =        0.270(Ac.)  Total runoff =     1.640(CFS)


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Process from Point/Station     2044.000 to Point/Station     2045.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   324.800(Ft.)
Downstream point/station elevation =   323.800(Ft.)
Pipe length  =    50.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     1.640(CFS)
```

```
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.640(CFS)
Normal flow depth in pipe =    4.99(In.)
Flow top width inside pipe =    8.95(In.)
Critical Depth =    7.07(In.)
Pipe flow velocity =      6.52(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =     5.13 min.


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Process from Point/Station     2045.000 to Point/Station     2045.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                        ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =     5.13 min.
Rainfall intensity =      7.268(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      0.771
Subarea runoff =      3.955(CFS) for      0.670(Ac.)
Total runoff =      5.595(CFS)      Total area =      0.940(Ac.)


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Process from Point/Station     2045.000 to Point/Station     2046.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   323.800(Ft.)
Downstream point/station elevation =   323.000(Ft.)
Pipe length  =    40.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     5.595(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     5.595(CFS)
Normal flow depth in pipe =    9.23(In.)
Flow top width inside pipe =   10.11(In.)
Critical Depth =   11.31(In.)
Pipe flow velocity =      8.62(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =     5.21 min.


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Process from Point/Station     2046.000 to Point/Station     2047.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   323.000(Ft.)
Downstream point/station elevation =   321.800(Ft.)
Pipe length  =    60.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     5.595(CFS)
Nearest computed pipe diameter  =     12.00(In.)
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Calculated individual pipe flow  =     5.595(CFS)
Normal flow depth in pipe =    9.23(In.)
Flow top width inside pipe =   10.11(In.)
Critical Depth =   11.31(In.)
Pipe flow velocity =      8.62(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =     5.32 min.


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Process from Point/Station     2047.000 to Point/Station     2047.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                        ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.520
Time of concentration =     5.32 min.
Rainfall intensity =      7.087(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      0.927
Subarea runoff =      0.972(CFS) for      0.190(Ac.)
Total runoff =      6.567(CFS)      Total area =       1.130(Ac.)


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Process from Point/Station     2047.000 to Point/Station     2048.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   321.800(Ft.)
Downstream point/station elevation =   320.300(Ft.)
Pipe length  =    75.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     6.567(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     6.567(CFS)
Normal flow depth in pipe =    8.45(In.)
Flow top width inside pipe =   14.88(In.)
Critical Depth =   12.39(In.)
Pipe flow velocity =      9.23(Ft/s)
Travel time through pipe =    0.14 min.
Time of concentration (TC) =     5.46 min.


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Process from Point/Station     2048.000 to Point/Station     2048.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                        ]
(General Commercial     )
```

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Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =      5.46 min.
Rainfall intensity =      6.973(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      1.287
Subarea runoff =      2.410(CFS) for      0.440(Ac.)
Total runoff =      8.977(CFS)      Total area =      1.570(Ac.)


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Process from Point/Station     2048.000 to Point/Station     2048.500
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   320.300(Ft.)
Downstream point/station elevation =   319.000(Ft.)
Pipe length =    65.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow =     8.977(CFS)
Nearest computed pipe diameter =     15.00(In.)
Calculated individual pipe flow =     8.977(CFS)
Normal flow depth in pipe =   10.44(In.)
Flow top width inside pipe =   13.80(In.)
Critical Depth =   13.86(In.)
Pipe flow velocity =      9.84(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =     5.57 min.


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Process from Point/Station     2048.500 to Point/Station     2048.500
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =      5.57 min.
Rainfall intensity =      6.884(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      1.963
Subarea runoff =      3.159(CFS) for      0.580(Ac.)
Total runoff =     12.136(CFS)      Total area =      2.150(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2048.500 to Point/Station     2042.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   319.000(Ft.)
Downstream point/station elevation =   318.800(Ft.)
Pipe length =    10.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow =    12.136(CFS)
Nearest computed pipe diameter =     18.00(In.)
```

```
Calculated individual pipe flow  =    12.136(CFS)
Normal flow depth in pipe =   11.00(In.)
Flow top width inside pipe =   17.55(In.)
Critical Depth =   15.83(In.)
Pipe flow velocity =     10.72(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =     5.58 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2041.000 to Point/Station     2042.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      2.150(Ac.)
Runoff from this stream =     12.136(CFS)
Time of concentration =    5.58 min.
Rainfall intensity =     6.871(In/Hr)
Summary of stream data:

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


1       30.724      6.07                6.509
2       12.136      5.58                6.871
Qmax(1) =
         1.000 *    1.000 *    30.724) +
         0.947 *    1.000 *    12.136) + =      42.219
Qmax(2) =
         1.000 *    0.919 *    30.724) +
         1.000 *    1.000 *    12.136) + =      40.384

Total of 2 streams to confluence:
Flow rates before confluence point:
      30.724      12.136
Maximum flow rates at confluence using above data:
       42.219      40.384
Area of streams before confluence:
        5.680       2.150
Results of confluence:
Total flow rate =     42.219(CFS)
Time of concentration =     6.072 min.
Effective stream area after confluence =      7.830(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2042.000 to Point/Station     2043.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   318.800(Ft.)
Downstream point/station elevation =   318.200(Ft.)
Pipe length =    30.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =    42.219(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    42.219(CFS)
Normal flow depth in pipe =   18.54(In.)
```

```
Flow top width inside pipe =    25.05(In.)
Critical Depth =    25.42(In.)
Pipe flow velocity =      14.51(Ft/s)
Travel time through pipe =     0.03 min.
Time of concentration (TC) =      6.11 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2043.000 to Point/Station     2043.000
**** SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =      6.11 min.
Rainfall intensity =      6.485(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      6.749
Subarea runoff =      1.546(CFS) for      0.400(Ac.)
Total runoff =     43.766(CFS)      Total area =      8.230(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2043.000 to Point/Station     2049.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------
Upstream point/station elevation =   315.200(Ft.)
Downstream point/station elevation =   305.000(Ft.)
Pipe length  =   245.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =    43.766(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    43.766(CFS)
Normal flow depth in pipe =   14.87(In.)
Flow top width inside pipe =   23.30(In.)
Critical depth could not be calculated.
Pipe flow velocity =     21.41(Ft/s)
Travel time through pipe =    0.19 min.
Time of concentration (TC) =      6.30 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2020.000 to Point/Station     2049.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      8.230(Ac.)
Runoff from this stream =     43.766(CFS)
Time of concentration =    6.30 min.
Rainfall intensity =     6.358(In/Hr)


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Process from Point/Station      2050.000 to Point/Station      2050.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
____________________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                          ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Rainfall intensity (I) =      7.377(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =    5.00 min.  Rain intensity =       7.38(In/Hr)
Total area =        0.050(Ac.)  Total runoff =      0.300(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      2050.000 to Point/Station      2051.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
____________________________________________________________________________
Upstream point/station elevation =    324.000(Ft.)
Downstream point/station elevation =    322.300(Ft.)
Pipe length  =     85.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =      0.300(CFS)
Nearest computed pipe diameter  =       6.00(In.)
Calculated individual pipe flow  =      0.300(CFS)
Normal flow depth in pipe =     2.34(In.)
Flow top width inside pipe =     5.85(In.)
Critical Depth =     3.32(In.)
Pipe flow velocity =       4.25(Ft/s)
Travel time through pipe =     0.33 min.
Time of concentration (TC) =      5.33 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      2051.000 to Point/Station      2052.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
____________________________________________________________________________
Upstream point/station elevation =    322.300(Ft.)
Downstream point/station elevation =    317.400(Ft.)
Pipe length  =    245.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =      0.300(CFS)
Nearest computed pipe diameter  =       6.00(In.)
Calculated individual pipe flow  =      0.300(CFS)
Normal flow depth in pipe =     2.34(In.)
Flow top width inside pipe =     5.85(In.)
Critical Depth =     3.32(In.)
Pipe flow velocity =       4.25(Ft/s)
Travel time through pipe =     0.96 min.
Time of concentration (TC) =      6.29 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      2052.000 to Point/Station      2053.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
____________________________________________________________________________
```

```
Upstream point/station elevation =   317.400(Ft.)
Downstream point/station elevation =   314.900(Ft.)
Pipe length  =   125.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     0.300(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.300(CFS)
Normal flow depth in pipe =    2.24(In.)
Flow top width inside pipe =    5.85(In.)
Critical Depth =    3.32(In.)
Pipe flow velocity =      4.25(Ft/s)
Travel time through pipe =    0.49 min.
Time of concentration (TC) =     6.78 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2053.000 to Point/Station     2054.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   314.900(Ft.)
Downstream point/station elevation =   312.800(Ft.)
Pipe length  =   105.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     0.300(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.300(CFS)
Normal flow depth in pipe =    2.34(In.)
Flow top width inside pipe =    5.85(In.)
Critical Depth =    3.32(In.)
Pipe flow velocity =      4.25(Ft/s)
Travel time through pipe =    0.41 min.
Time of concentration (TC) =     7.19 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2054.000 to Point/Station     2054.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial    )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =     7.19 min.
Rainfall intensity =     5.834(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =     2.829
Subarea runoff =     16.204(CFS) for     3.400(Ac.)
Total runoff =     16.504(CFS)     Total area =     3.450(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2054.000 to Point/Station     2055.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   312.800(Ft.)
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Downstream point/station elevation =   310.900(Ft.)
Pipe length  =    95.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =    16.504(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    16.504(CFS)
Normal flow depth in pipe =   13.88(In.)
Flow top width inside pipe =   15.13(In.)
Critical depth could not be calculated.
Pipe flow velocity =     11.30(Ft/s)
Travel time through pipe =    0.14 min.
Time of concentration (TC) =     7.34 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2055.000 to Point/Station     2056.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   310.900(Ft.)
Downstream point/station elevation =   307.400(Ft.)
Pipe length  =   175.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =    16.504(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    16.504(CFS)
Normal flow depth in pipe =   13.88(In.)
Flow top width inside pipe =   15.13(In.)
Critical depth could not be calculated.
Pipe flow velocity =     11.30(Ft/s)
Travel time through pipe =    0.26 min.
Time of concentration (TC) =     7.59 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2056.000 to Point/Station     2057.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   307.400(Ft.)
Downstream point/station elevation =   306.000(Ft.)
Pipe length  =    70.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =    16.504(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    16.504(CFS)
Normal flow depth in pipe =   13.88(In.)
Flow top width inside pipe =   15.13(In.)
Critical depth could not be calculated.
Pipe flow velocity =     11.30(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =     7.70 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2057.000 to Point/Station     2057.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
```

```
[COMMERCIAL area type                                    ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =      7.70 min.
Rainfall intensity =       5.586(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =       2.993
Subarea runoff =       0.214(CFS) for       0.200(Ac.)
Total runoff =      16.718(CFS)       Total area =       3.650(Ac.)


++-++-++++++++++++++-++++++++++-++++++++++++++++++++++++++-++++-++-+++++
Process from Point/Station     2057.000 to Point/Station     2057.500
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   306.000(Ft.)
Downstream point/station elevation =   305.700(Ft.)
Pipe length  =     15.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =    16.718(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    16.718(CFS)
Normal flow depth in pipe =   14.04(In.)
Flow top width inside pipe =   14.91(In.)
Critical depth could not be calculated.
Pipe flow velocity =      11.31(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =      7.72 min.


++++-++-++++++++++-++-++++++++++++++++++++++++++++-+++++++-++-++++++++-
Process from Point/Station     2057.500 to Point/Station     2057.500
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                                    ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =      7.72 min.
Rainfall intensity =       5.575(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =       3.788
Subarea runoff =       4.404(CFS) for       0.970(Ac.)
Total runoff =      21.121(CFS)       Total area =       4.620(Ac.)


++++-++-++-++-+++++-++-++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2057.500 to Point/Station     2049.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   305.700(Ft.)
Downstream point/station elevation =   305.000(Ft.)
Pipe length  =     35.00(Ft.)   Manning's N = 0.011
```

```
No. of pipes = 1  Required pipe flow  =    21.121(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    21.121(CFS)
Normal flow depth in pipe =   14.18(In.)
Flow top width inside pipe =   19.67(In.)
Critical Depth =   19.47(In.)
Pipe flow velocity =     12.23(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =     7.77 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2050.000 to Point/Station     2049.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      4.620(Ac.)
Runoff from this stream =     21.121(CFS)
Time of concentration =    7.77 min.
Rainfall intensity =     5.553(In/Hr)
Summary of stream data:

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


1       43.766      6.30                 6.358
2       21.121      7.77                 5.553
Qmax(1) =
         1.000 *    1.000 *    43.766) +
         1.000 *    0.811 *    21.121) + =      60.890
Qmax(2) =
         0.873 *    1.000 *    43.766) +
         1.000 *    1.000 *    21.121) + =      59.348

Total of 2 streams to confluence:
Flow rates before confluence point:
      43.766      21.121
Maximum flow rates at confluence using above data:
       60.890      59.348
Area of streams before confluence:
        8.230       4.620
Results of confluence:
Total flow rate =     60.890(CFS)
Time of concentration =     6.297 min.
Effective stream area after confluence =     12.850(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2049.000 to Point/Station     2029.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =    305.000(Ft.)
Downstream point/station elevation =    289.000(Ft.)
Pipe length  =    90.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =    60.890(CFS)
Nearest computed pipe diameter  =     21.00(In.)
```

```
Calculated individual pipe flow  =    60.890(CFS)
Normal flow depth in pipe =   13.83(In.)
Flow top width inside pipe =   19.92(In.)
Critical depth could not be calculated.
Pipe flow velocity =     36.21(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =     6.34 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2030.000 to Point/Station     2029.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     12.850(Ac.)
Runoff from this stream =     60.890(CFS)
Time of concentration =    6.34 min.
Rainfall intensity =     6.331(In/Hr)
Summary of stream data:

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


1       35.272      5.85                6.668
2       60.890      6.34                6.331
Qmax(1) =
         1.000 *    1.000 *    35.272) +
         1.000 *    0.923 *    60.890) + =      91.460
Qmax(2) =
         0.949 *    1.000 *    35.272) +
         1.000 *    1.000 *    60.890) + =      94.380

Total of 2 main streams to confluence:
Flow rates before confluence point:
      35.272      60.890
Maximum flow rates at confluence using above data:
       91.460      94.380
Area of streams before confluence:
        6.430      12.850


Results of confluence:
Total flow rate =     94.380(CFS)
Time of concentration =     6.338 min.
Effective stream area after confluence  =     19.280(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2029.000 to Point/Station     2058.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   289.000(Ft.)
Downstream point/station elevation =   288.000(Ft.)
Pipe length  =    25.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =    94.380(CFS)
```

```
Nearest computed pipe diameter  =      30.00(In.)
Calculated individual pipe flow  =     94.380(CFS)
Normal flow depth in pipe =   23.91(In.)
Flow top width inside pipe =   24.14(In.)
Critical depth could not be calculated.
Pipe flow velocity =      22.51(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =      6.36 min.


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Process from Point/Station      2058.000 to Point/Station      2059.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   288.000(Ft.)
Downstream point/station elevation =   280.000(Ft.)
Pipe length  =    95.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =    94.380(CFS)
Nearest computed pipe diameter  =      27.00(In.)
Calculated individual pipe flow  =     94.380(CFS)
Normal flow depth in pipe =   19.83(In.)
Flow top width inside pipe =   23.85(In.)
Critical depth could not be calculated.
Pipe flow velocity =      30.18(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =      6.41 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      2059.000 to Point/Station      2059.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                          ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =      6.41 min.
Rainfall intensity =      6.256(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      16.892
Subarea runoff =      11.796(CFS) for      1.320(Ac.)
Total runoff =    106.177(CFS)      Total area =      20.600(Ac.)


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Process from Point/Station      2059.000 to Point/Station      2060.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   280.000(Ft.)
Downstream point/station elevation =   275.800(Ft.)
Pipe length  =    50.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =   106.177(CFS)
Nearest computed pipe diameter  =      27.00(In.)
```

```
Calculated individual pipe flow  =   106.177(CFS)
Normal flow depth in pipe =   22.14(In.)
Flow top width inside pipe =   20.75(In.)
Critical depth could not be calculated.
Pipe flow velocity =     30.41(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =     6.44 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2000.000 to Point/Station     2060.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     20.600(Ac.)
Runoff from this stream =    106.177(CFS)
Time of concentration =    6.44 min.
Rainfall intensity =     6.268(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station     2061.000 to Point/Station     2062.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                          ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Initial subarea total flow distance  =   80.000(Ft.)
Highest elevation =  336.000(Ft.)
Lowest elevation =  335.200(Ft.)
Elevation difference =    0.800(Ft.) Slope =  1.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 60.00 (Ft)
for the top area slope value of   1.00 %, in a development type of
 General Commercial
In Accordance With Figure 3-3
Initial Area Time of Concentration =   3.90 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8200)*(  60.000^.5)/(   1.000^(1/3)]=   3.90
The initial area total distance of   80.00 (Ft.) entered leaves a
remaining distance of   20.00 (Ft.)
Using Figure 3-4, the travel time for this distance is   0.46 minutes
for a distance of  20.00 (Ft.) and a slope of  1.00 %
with an elevation difference of   0.20(Ft.) from the end of the top area
Tt = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr)
 =    0.462 Minutes
Tt=[(11.9*0.0038^3)/(  0.20)]^.385=  0.46
Total initial area Ti =   3.90 minutes from Figure 3-3 formula plus
  0.46 minutes from the Figure 3-4 formula =   4.37 minutes
Calculated TC of    4.366 minutes is less than 5 minutes,
```

```
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q-KCIA) is C = 0.820
Subarea runoff =      1.028(CFS)
Total initial stream area =        0.170(Ac.)


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Process from Point/Station     2062.000 to Point/Station     2063.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   335.200(Ft.)
Downstream point elevation =   321.000(Ft.)
Channel length thru subarea  =   690.000(Ft.)
Channel base width      =    0.000(Ft.)
Slope or 'Z' of left channel bank =  10.000
Slope or 'Z' of right channel bank =   2.000
Estimated mean flow rate at midpoint of channel =      4.248(CFS)
Manning's 'N'    = 0.024
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      4.248(CFS)
Depth of flow =   0.463(Ft.), Average velocity =   3.298(Ft/s)
Channel flow top width =    5.560(Ft.)
Flow Velocity =    3.30(Ft/s)
Travel time  =    3.49 min.
Time of concentration =    7.85 min.
Critical depth =      0.500(Ft.)
 Adding area flow to channel
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
{COMMERCIAL area type                          }
{General Commercial     }
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Rainfall intensity =      5.514(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      1.337
Subarea runoff =      6.341(CFS) for      1.160(Ac.)
Total runoff =      7.370(CFS)      Total area =       1.630(Ac.)
Depth of flow =   0.570(Ft.), Average velocity =   3.785(Ft/s)
Critical depth =      0.625(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2063.000 to Point/Station     2064.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   315.000(Ft.)
Downstream point/station elevation =   313.800(Ft.)
Pipe length  =   120.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     7.370(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     7.370(CFS)
Normal flow depth in pipe =   11.86(In.)
Flow top width inside pipe =   12.21(In.)
```

```
Critical Depth =    12.98(In.)
Pipe flow velocity =       7.09(Ft/s)
Travel time through pipe =     0.28 min.
Time of concentration (TC) =      8.13 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2064.000 to Point/Station     2065.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =    313.800(Ft.)
Downstream point/station elevation =    306.830(Ft.)
Pipe length  =     90.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =      7.370(CFS)
Nearest computed pipe diameter  =      12.00(In.)
Calculated individual pipe flow  =      7.370(CFS)
Normal flow depth in pipe =     6.90(In.)
Flow top width inside pipe =    11.86(In.)
Critical depth could not be calculated.
Pipe flow velocity =      15.77(Ft/s)
Travel time through pipe =     0.10 min.
Time of concentration (TC) =      8.23 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2061.000 to Point/Station     2065.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =       1.620(Ac.)
Runoff from this stream =       7.370(CFS)
Time of concentration =     8.23 min.
Rainfall intensity =      5.249(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2065.000 to Point/Station     2065.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
________________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                        ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Rainfall intensity (I) =       3.350(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =  17.00 min.  Rain intensity =       3.35(In/Hr)
Total area =       10.800(Ac.)  Total runoff =     32.500(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2065.000 to Point/Station     2065.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
```

```
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      10.800(Ac.)
Runoff from this stream =      32.500(CFS)
Time of concentration =    17.00 min.
Rainfall intensity =      3.350(In/Hr)
Summary of stream data:

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


1         7.370       8.23                 5.349
2        32.500      17.00                 3.350
Qmax(1) =
          1.000 *     1.000 *      7.370) +
          1.000 *     0.484 *     32.500) + =       23.103
Qmax(2) =
          0.626 *     1.000 *      7.370) +
          1.000 *     1.000 *     32.500) + =       37.116

Total of 2 streams to confluence:
Flow rates before confluence point:
        7.370       32.500
Maximum flow rates at confluence using above data:
        23.103       37.116
Area of streams before confluence:
         1.630       10.800
Results of confluence:
Total flow rate =      37.116(CFS)
Time of concentration =     17.000 min.
Effective stream area after confluence =      12.430(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      2065.000 to Point/Station      2066.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =    306.830(Ft.)
Downstream point/station elevation =    300.330(Ft.)
Pipe length  =     56.00(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     37.116(CFS)
Nearest computed pipe diameter  =      21.00(In.)
Calculated individual pipe flow  =     37.116(CFS)
Normal flow depth in pipe =    12.80(In.)
Flow top width inside pipe =    20.49(In.)
Critical depth could not be calculated.
Pipe flow velocity =      24.19(Ft/s)
Travel time through pipe =     0.04 min.
Time of concentration (TC) =     17.04 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      2066.000 to Point/Station      2067.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =    300.000(Ft.)
Downstream point/station elevation =    286.030(Ft.)
```

```
Pipe length  =   230.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    37.116(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    37.116(CFS)
Normal flow depth in pipe =   16.26(In.)
Flow top width inside pipe =   17.43(In.)
Critical depth could not be calculated.
Pipe flow velocity =     18.48(Ft/s)
Travel time through pipe =    0.21 min.
Time of concentration (TC) =    17.25 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2067.000 to Point/Station     2067.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                          ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
The area added to the existing stream causes a
a lower flow rate of Q =     34.868(CFS)
therefore the upstream flow rate of Q =     37.116(CFS) is being used
Time of concentration =    17.25 min.
Rainfall intensity =      3.319(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =     10.504
Subarea runoff =      0.000(CFS) for      0.380(Ac.)
Total runoff =     37.116(CFS)      Total area =      12.810(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2067.000 to Point/Station     2060.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   286.000(Ft.)
Downstream point/station elevation =   274.000(Ft.)
Pipe length  =   100.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    37.116(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    37.116(CFS)
Normal flow depth in pipe =   12.64(In.)
Flow top width inside pipe =   20.56(In.)
Critical depth could not be calculated.
Pipe flow velocity =     24.53(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =    17.31 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2061.000 to Point/Station     2060.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
```

```
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      12.810(Ac.)
Runoff from this stream =      37.116(CFS)
Time of concentration =   17.31 min.
Rainfall intensity =     3.211(In/Hr)
Summary of stream data:

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


1       106.177       6.44                 6.268
2        37.116      17.31                 3.311
Qmax(1) =
          1.000 *     1.000 *    106.177) +
          1.000 *     0.372 *     37.116) + =      119.974
Qmax(2) =
          0.528 *     1.000 *    106.177) +
          1.000 *     1.000 *     37.116) + =       93.200

Total of 2 main streams to confluence:
Flow rates before confluence point:
     106.177       37.116
Maximum flow rates at confluence using above data:
      119.974       93.200
Area of streams before confluence:
       20.600       12.810


Results of confluence:
Total flow rate =     119.974(CFS)
Time of concentration =      6.436 min.
Effective stream area after confluence  =      33.410(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      2060.000 to Point/Station      2068.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =    274.000(Ft.)
Downstream point/station elevation =    266.000(Ft.)
Pipe length  =    260.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    119.974(CFS)
Nearest computed pipe diameter  =      39.00(In.)
Calculated individual pipe flow  =    119.974(CFS)
Normal flow depth in pipe =    27.09(In.)
Flow top width inside pipe =    35.92(In.)
Critical depth could not be calculated.
Pipe flow velocity =      19.52(Ft/s)
Travel time through pipe =     0.22 min.
Time of concentration (TC) =      6.66 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      2000.000 to Point/Station      2068.000
**** CONFLUENCE OF MAIN STREAMS ****
```

```
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      33.410(Ac.)
Runoff from this stream =     119.974(CFS)
Time of concentration =     6.66 min.
Rainfall intensity =      6.133(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      2069.000 to Point/Station      2070.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                          ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Initial subarea total flow distance  =    30.000(Ft.)
Highest elevation =  336.000(Ft.)
Lowest elevation =  317.000(Ft.)
Elevation difference =    19.000(Ft.) Slope = 63.333 %
Top of Initial Area Slope adjusted by User to 30.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of  30.00 %, in a development type of
 General Commercial
In Accordance With Figure 3-3
Initial Area Time of Concentration =   1.62 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8200)*( 100.000^.5)/(  30.000^(1/3)]=   1.62
Calculated TC of     1.622 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.820
Subarea runoff =      0.060(CFS)
Total initial stream area =        0.010(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      2070.000 to Point/Station      2071.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
----------------------------------------------------------------------
Estimated mean flow rate at midpoint of channel =      2.359(CFS)
Depth of flow =   0.435(Ft.), Average velocity =   4.454(Ft/s)
      ******* Irregular Channel Data ***********
----------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1              0.00              1.00
      2              0.50              0.00
      3              1.50              0.00
      4              2.00              1.00
```

```
Manning's 'N' friction factor =   0.015
----------------------------------------------------------------
Sub-Channel flow  =      2.359(CFS)
  '      '    flow top width =      1.435(Ft.)
  '      '    velocity=    4.454(Ft/s)
  '      '    area =      0.530(Sq.Ft)
  '      '    Froude number =     1.292

Upstream point elevation =   317.000(Ft.)
Downstream point elevation =   315.000(Ft.)
Flow length =   600.000(Ft.)
Travel time  =    2.25 min.
Time of concentration =    3.87 min.
Depth of flow =   0.435(Ft.)
Average velocity =   4.454(Ft/s)
Total irregular channel flow =     2.359(CFS)
Irregular channel normal depth above invert elev. =   0.435(Ft.)
Average velocity of channel(s) =   4.454(Ft/s)
 Adding area flow to channel
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                          ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Rainfall intensity =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      0.631
Subarea runoff =      4.598(CFS) for      0.760(Ac.)
Total runoff =      4.658(CFS)      Total area =      0.770(Ac.)
Depth of flow =   0.656(Ft.), Average velocity =   5.346(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2071.000 to Point/Station     2072.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------
Upstream point/station elevation =   291.000(Ft.)
Downstream point/station elevation =   284.000(Ft.)
Pipe length  =   400.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     4.658(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     4.658(CFS)
Normal flow depth in pipe =    8.39(In.)
Flow top width inside pipe =   11.01(In.)
Critical Depth =   10.76(In.)
Pipe flow velocity =      7.94(Ft/s)
Travel time through pipe =    0.84 min.
Time of concentration (TC) =     4.71 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2072.000 to Point/Station     2072.000
**** SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------
```

```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =      4.71 min.
Rainfall intensity =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      0.959
Subarea runoff =      2.420(CFS) for      0.400(Ac.)
Total runoff =      7.078(CFS)      Total area =      1.170(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2072.000 to Point/Station     2073.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   284.000(Ft.)
Downstream point/station elevation =   266.000(Ft.)
Pipe length  =    40.00(Ft.)   Manning's N = 0.011
No. of pipes = 1  Required pipe flow  =     7.078(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     7.078(CFS)
Normal flow depth in pipe =    4.71(In.)
Flow top width inside pipe =    8.99(In.)
Critical depth could not be calculated.
Pipe flow velocity =     30.26(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =     4.73 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     2073.000 to Point/Station     2073.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[COMMERCIAL area type                    ]
(General Commercial     )
Impervious value, Ai = 0.850
Sub-Area C Value = 0.820
Time of concentration =      4.73 min.
Rainfall intensity =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      3.127
Subarea runoff =     15.988(CFS) for      2.643(Ac.)
Total runoff =     23.066(CFS)      Total area =      3.813(Ac.)


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Process from Point/Station     2073.000 to Point/Station     2068.000
**** CONFLUENCE OF MAIN STREAMS ****
```

The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area = 3.813(Ac.)
Runoff from this stream = 23.066(CFS)
Time of concentration = 4.73 min.
Rainfall intensity = 7.377(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	119.974	6.66	6.133
2	23.066	4.73	7.377

Qmax(1) =
1.000 * 1.000 * 119.974) +
0.831 * 1.000 * 23.066) + = 139.149
Qmax(2) =
1.000 * 0.710 * 119.974) +
1.000 * 1.000 * 23.066) + = 108.276

Total of 2 main streams to confluence:
Flow rates before confluence point:
119.974 23.066
Maximum flow rates at confluence using above data:
139.149 108.276
Area of streams before confluence:
33.410 3.813

Results of confluence:
Total flow rate = 139.149(CFS)
Time of concentration = 6.659 min.
Effective stream area after confluence = 37.223(Ac.)
End of computations, total study area = 37.223 (Ac.)

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2004 Version 7.4

Rational method hydrology program based on
San Diego County Flood Control Division 2003 hydrology manual
Rational Hydrology Study Date: 10/16/08

LA COSTA TOWN SQUARE
CENTRAL - OFFICE - BASIN 3
G:\ACCTS\001017\TMBSN1.OUT

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

Program License Serial Number 5014

Rational hydrology study storm event year is 100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour, precipitation(inches) = 2.800
24 hour precipitation(inches) = 5.100
P6/P24 = 54.9%
San Diego hydrology manual 'C' values used

++
Process from Point/Station 3001.000 to Point/Station 3002.000
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type]
(General Industrial)
Impervious value, Ai = 0.950
Sub-Area C Value = 0.870
Initial subarea total flow distance = 50.000(Ft.)
Highest elevation = 322.500(Ft.)
Lowest elevation = 322.000(Ft.)
Elevation difference = 0.500(Ft.) Slope = 1.000 %
Top of Initial Area Slope adjusted by User to 2.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 70.00 (Ft)
for the top area slope value of 2.00 %, in a development type of
General Industrial
In Accordance With Figure 3.3
Initial Area Time of Concentration = 2.75 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8700)*(70.000^.5)/(2.000^(1/3)]= 2.75

```
Calculated TC of     2.749 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =       7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.870
Subarea runoff =       0.513(CFS)
Total initial stream area =        0.080(Ac.)


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Process from Point/Station     3002.000 to Point/Station     3003.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   296.500(Ft.)
Downstream point elevation =   294.000(Ft.)
Channel length thru subarea  =   120.000(Ft.)
Channel base width       =    0.000(Ft.)
Slope or 'Z' of left channel bank = 100.000
Slope or 'Z' of right channel bank = 100.000
Estimated mean flow rate at midpoint of channel =      0.931(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    0.500(Ft.)
Flow(q) thru subarea =      0.931(CFS)
Depth of flow =   0.076(Ft.), Average velocity =   1.615(Ft/s)
Channel flow top width =   15.183(Ft.)
Flow Velocity =    1.61(Ft/s)
Travel time  =    1.24 min.
Time of concentration =    3.99 min.
Critical depth =      0.088(Ft.)
 Adding area flow to channel
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
(General Industrial        )
Impervious value, Ai = 0.930
Sub-Area C Value = 0.870
Rainfall intensity =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.870  CA =      0.183
Subarea runoff =      0.834(CFS) for      0.130(Ac.)
Total runoff =      1.348(CFS)      Total area =      0.210(Ac.)
Depth of flow =   0.087(Ft.), Average velocity =   1.772(Ft/s)
Critical depth =      0.103(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     3003.000 to Point/Station     3004.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =   294.000(Ft.)
Downstream point elevation =   289.000(Ft.)
Channel length thru subarea  =   280.000(Ft.)
Channel base width       =    1.000(Ft.)
Slope or 'Z' of left channel bank =   3.000
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =      2.332(CFS)
```

```
Manning's 'N'     = 0.025
Maximum depth of channel  =     1.000(Ft.)
Flow(q) thru subarea =       2.332(CFS)
Depth of flow =    0.368(Ft.), Average velocity =    3.007(Ft/s)
Channel flow top width =     3.211(Ft.)
Flow Velocity =     3.01(Ft/s)
Travel time  =     1.55 min.
Time of concentration =     5.54 min.
Critical depth =       0.383(Ft.)
 Adding area flow to channel
User specified 'C' value of 0.750 given for subarea
Rainfall intensity =       6.905(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.750  CA =       0.473
Subarea runoff =       1.915(CFS) for       0.420(Ac.)
Total runoff =       3.263(CFS)       Total area =       0.630(Ac.)
Depth of flow =    0.432(Ft.), Average velocity =    3.285(Ft/s)
Critical depth =       0.453(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     3004.000 to Point/Station     3004.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.800 given for subarea
Time of concentration =     5.54 min.
Rainfall intensity =       6.905(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.800  CA =       0.792
Subarea runoff =       2.206(CFS) for       0.360(Ac.)
Total runoff =       5.469(CFS)       Total area =       0.990(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     3004.000 to Point/Station     3005.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =    279.000(Ft.)
Downstream point/station elevation =    264.800(Ft.)
Pipe length  =     72.00(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =      5.469(CFS)
Nearest computed pipe diameter  =       9.00(In.)
Calculated individual pipe flow  =      5.469(CFS)
Normal flow depth in pipe =     5.79(In.)
Flow top width inside pipe =     8.62(In.)
Critical depth could not be calculated.
Pipe flow velocity =      18.23(Ft/s)
Travel time through pipe =     0.07 min.
Time of concentration (TC) =      5.61 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     3004.000 to Point/Station     3005.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =       0.990(Ac.)
```

```
Runoff from this stream =       5.469(CFS)
Time of concentration =     5.61 min.
Rainfall intensity =      6.853(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     3011.000 to Point/Station     3012.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
(General Industrial        )
Impervious value, Ai = 0.950
Sub-Area C Value = 0.870
Initial subarea total flow distance  =   80.000(Ft.)
Highest elevation =  294.100(Ft.)
Lowest elevation =  291.600(Ft.)
Elevation difference =    2.500(Ft.) Slope =  3.125 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 80.00 (Ft)
for the top area slope value of   3.13 %, in a development type of
 General Industrial
In Accordance With Figure 3-3
Initial Area Time of Concentration =   2.53 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8700)*(  80.000^.5)/(   3.125^(1/3)]=   2.53
Calculated TC of    2.533 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.870
Subarea runoff =      0.321(CFS)
Total initial stream area =        0.050(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     3012.000 to Point/Station     3013.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   291.600(Ft.)
End of street segment elevation =   271.100(Ft.)
Length of street segment  =   250.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  30.000(Ft.)
Distance from crown to crossfall grade break  =  28.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.090
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.330(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 =      1.368(CFS)
Depth of flow =   0.182(Ft.), Average velocity =   4.356(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   5.035(Ft.)
Flow velocity =   4.36(Ft/s)
Travel time =    0.96 min.     TC =    3.49  min.
 Adding area flow to street
User specified 'C' value of 0.700 given for subarea
Rainfall intensity =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.700  CA =      0.336
Subarea runoff =      2.158(CFS) for      0.430(Ac.)
Total runoff =      2.479(CFS)      Total area =       0.480(Ac.)
Street flow at end of street =      2.479(CFS)
Half street flow at end of street =      2.479(CFS)
Depth of flow =   0.213(Ft.), Average velocity =   4.956(Ft/s)
Flow width (from curb towards crown)=   6.629(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     3013.000 to Point/Station     3013.000
**** SUBAREA FLOW ADDITION ****

User specified 'C' value of 0.700 given for subarea
Time of concentration =     3.49 min.
Rainfall intensity =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.700  CA =      0.385
Subarea runoff =      0.361(CFS) for      0.070(Ac.)
Total runoff =      2.840(CFS)      Total area =       0.550(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     3013.000 to Point/Station     3005.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =   265.000(Ft.)
Downstream point/station elevation =   264.800(Ft.)
Pipe length =    40.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow =     2.840(CFS)
Nearest computed pipe diameter =     15.00(In.)
Calculated individual pipe flow =     2.840(CFS)
Normal flow depth in pipe =    8.57(In.)
Flow top width inside pipe =   14.85(In.)
Critical Depth =    9.12(In.)
Pipe flow velocity =      3.92(Ft/s)
Travel time through pipe =    0.17 min.
Time of concentration (TC) =     3.66 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     3013.000 to Point/Station     3005.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.550(Ac.)
Runoff from this stream =      2.840(CFS)
```

```
Time of concentration =     3.66 min.
Rainfall intensity =      7.377(In/Hr)
Summary of stream data:

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


1         5.469       5.61                 6.853
2         2.840       3.66                 7.377
Qmax(1) =
          1.000 *     1.000 *      5.469) +
          0.929 *     1.000 *      2.840) + =        8.107
Qmax(2) =
          1.000 *     0.653 *      5.469) +
          1.000 *     1.000 *      2.840) + =        6.410

Total of 2 streams to confluence:
Flow rates before confluence point:
       5.469        2.840
Maximum flow rates at confluence using above data:
        8.107        6.410
Area of streams before confluence:
        0.990        0.550
Results of confluence:
Total flow rate =       8.107(CFS)
Time of concentration =      5.606 min.
Effective stream area after confluence =       1.540(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      3005.000 to Point/Station      3006.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =    264.800(Ft.)
Downstream point/station elevation =    264.000(Ft.)
Pipe length =     70.00(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =      8.107(CFS)
Nearest computed pipe diameter  =      18.00(In.)
Calculated individual pipe flow  =      8.107(CFS)
Normal flow depth in pipe =    11.33(In.)
Flow top width inside pipe =    17.29(In.)
Critical Depth =    13.23(In.)
Pipe flow velocity =       6.92(Ft/s)
Travel time through pipe =     0.17 min.
Time of concentration (TC) =      5.77 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      3006.000 to Point/Station      3007.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =    264.000(Ft.)
Downstream point elevation =    261.600(Ft.)
Channel length thru subarea  =    160.000(Ft.)
Channel base width       =     2.500(Ft.)
Slope or '%' of left channel bank =    3.000
```

```
Slope or 'Z' of right channel bank =   3.000
Estimated mean flow rate at midpoint of channel =      8.140(CFS)
Manning's 'N'    = 0.025
Maximum depth of channel  =    2.000(Ft.)
Flow(q) thru subarea =      8.140(CFS)
Depth of flow =   0.630(Ft.), Average velocity =   2.945(Ft/s)
Channel flow top width =    6.278(Ft.)
Flow Velocity =    2.95(Ft/s)
Travel time  =    0.91 min.
Time of concentration =    6.68 min.
Critical depth =      0.551(Ft.)
 Adding area flow to channel
User specified 'C' value of 0.500 given for subarea
The area added to the existing stream causes a
a lower flow rate of Q =      5.937(CFS)
therefore the upstream flow rate of Q =      8.107(CFS) is being used
Rainfall intensity =      6.120(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.500  CA =      0.970
Subarea runoff =      0.000(CFS) for      0.400(Ac.)
Total runoff =      8.107(CFS)      Total area =      1.940(Ac.)
Depth of flow =   0.628(Ft.), Average velocity =   2.942(Ft/s)
Critical depth =      0.547(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     3007.000 to Point/Station     3008.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   261.600(Ft.)
Downstream point/station elevation =   258.950(Ft.)
Pipe length  =   200.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.107(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     8.107(CFS)
Normal flow depth in pipe =   10.78(In.)
Flow top width inside pipe =   17.64(In.)
Critical Depth =   13.23(In.)
Pipe flow velocity =      7.33(Ft/s)
Travel time through pipe =    0.45 min.
Time of concentration (TC) =     7.13 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     3008.000 to Point/Station     3008.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[INDUSTRIAL area type                        ]
(Limited Industrial        )
Impervious value, Ai = 0.900
Sub-Area C Value = 0.850
The area added to the existing stream causes a
a lower flow rate of Q =      7.335(CFS)
```

```
therefore the upstream flow rate of Q =      8.107(CFS) is being used
Time of concentration =      7.13 min.
Rainfall intensity =      5.866(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.551  CA =      1.250
Subarea runoff =      0.000(CFS) for      0.330(Ac.)
Total runoff =      8.107(CFS)      Total area =      2.270(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     3008.000 to Point/Station     3009.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   258.950(Ft.)
Downstream point/station elevation =   257.700(Ft.)
Pipe length =    95.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow =     8.107(CFS)
Nearest computed pipe diameter =     18.00(In.)
Calculated individual pipe flow =     8.107(CFS)
Normal flow depth in pipe =   10.80(In.)
Flow top width inside pipe =   17.63(In.)
Critical Depth =   13.23(In.)
Pipe flow velocity =      7.31(Ft/s)
Travel time through pipe =    0.22 min.
Time of concentration (TC) =     7.35 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     3009.000 to Point/Station     3009.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.800 given for subarea
Time of concentration =      7.35 min.
Rainfall intensity =      5.754(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.800  CA =      2.072
Subarea runoff =      3.815(CFS) for      0.320(Ac.)
Total runoff =     11.922(CFS)      Total area =      2.590(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     3009.000 to Point/Station     3009.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.500 given for subarea
The area added to the existing stream causes a
a lower flow rate of Q =      7.912(CFS)
Therefore the upstream flow rate of Q =     11.922(CFS) is being used
Time of concentration =      7.35 min.
Rainfall intensity =      5.754(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.500  CA =      1.375
Subarea runoff =      0.000(CFS) for      0.160(Ac.)
Total runoff =     11.922(CFS)      Total area =      2.750(Ac.)


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Process from Point/Station     3009.000 to Point/Station     3010.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
_____________________________________________________________________
Upstream point/station elevation =   257.500(Ft.)
Downstream point/station elevation =   254.350(Ft.)
Pipe length  =    18.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.922(CFS)
Given pipe size =     30.00(In.)
Calculated individual pipe flow  =    11.922(CFS)
Normal flow depth in pipe =    5.36(In.)
Flow top width inside pipe =   22.98(In.)
Critical Depth =   13.90(In.)
Pipe flow velocity =     20.08(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =     7.37 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     3009.000 to Point/Station     3010.000
**** CONFLUENCE OF MINOR STREAMS ****
_____________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      2.750(Ac.)
Runoff from this stream =     11.922(CFS)
Time of concentration =    7.37 min.
Rainfall intensity =     5.746(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     3014.000 to Point/Station     3015.000
**** INITIAL AREA EVALUATION ****
_____________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
'COMMERCIAL area type                          ]
(Neighborhod Commercial )
Impervious value, Ai = 0.800
Sub-Area C Value = 0.790
Initial subarea total flow distance  -   50.000(Ft.)
Highest elevation =  294.000(Ft.)
Lowest elevation =  277.600(Ft.)
Elevation difference =   16.400(Ft.) Slope = 32.800 %
Top of Initial Area Slope adjusted by User to 30.000 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of  30.00 %, in a development type of
 Neighborhod Commercial
In Accordance With Figure 3-3
Initial Area Time of Concentration =   1.80 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.7900)*( 100.000^.5)/(  30.000^(1/3)]=   1.80
Calculated TC of    1.796 minutes is less than 5 minutes,
 resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.790
```

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Subarea runoff =       0.408(CFS)
Total initial stream area =        0.070(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     3015.000 to Point/Station     3010.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   277.600(Ft.)
End of street segment elevation =   260.100(Ft.)
Length of street segment  =   330.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  70.000(Ft.)
Distance from crown to crossfall grade break  =  68.500(Ft.)
Slope from gutter to grade break (v/hz) =   0.090
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   1.500(Ft.)
Gutter hike from flowline =  1.330(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 =      7.467(CFS)
Depth of flow =   0.310(Ft.), Average velocity =   5.444(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  11.450(Ft.)
Flow velocity =   5.44(Ft/s)
Travel time =    1.01 min.     TC =    2.81  min.
 Adding area flow to street
User specified 'C' value of 0.800 given for subarea
Rainfall intensity =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.800  CA =      1.976
Subarea runoff =     14.170(CFS) for      2.400(Ac.)
Total runoff =     14.577(CFS)      Total area =       2.470(Ac.)
Street flow at end of street =     14.577(CFS)
Half street flow at end of street =     14.577(CFS)
Depth of flow =   0.378(Ft.), Average velocity =   6.411(Ft/s)
Flow width (from curb towards crown)=  14.876(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     3010.000 to Point/Station     3010.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
User specified 'C' value of 0.700 given for subarea
Time of concentration =     2.81 min.
Rainfall intensity =      7.377(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.700  CA =      2.254
Subarea runoff =      2.051(CFS) for      0.750(Ac.)
Total runoff =     16.628(CFS)      Total area =       3.220(Ac.)


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Process from Point/Station     3015.000 to Point/Station     3010.000
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =       3.220(Ac.)
Runoff from this stream =      16.628(CFS)
Time of concentration =     2.81 min.
Rainfall intensity =      7.377(In/Hr)
Summary of stream data:

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


1        11.922      7.37                 5.746
2        16.628      2.81                 7.377
Qmax(1) =
          1.000 *    1.000 *    11.922) +
          0.779 *    1.000 *    16.628) + =       24.874
Qmax(2) =
          1.000 *    0.381 *    11.922) +
          1.000 *    1.000 *    16.628) + =       21.170

Total of 2 streams to confluence:
Flow rates before confluence point:
      11.922      16.628
Maximum flow rates at confluence using above data:
       24.874       21.170
Area of streams before confluence:
        2.750        3.220
Results of confluence:
Total flow rate =      24.874(CFS)
Time of concentration =      7.365 min.
Effective stream area after confluence =       5.970(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     3010.000 to Point/Station     3016.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
____________________________________________________________________________
Upstream point/station elevation =    254.020(Ft.)
Downstream point/station elevation =    250.540(Ft.)
Pipe length  =     94.04(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     24.874(CFS)
Given pipe size =      30.00(In.)
Calculated individual pipe flow  =     24.874(CFS)
Normal flow depth in pipe =    11.58(In.)
Flow top width inside pipe =    29.21(In.)
Critical Depth =    20.39(In.)
Pipe flow velocity =      14.25(Ft/s)
Travel time through pipe =     0.11 min.
Time of concentration (TC) =      7.48 min.

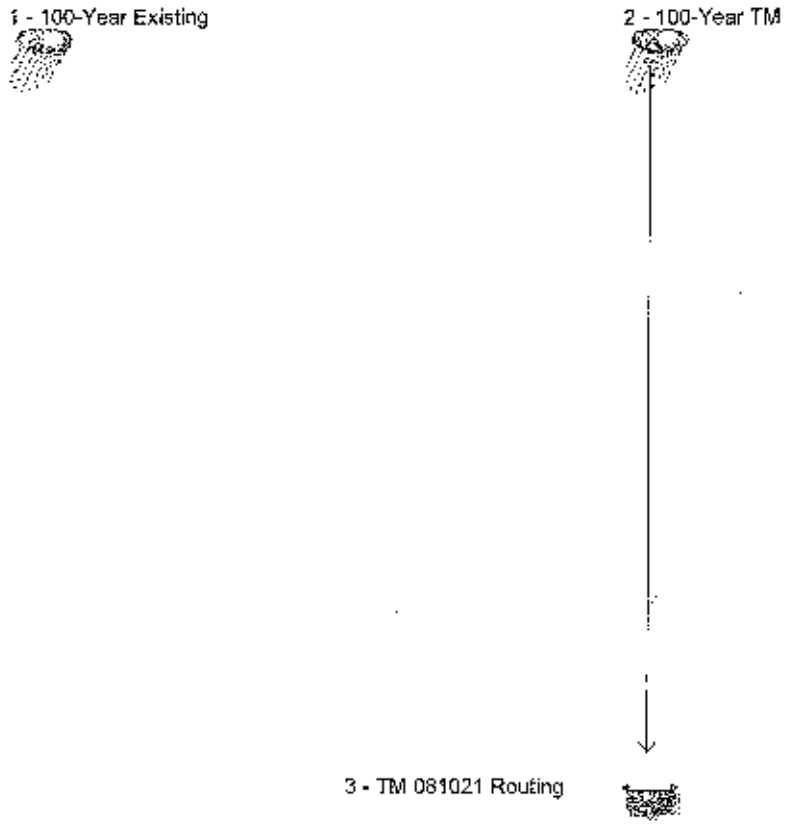

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     3016.000 to Point/Station     3016.000
**** SUBAREA FLOW ADDITION ****
```

```
User specified 'C' value of 0.820 given for subarea
Time of concentration =      7.48 min.
Rainfall intensity =      5.692(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.820  CA =      4.920
Subarea runoff =      3.129(CFS) for      0.030(Ac.)
Total runoff =     28.003(CFS)      Total area =       6.000(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     3016.000 to Point/Station     3017.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________________
Upstream point/station elevation =    250.210(Ft.)
Downstream point/station elevation =    246.700(Ft.)
Pipe length  =    238.54(Ft.)    Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     28.003(CFS)
Given pipe size =      30.00(In.)
Calculated individual pipe flow  =     28.003(CFS)
Normal flow depth in pipe =    16.10(In.)
Flow top width inside pipe =    29.92(In.)
Critical Depth =    21.63(In.)
Pipe flow velocity =      10.43(Ft/s)
Travel time through pipe =     0.38 min.
Time of concentration (TC) =      7.86 min.
End of computations, total study area =            6.000 (Ac.)
```

Watershed Model Schematic

Hydraflow Hydrographs by Intelisolve v9.22



Project: TM081021-REV.gpw

Tuesday, Nov 18, 2008

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.22

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	Manual	64.76	1	252	167,387	---	----	----	100-Year Existing
2	Manual	139.15	1	245	228,427	---	----	----	100-Year TM
3	Reservoir	32.57	1	251	228,420	2	271.15	71,857	TM 081021 Routing

RATIONAL METHOD HYDROGRAPH PROGRAM
COPYRIGHT 1992, 2001 RICK ENGINEERING COMPANY

RUN DATE 10/21/2008
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 18 MIN.
6 HOUR RAINFALL 2.8 INCHES
BA[illegible] AREA 30.2 ACRES
R[illegible]FF COEFFICIENT 0.554
PEAK DISCHARGE 54.757 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 18	DISCHARGE (CFS) = 2.8
TIME (MIN) = 36	DISCHARGE (CFS) = 3
TIME (MIN) = 54	DISCHARGE (CFS) = 3.1
TIME (MIN) = 72	DISCHARGE (CFS) = 3.4
TIME (MIN) = 90	DISCHARGE (CFS) = 3.6
TIME (MIN) = 108	DISCHARGE (CFS) = 4
TIME (MIN) = 126	DISCHARGE (CFS) = 4.2
TIME (MIN) = 144	DISCHARGE (CFS) = 4.8
TIME (MIN) = 162	DISCHARGE (CFS) = 5.2
TIME (MIN) = 180	DISCHARGE (CFS) = 6.4
TIME (MIN) = 198	DISCHARGE (CFS) = 7.3
TIME (MIN) = 216	DISCHARGE (CFS) = 10.7
TIME (MIN) = 234	DISCHARGE (CFS) = 14.3
TIME (MIN) = 252	DISCHARGE (CFS) = 54.757
TIME (MIN) = 270	DISCHARGE (CFS) = 6.6
TIME (MIN) = 288	DISCHARGE (CFS) = 5.7
TIME (MIN) = 306	DISCHARGE (CFS) = 4.5
TIME (MIN) = 324	DISCHARGE (CFS) = 3.8
TIME (MIN) = 342	DISCHARGE (CFS) = 3.3
TIME (MIN) = 360	DISCHARGE (CFS) = 2.9
TIME (MIN) = 378	DISCHARGE (CFS) = 0

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.22 — Tuesday, Nov 18, 2008

Hyd. No. 1

100-Year Existing

Hydrograph type	= Manual	Peak discharge	= 54.76 cfs
Storm frequency	= 100 yrs	Time to peak	= 252 min
Time interval	= 1 min	Hyd. volume	= 167,387 cuft

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp)

Time (min)	Outflow (cfs)	Time (min)	Outflow (cfs)	Time (min)	Outflow (cfs)	Time (min)	Outflow (cfs)
4	0.620	47	3.060	90	3.600	133	4.430
5	0.780	48	3.070	91	3.620	134	4.470
6	0.930	49	3.070	92	3.640	135	4.500
7	1.090	50	3.080	93	3.670	136	4.530
8	1.240	51	3.080	94	3.690	137	4.570
9	1.400	52	3.090	95	3.710	138	4.600
10	1.560	53	3.090	96	3.730	139	4.630
11	1.710	54	3.100	97	3.760	140	4.670
12	1.870	55	3.120	98	3.780	141	4.700
13	2.020	56	3.130	99	3.800	142	4.730
14	2.180	57	3.150	100	3.820	143	4.770
15	2.330	58	3.170	101	3.840	144	4.800
16	2.490	59	3.180	102	3.870	145	4.820
17	2.640	60	3.200	103	3.890	146	4.840
18	2.800	61	3.220	104	3.910	147	4.870
19	2.810	62	3.230	105	3.930	148	4.890
20	2.820	63	3.250	106	3.960	149	4.910
21	2.830	64	3.270	107	3.980	150	4.930
22	2.840	65	3.280	108	4.000	151	4.960
23	2.860	66	3.300	109	4.010	152	4.980
24	2.870	67	3.320	110	4.020	153	5.000
25	2.880	68	3.330	111	4.030	154	5.020
26	2.890	69	3.350	112	4.040	155	5.040
27	2.900	70	3.370	113	4.060	156	5.070
28	2.910	71	3.380	114	4.070	157	5.090
29	2.920	72	3.400	115	4.080	158	5.110
30	2.930	73	3.410	116	4.090	159	5.130
31	2.940	74	3.420	117	4.100	160	5.160
32	2.960	75	3.430	118	4.110	161	5.180
33	2.970	76	3.440	119	4.120	162	5.200
34	2.980	77	3.460	120	4.130	163	5.270
35	2.990	78	3.470	121	4.140	164	5.330
36	3.000	79	3.480	122	4.160	165	5.400
37	3.010	80	3.490	123	4.170	166	5.470
38	3.010	81	3.500	124	4.180	167	5.530
39	3.020	82	3.510	125	4.190	168	5.600
40	3.020	83	3.520	126	4.200	169	5.670
41	3.030	84	3.530	127	4.230	170	5.730
42	3.030	85	3.540	128	4.270	171	5.800
43	3.040	86	3.560	129	4.300	172	5.870
44	3.040	87	3.570	130	4.330	173	5.930
45	3.050	88	3.580	131	4.370	174	6.000
46	3.060	89	3.590	132	4.400	175	6.070

Continues on next page...

100-Year Existing

Hydrograph Discharge Table

Time (min	-- Outflow cfs)	Time (min	-- Outflow cfs)	Time (min	-- Outflow cfs)	Time (min	-- Outflow cfs)
176	6.130	229	13.30	282	6.670	335	3.490
177	6.200	230	13.50	283	6.510	336	3.470
178	6.270	231	13.70	284	6.340	337	3.440
179	6.330	232	13.90	285	6.180	338	3.410
180	6.400	233	14.10	286	6.020	339	3.380
181	6.450	234	14.30	287	5.860	340	3.360
182	6.500	235	16.55	288	5.700	341	3.330
183	6.550	236	18.80	289	5.630	342	3.300
184	6.600	237	21.04	290	5.570	343	3.280
185	6.650	238	23.29	291	5.500	344	3.260
186	6.700	239	25.54	292	5.430	345	3.230
187	6.750	240	27.79	293	5.370	346	3.210
188	6.800	241	30.03	294	5.300	347	3.190
189	6.850	242	32.28	295	5.230	348	3.170
190	6.900	243	34.53	296	5.170	349	3.140
191	6.950	244	36.78	297	5.100	350	3.120
192	7.000	245	39.02	298	5.030	351	3.100
193	7.050	246	41.27	299	4.970	352	3.080
194	7.100	247	43.52	300	4.900	353	3.060
195	7.150	248	45.77	301	4.830	354	3.030
196	7.200	249	48.01	302	4.770	355	3.010
197	7.250	250	50.26	303	4.700	356	2.990
198	7.300	251	52.51	304	4.630	357	2.970
199	7.490	252	54.76 <<	305	4.570	358	2.940
200	7.680	253	52.19	306	4.500	359	2.920
201	7.870	254	49.63	307	4.460	360	2.900
202	8.060	255	47.06	308	4.420		
203	8.240	256	44.50	309	4.380	*...End*	
204	8.430	257	41.94	310	4.340		
205	8.620	258	39.37	311	4.310		
206	8.810	259	36.81	312	4.270		
207	9.000	260	34.24	313	4.230		
208	9.190	261	31.68	314	4.190		
209	9.380	262	29.11	315	4.150		
210	9.570	263	26.55	316	4.110		
211	9.760	264	23.99	317	4.070		
212	9.940	265	21.42	318	4.030		
213	10.13	266	18.86	319	3.990		
214	10.32	267	16.29	320	3.960		
215	10.51	268	13.73	321	3.920		
216	10.70	269	11.16	322	3.880		
217	10.90	270	8.600	323	3.840		
218	11.10	271	8.440	324	3.800		
219	11.30	272	8.280	325	3.770		
220	11.50	273	8.120	326	3.740		
221	11.70	274	7.960	327	3.720		
222	11.90	275	7.790	328	3.690		
223	12.10	276	7.630	329	3.660		
224	12.30	277	7.470	330	3.630		
225	12.50	278	7.310	331	3.610		
226	12.70	279	7.150	332	3.580		
227	12.90	280	6.990	333	3.550		
228	13.10	281	6.830	334	3.520		

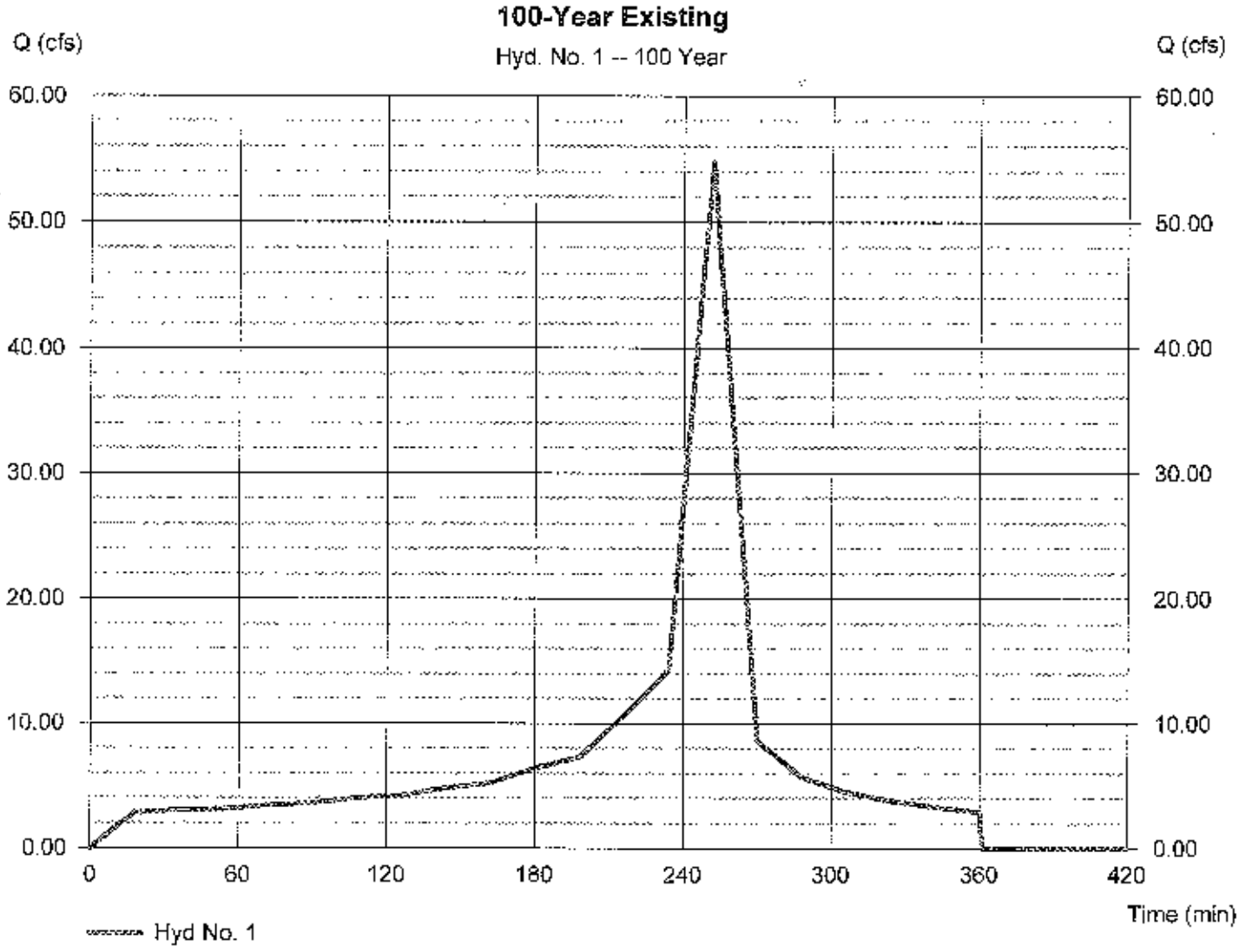
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.22 | Tuesday, Nov 18, 2008

Hyd. No. 1

100-Year Existing

Hydrograph type	= Manual	Peak discharge	= 54.76 cfs
Storm frequency	= 100 yrs	Time to peak	= 252 min
Time interval	= 1 min	Hyd. volume	= 167,387 cuft



RATIONAL METHOD HYDROGRAPH PROGRAM
COPYRIGHT 1992, 2001 RICK ENGINEERING COMPANY

RUN DATE 11/15/2008
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 7 MIN.
6 HOUR RAINFALL 2.8 INCHES
[illegible] AREA 37.22 ACRES
[illegible] OFF COEFFICIENT 0.61
PEAK DISCHARGE 139.15 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 7	DISCHARGE (CFS) = 3.8
TIME (MIN) = 14	DISCHARGE (CFS) = 3.9
TIME (MIN) = 21	DISCHARGE (CFS) = 4
TIME (MIN) = 28	DISCHARGE (CFS) = 4
TIME (MIN) = 35	DISCHARGE (CFS) = 4.1
TIME (MIN) = 42	DISCHARGE (CFS) = 4.2
TIME (MIN) = 49	DISCHARGE (CFS) = 4.3
TIME (MIN) = 56	DISCHARGE (CFS) = 4.4
TIME (MIN) = 63	DISCHARGE (CFS) = 4.5
TIME (MIN) = 70	DISCHARGE (CFS) = 4.6
TIME (MIN) = 77	DISCHARGE (CFS) = 4.8
TIME (MIN) = 84	DISCHARGE (CFS) = 4.9
TIME (MIN) = 91	DISCHARGE (CFS) = 5.1
TIME (MIN) = 98	DISCHARGE (CFS) = 5.2
TIME (MIN) = 105	DISCHARGE (CFS) = 5.4
TIME (MIN) = 112	DISCHARGE (CFS) = 5.5
TIME (MIN) = 119	DISCHARGE (CFS) = 5.8
TIME (MIN) = 126	DISCHARGE (CFS) = 5.9
TIME (MIN) = 133	DISCHARGE (CFS) = 6.2
TIME (MIN) = 140	DISCHARGE (CFS) = 6.4
TIME (MIN) = 147	DISCHARGE (CFS) = 6.8
TIME (MIN) = 154	DISCHARGE (CFS) = 7
TIME (MIN) = 161	DISCHARGE (CFS) = 7.6
TIME (MIN) = 168	DISCHARGE (CFS) = 7.8
TIME (MIN) = 175	DISCHARGE (CFS) = 8.5
TIME (MIN) = 182	DISCHARGE (CFS) = 8.9
TIME (MIN) = 189	DISCHARGE (CFS) = 9.9
TIME (MIN) = 196	DISCHARGE (CFS) = 10.5
[illegible] (MIN) = 203	DISCHARGE (CFS) = 12
[illegible] (MIN) = 210	DISCHARGE (CFS) = 13.1
TIME (MIN) = 217	DISCHARGE (CFS) = 16
TIME (MIN) = 224	DISCHARGE (CFS) = 18.2
TIME (MIN) = 231	DISCHARGE (CFS) = 26.7
TIME (MIN) = 238	DISCHARGE (CFS) = 33.3
TIME (MIN) = 245	DISCHARGE (CFS) = 139.15
TIME (MIN) = 252	DISCHARGE (CFS) = 21.4
TIME (MIN) = 259	DISCHARGE (CFS) = 14.3
TIME (MIN) = 266	DISCHARGE (CFS) = 11.2
TIME (MIN) = 273	DISCHARGE (CFS) = 9.4
TIME (MIN) = 280	DISCHARGE (CFS) = 8.2
TIME (MIN) = 287	DISCHARGE (CFS) = 7.3
TIME (MIN) = 294	DISCHARGE (CFS) = 6.6
TIME (MIN) = 301	DISCHARGE (CFS) = 6.1
TIME (MIN) = 308	DISCHARGE (CFS) = 5.6
TIME (MIN) = 315	DISCHARGE (CFS) = 5.3
TIME (MIN) = 322	DISCHARGE (CFS) = 5
TIME (MIN) = 329	DISCHARGE (CFS) = 4.7
TIME (MIN) = 336	DISCHARGE (CFS) = 4.5
TIME (MIN) = 343	DISCHARGE (CFS) = 4.3
TIME (MIN) = 350	DISCHARGE (CFS) = 4.1
TIME (MIN) = 357	DISCHARGE (CFS) = 3.9
TIME (MIN) = 364	DISCHARGE (CFS) = 0

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.22 — Tuesday, Nov 18, 2008

Hyd. No. 2

100-Year TM

Hydrograph type	= Manual	Peak discharge	= 139.15 cfs
Storm frequency	= 100 yrs	Time to peak	= 245 min
Time interval	= 1 min	Hyd. volume	= 228,427 cuft

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time (min)	Outflow (cfs)	Time (min)	Outflow (cfs)	Time (min)	Outflow (cfs)	Time (min)	Outflow (cfs)
3	1.630	46	4.260	89	5.040	132	6.160
4	2.170	47	4.270	90	5.070	133	6.200
5	2.710	48	4.290	91	5.100	134	6.230
6	3.260	49	4.300	92	5.110	135	6.260
7	3.800	50	4.310	93	5.130	136	6.290
8	3.810	51	4.330	94	5.140	137	6.310
9	3.830	52	4.340	95	5.160	138	6.340
10	3.840	53	4.360	96	5.170	139	6.370
11	3.860	54	4.370	97	5.190	140	6.400
12	3.870	55	4.390	98	5.200	141	6.460
13	3.890	56	4.400	99	5.230	142	6.510
14	3.900	57	4.410	100	5.260	143	6.570
15	3.910	58	4.430	101	5.290	144	6.630
16	3.930	59	4.440	102	5.310	145	6.690
17	3.940	60	4.460	103	5.340	146	6.740
18	3.960	61	4.470	104	5.370	147	6.800
19	3.970	62	4.490	105	5.400	148	6.830
20	3.990	63	4.500	106	5.410	149	6.860
21	4.000	64	4.510	107	5.430	150	6.890
22	4.000	65	4.530	108	5.440	151	6.910
23	4.000	66	4.540	109	5.460	152	6.940
24	4.000	67	4.560	110	5.470	153	6.970
25	4.000	68	4.570	111	5.490	154	7.000
26	4.000	69	4.590	112	5.500	155	7.090
27	4.000	70	4.600	113	5.540	156	7.170
28	4.000	71	4.630	114	5.590	157	7.260
29	4.010	72	4.660	115	5.630	158	7.340
30	4.030	73	4.690	116	5.670	159	7.430
31	4.040	74	4.710	117	5.710	160	7.510
32	4.060	75	4.740	118	5.760	161	7.600
33	4.070	76	4.770	119	5.800	162	7.630
34	4.090	77	4.800	120	5.810	163	7.660
35	4.100	78	4.810	121	5.830	164	7.690
36	4.110	79	4.830	122	5.840	165	7.710
37	4.130	80	4.840	123	5.860	166	7.740
38	4.140	81	4.860	124	5.870	167	7.770
39	4.160	82	4.870	125	5.890	168	7.800
40	4.170	83	4.890	126	5.900	169	7.900
41	4.190	84	4.900	127	5.940	170	8.000
42	4.200	85	4.930	128	5.990	171	8.100
43	4.210	86	4.960	129	6.030	172	8.200
44	4.230	87	4.990	130	6.070	173	8.300
45	4.240	88	5.010	131	6.110	174	8.400

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Hydrograph Discharge Table

Time -- Outflow (min	cfs)	Time -- Outflow (min	cfs)	Time -- Outflow (min	cfs)	Time -- Outflow (min	cfs)
175	8.500	228	23.06	281	8.070	334	4.560
176	8.560	229	24.27	282	7.940	335	4.530
177	8.610	230	25.49	283	7.810	336	4.500
178	8.670	231	26.70	284	7.690	337	4.470
179	8.730	232	27.64	285	7.560	338	4.440
180	8.790	233	28.59	286	7.430	339	4.410
181	8.840	234	29.53	287	7.300	340	4.390
182	8.900	235	30.47	288	7.200	341	4.360
183	9.040	236	31.41	289	7.100	342	4.330
184	9.190	237	32.36	290	7.000	343	4.300
185	9.330	238	33.30	291	6.900	344	4.270
186	9.470	239	48.42	292	6.800	345	4.240
187	9.610	240	63.54	293	6.700	346	4.210
188	9.760	241	78.66	294	6.600	347	4.190
189	9.900	242	93.79	295	6.530	348	4.160
190	9.990	243	108.91	296	6.460	349	4.130
191	10.07	244	124.03	297	6.390	350	4.100
192	10.16	245	139.15 <<	298	6.310	351	4.070
193	10.24	246	122.33	299	6.240	352	4.040
194	10.33	247	105.51	300	6.170	353	4.010
195	10.41	248	88.69	301	6.100	354	3.990
196	10.50	249	71.86	302	6.030	355	3.960
197	10.71	250	55.04	303	5.960	356	3.930
198	10.93	251	38.22	304	5.890	357	3.900
199	11.14	252	21.40	305	5.810	358	3.340
200	11.36	253	20.39	306	5.740	359	2.790
201	11.57	254	19.37	307	5.670	360	2.230
202	11.79	255	18.36	308	5.600		
203	12.00	256	17.34	309	5.560	*...End*	
204	12.16	257	16.33	310	5.510		
205	12.31	258	15.31	311	5.470		
206	12.47	259	14.30	312	5.430		
207	12.63	260	13.86	313	5.390		
208	12.79	261	13.41	314	5.340		
209	12.94	262	12.97	315	5.300		
210	13.10	263	12.53	316	5.260		
211	13.51	264	12.09	317	5.210		
212	13.93	265	11.64	318	5.170		
213	14.34	266	11.20	319	5.130		
214	14.76	267	10.94	320	5.090		
215	15.17	268	10.69	321	5.040		
216	15.59	269	10.43	322	5.000		
217	16.00	270	10.17	323	4.960		
218	16.31	271	9.910	324	4.910		
219	16.63	272	9.660	325	4.870		
220	16.94	273	9.400	326	4.830		
221	17.26	274	9.230	327	4.790		
222	17.57	275	9.060	328	4.740		
223	17.89	276	8.890	329	4.700		
224	18.20	277	8.710	330	4.670		
225	19.41	278	8.540	331	4.640		
226	20.63	279	8.370	332	4.610		
227	21.84	280	8.200	333	4.590		

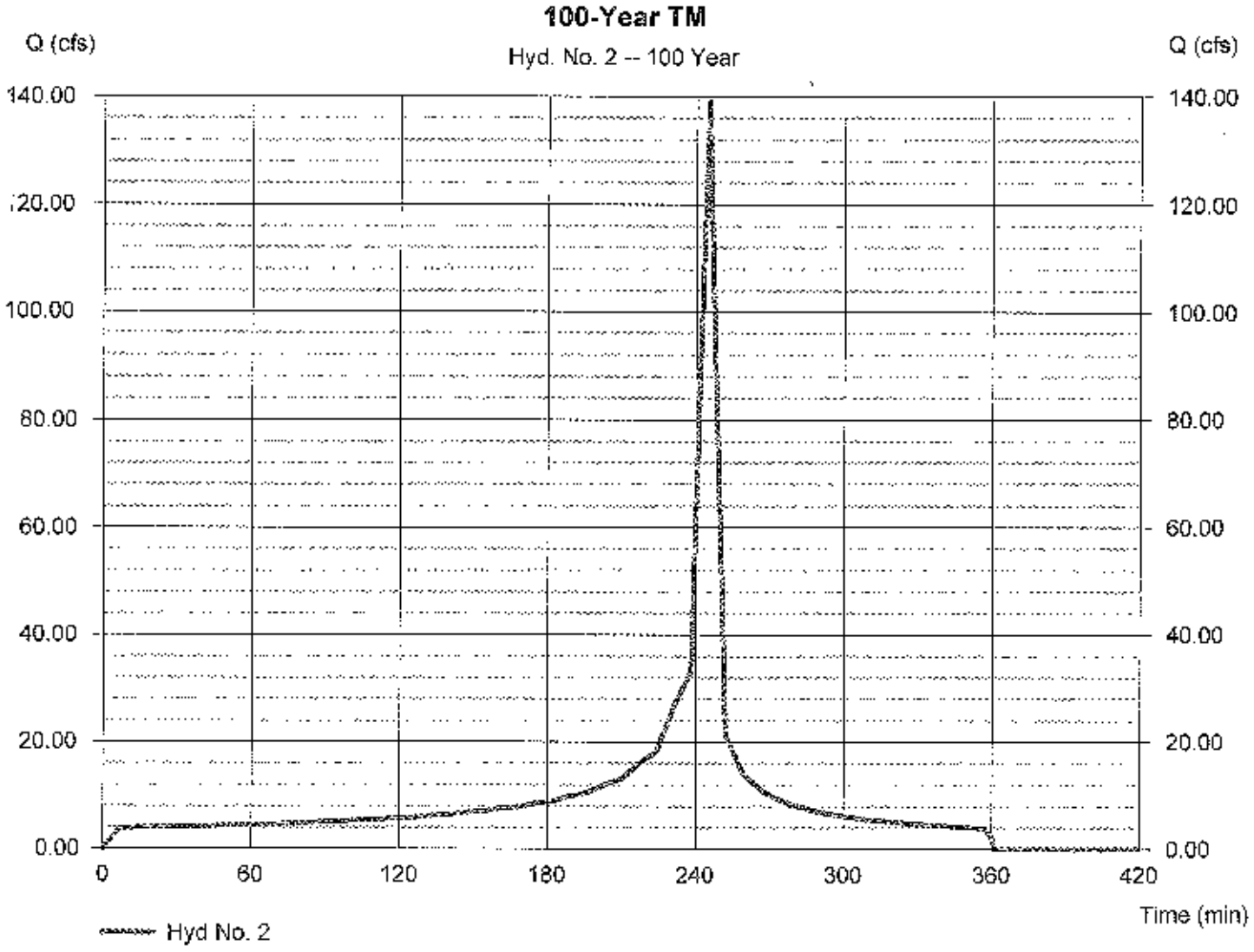
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.22 | Tuesday, Nov 18, 2008

Hyd. No. 2

100-Year TM

Hydrograph type	= Manual	Peak discharge	= 139.15 cfs
Storm frequency	= 100 yrs	Time to peak	= 245 min
Time interval	= 1 min	Hyd. volume	= 228,427 cuft



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.22 — Tuesday, Nov 18, 2008

Hyd. No. 3

TM 081021 Routing

Hydrograph type	= Reservoir	Peak discharge	= 32.57 cfs
Storm frequency	= 100 yrs	Time to peak	= 251 min
Time interval	= 1 min	Hyd. volume	= 228,420 cuft
Inflow hyd. No.	= 2 - 100-Year TM	Reservoir name	= TM Basin 2 - 0810
Max. Elevation	= 271.15 ft	Max. Storage	= 71,857 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
9	3.830	266.05	0.428	---	---	---	---	---	---	---	---	0.428
10	3.840	266.10	0.573	---	---	---	---	---	---	---	---	0.573
11	3.860	266.14	0.721	---	---	---	---	---	---	---	---	0.721
12	3.870	266.18	0.901	---	---	---	---	---	---	---	---	0.901
13	3.890	266.21	1.072	---	---	---	---	---	---	---	---	1.072
14	3.900	266.25	1.243	---	---	---	---	---	---	---	---	1.243
15	3.910	266.28	1.431	---	---	---	---	---	---	---	---	1.431
16	3.930	266.31	1.608	---	---	---	---	---	---	---	---	1.608
17	3.940	266.34	1.773	---	---	---	---	---	---	---	---	1.773
18	3.960	266.37	1.944	---	---	---	---	---	---	---	---	1.944
19	3.970	266.39	2.114	---	---	---	---	---	---	---	---	2.114
20	3.990	266.41	2.271	---	---	---	---	---	---	---	---	2.271
21	4.000	266.43	2.415	---	---	---	---	---	---	---	---	2.415
22	4.000	266.45	2.548	---	---	---	---	---	---	---	---	2.548
23	4.000	266.47	2.680	---	---	---	---	---	---	---	---	2.680
24	4.000	266.49	2.805	---	---	---	---	---	---	---	---	2.805
25	4.000	266.50	2.918	---	---	---	---	---	---	---	---	2.918
26	4.000	266.52	3.020	---	---	---	---	---	---	---	---	3.020
27	4.000	266.53	3.113	---	---	---	---	---	---	---	---	3.113
28	4.000	266.54	3.196	---	---	---	---	---	---	---	---	3.197
29	4.010	266.55	3.273	---	---	---	---	---	---	---	---	3.273
30	4.030	266.56	3.344	---	---	---	---	---	---	---	---	3.343
31	4.040	266.56	3.409	---	---	---	---	---	---	---	---	3.409
32	4.060	266.57	3.471	---	---	---	---	---	---	---	---	3.472
33	4.070	266.58	3.533	---	---	---	---	---	---	---	---	3.533
34	4.090	266.59	3.590	---	---	---	---	---	---	---	---	3.590
35	4.100	266.59	3.643	---	---	---	---	---	---	---	---	3.643
36	4.110	266.60	3.691	---	---	---	---	---	---	---	---	3.691
37	4.130	266.60	3.736	---	---	---	---	---	---	---	---	3.736
38	4.140	266.61	3.777	---	---	---	---	---	---	---	---	3.777
39	4.160	266.61	3.816	---	---	---	---	---	---	---	---	3.816
40	4.170	266.62	3.853	---	---	---	---	---	---	---	---	3.853
41	4.190	266.62	3.887	---	---	---	---	---	---	---	---	3.887
42	4.200	266.62	3.919	---	---	---	---	---	---	---	---	3.919
43	4.210	266.63	3.949	---	---	---	---	---	---	---	---	3.949
44	4.230	266.63	3.977	---	---	---	---	---	---	---	---	3.977
45	4.240	266.63	4.004	---	---	---	---	---	---	---	---	4.004
46	4.260	266.64	4.029	---	---	---	---	---	---	---	---	4.030
47	4.270	266.64	4.054	---	---	---	---	---	---	---	---	4.054
48	4.290	266.64	4.078	---	---	---	---	---	---	---	---	4.078

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Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
49	4.300	266.65	4.100	----	----	----	----	----	----	----	----	4.100
50	4.310	266.65	4.122	----	----	----	----	----	----	----	----	4.122
51	4.330	266.65	4.142	----	----	----	----	----	----	----	----	4.142
52	4.340	266.65	4.162	----	----	----	----	----	----	----	----	4.162
53	4.360	266.65	4.182	----	----	----	----	----	----	----	----	4.182
54	4.370	266.66	4.201	----	----	----	----	----	----	----	----	4.201
55	4.390	266.66	4.220	----	----	----	----	----	----	----	----	4.220
56	4.400	266.66	4.238	----	----	----	----	----	----	----	----	4.238
57	4.410	266.66	4.255	----	----	----	----	----	----	----	----	4.255
58	4.430	266.67	4.272	----	----	----	----	----	----	----	----	4.273
59	4.440	266.67	4.290	----	----	----	----	----	----	----	----	4.289
60	4.460	266.67	4.306	----	----	----	----	----	----	----	----	4.306
61	4.470	266.67	4.323	----	----	----	----	----	----	----	----	4.323
62	4.490	266.67	4.339	----	----	----	----	----	----	----	----	4.339
63	4.500	266.67	4.355	----	----	----	----	----	----	----	----	4.355
64	4.510	266.68	4.371	----	----	----	----	----	----	----	----	4.371
65	4.530	266.68	4.386	----	----	----	----	----	----	----	----	4.387
66	4.540	266.68	4.402	----	----	----	----	----	----	----	----	4.402
67	4.560	266.68	4.419	----	----	----	----	----	----	----	----	4.419
68	4.570	266.68	4.435	----	----	----	----	----	----	----	----	4.435
69	4.590	266.69	4.451	----	----	----	----	----	----	----	----	4.452
70	4.600	266.69	4.468	----	----	----	----	----	----	----	----	4.468
71	4.630	266.69	4.484	----	----	----	----	----	----	----	----	4.484
72	4.660	266.69	4.503	----	----	----	----	----	----	----	----	4.502
73	4.690	266.69	4.522	----	----	----	----	----	----	----	----	4.522
74	4.710	266.70	4.542	----	----	----	----	----	----	----	----	4.542
75	4.740	266.70	4.563	----	----	----	----	----	----	----	----	4.563
76	4.770	266.70	4.584	----	----	----	----	----	----	----	----	4.584
77	4.800	266.70	4.607	----	----	----	----	----	----	----	----	4.607
78	4.810	266.70	4.629	----	----	----	----	----	----	----	----	4.629
79	4.830	266.71	4.651	----	----	----	----	----	----	----	----	4.651
80	4.840	266.71	4.672	----	----	----	----	----	----	----	----	4.671
81	4.860	266.71	4.692	----	----	----	----	----	----	----	----	4.692
82	4.870	266.71	4.711	----	----	----	----	----	----	----	----	4.711
83	4.890	266.72	4.730	----	----	----	----	----	----	----	----	4.730
84	4.900	266.72	4.749	----	----	----	----	----	----	----	----	4.749
85	4.930	266.72	4.768	----	----	----	----	----	----	----	----	4.767
86	4.960	266.72	4.788	----	----	----	----	----	----	----	----	4.787
87	4.990	266.72	4.809	----	----	----	----	----	----	----	----	4.809
88	5.010	266.73	4.830	----	----	----	----	----	----	----	----	4.830
89	5.040	266.73	4.852	----	----	----	----	----	----	----	----	4.852
90	5.070	266.73	4.875	----	----	----	----	----	----	----	----	4.875
91	5.100	266.73	4.899	----	----	----	----	----	----	----	----	4.899
92	5.110	266.74	4.922	----	----	----	----	----	----	----	----	4.922
93	5.130	266.74	4.944	----	----	----	----	----	----	----	----	4.944
94	5.140	266.74	4.966	----	----	----	----	----	----	----	----	4.966
95	5.160	266.74	4.986	----	----	----	----	----	----	----	----	4.986
96	5.170	266.74	5.007	----	----	----	----	----	----	----	----	5.007
97	5.190	266.75	5.026	----	----	----	----	----	----	----	----	5.026
98	5.200	266.75	5.045	----	----	----	----	----	----	----	----	5.045
99	5.230	266.75	5.064	----	----	----	----	----	----	----	----	5.064
100	5.260	266.75	5.085	----	----	----	----	----	----	----	----	5.085
101	5.290	266.76	5.106	----	----	----	----	----	----	----	----	5.106
102	5.310	266.76	5.128	----	----	----	----	----	----	----	----	5.128

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Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
103	5.340	266.76	5.150	---	---	---	---	---	---	---	---	5.150
104	5.370	266.76	5.173	---	---	---	---	---	---	---	---	5.173
105	5.400	266.76	5.197	---	---	---	---	---	---	---	---	5.197
106	5.410	266.77	5.221	---	---	---	---	---	---	---	---	5.221
107	5.430	266.77	5.243	---	---	---	---	---	---	---	---	5.243
108	5.440	266.77	5.265	---	---	---	---	---	---	---	---	5.265
109	5.460	266.77	5.286	---	---	---	---	---	---	---	---	5.286
110	5.470	266.78	5.306	---	---	---	---	---	---	---	---	5.306
111	5.490	266.78	5.325	---	---	---	---	---	---	---	---	5.325
112	5.500	266.78	5.345	---	---	---	---	---	---	---	---	5.344
113	5.540	266.78	5.364	---	---	---	---	---	---	---	---	5.364
114	5.590	266.79	5.387	---	---	---	---	---	---	---	---	5.387
115	5.630	266.79	5.412	---	---	---	---	---	---	---	---	5.412
116	5.670	266.79	5.439	---	---	---	---	---	---	---	---	5.439
117	5.710	266.79	5.469	---	---	---	---	---	---	---	---	5.469
118	5.760	266.80	5.501	---	---	---	---	---	---	---	---	5.501
119	5.800	266.80	5.535	---	---	---	---	---	---	---	---	5.535
120	5.810	266.80	5.567	---	---	---	---	---	---	---	---	5.567
121	5.830	266.81	5.597	---	---	---	---	---	---	---	---	5.597
122	5.840	266.81	5.626	---	---	---	---	---	---	---	---	5.626
123	5.860	266.81	5.653	---	---	---	---	---	---	---	---	5.653
124	5.870	266.81	5.678	---	---	---	---	---	---	---	---	5.678
125	5.890	266.82	5.702	---	---	---	---	---	---	---	---	5.702
126	5.900	266.82	5.726	---	---	---	---	---	---	---	---	5.725
127	5.940	266.82	5.749	---	---	---	---	---	---	---	---	5.749
128	5.990	266.82	5.775	---	---	---	---	---	---	---	---	5.775
129	6.030	266.83	5.803	---	---	---	---	---	---	---	---	5.803
130	6.070	266.83	5.833	---	---	---	---	---	---	---	---	5.833
131	6.110	266.83	5.863	---	---	---	---	---	---	---	---	5.863
132	6.160	266.84	5.896	---	---	---	---	---	---	---	---	5.896
133	6.200	266.84	5.930	---	---	---	---	---	---	---	---	5.930
134	6.230	266.84	5.964	---	---	---	---	---	---	---	---	5.964
135	6.260	266.85	5.998	---	---	---	---	---	---	---	---	5.998
136	6.290	266.85	6.031	---	---	---	---	---	---	---	---	6.031
137	6.310	266.85	6.063	---	---	---	---	---	---	---	---	6.063
138	6.340	266.86	6.095	---	---	---	---	---	---	---	---	6.095
139	6.370	266.86	6.126	---	---	---	---	---	---	---	---	6.126
140	6.400	266.86	6.157	---	---	---	---	---	---	---	---	6.157
141	6.460	266.87	6.190	---	---	---	---	---	---	---	---	6.190
142	6.510	266.87	6.225	---	---	---	---	---	---	---	---	6.225
143	6.570	266.87	6.263	---	---	---	---	---	---	---	---	6.263
144	6.630	266.88	6.303	---	---	---	---	---	---	---	---	6.303
145	6.690	266.88	6.346	---	---	---	---	---	---	---	---	6.346
146	6.740	266.89	6.390	---	---	---	---	---	---	---	---	6.390
147	6.800	266.89	6.436	---	---	---	---	---	---	---	---	6.436
148	6.830	266.89	6.481	---	---	---	---	---	---	---	---	6.481
149	6.860	266.90	6.525	---	---	---	---	---	---	---	---	6.525
150	6.890	266.90	6.546	---	---	---	---	---	---	---	---	6.546
151	6.910	266.90	6.561	---	---	---	---	---	---	---	---	6.561
152	6.940	266.90	6.575	---	---	---	---	---	---	---	---	6.575
153	6.970	266.91	6.591	---	---	---	---	---	---	---	---	6.591
154	7.000	266.91	6.607	---	---	---	---	---	---	---	---	6.607
155	7.090	266.91	6.624	---	---	---	---	---	---	---	---	6.624
156	7.170	266.91	6.645	---	---	---	---	---	---	---	---	6.645

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Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
157	7.260	266.91	6.668	----	----	----	----	----	----	----	----	6.668
158	7.340	266.91	6.694	----	----	----	----	----	----	----	----	6.694
159	7.430	266.92	6.722	----	----	----	----	----	----	----	----	6.722
160	7.510	266.92	6.752	----	----	----	----	----	----	----	----	6.752
161	7.600	266.92	6.785	----	----	----	----	----	----	----	----	6.785
162	7.630	266.93	6.819	----	----	----	----	----	----	----	----	6.818
163	7.660	266.93	6.852	----	----	----	----	----	----	----	----	6.852
164	7.690	266.93	6.885	----	----	----	----	----	----	----	----	6.885
165	7.710	266.94	6.919	----	----	----	----	----	----	----	----	6.918
166	7.740	266.94	6.951	----	----	----	----	----	----	----	----	6.951
167	7.770	266.94	6.984	----	----	----	----	----	----	----	----	6.984
168	7.800	266.94	7.016	----	----	----	----	----	----	----	----	7.016
169	7.900	266.95	7.050	----	----	----	----	----	----	----	----	7.050
170	8.000	266.95	7.087	----	----	----	----	----	----	----	----	7.087
171	8.100	266.95	7.126	----	----	----	----	----	----	----	----	7.126
172	8.200	266.96	7.167	----	----	----	----	----	----	----	----	7.167
173	8.300	266.96	7.211	----	----	----	----	----	----	----	----	7.211
174	8.400	266.97	7.257	----	----	----	----	----	----	----	----	7.257
175	8.500	266.97	7.306	----	----	----	----	----	----	----	----	7.306
176	8.560	266.98	7.355	----	----	----	----	----	----	----	----	7.356
177	8.610	266.98	7.405	----	----	----	----	----	----	----	----	7.405
178	8.670	266.99	7.456	----	----	----	----	----	----	----	----	7.456
179	8.730	266.99	7.506	----	----	----	----	----	----	----	----	7.506
180	8.790	266.99	7.557	----	----	----	----	----	----	----	----	7.557
181	8.840	267.00	7.608	----	----	----	----	----	----	----	----	7.608
182	8.900	267.00	7.659	----	----	----	----	----	----	----	----	7.659
183	9.040	267.01	7.712	----	----	----	----	----	----	----	----	7.712
184	9.190	267.01	7.769	----	----	----	----	----	----	----	----	7.769
185	9.330	267.02	7.830	----	----	----	----	----	----	----	----	7.830
186	9.470	267.03	7.893	----	----	----	----	----	----	----	----	7.893
187	9.610	267.03	7.960	----	----	----	----	----	----	----	----	7.960
188	9.760	267.04	8.030	----	----	----	----	----	----	----	----	8.030
189	9.900	267.04	8.103	----	----	----	----	----	----	----	----	8.103
190	9.990	267.05	8.178	----	----	----	----	----	----	----	----	8.178
191	10.07	267.06	8.253	----	----	----	----	----	----	----	----	8.253
192	10.16	267.07	8.329	----	----	----	----	----	----	----	----	8.329
193	10.24	267.07	8.405	----	----	----	----	----	----	----	----	8.405
194	10.33	267.08	8.481	----	----	----	----	----	----	----	----	8.481
195	10.41	267.09	8.558	----	----	----	----	----	----	----	----	8.558
196	10.50	267.09	8.635	----	----	----	----	----	----	----	----	8.635
197	10.71	267.10	8.715	----	----	----	----	----	----	----	----	8.715
198	10.93	267.11	8.800	----	----	----	----	----	----	----	----	8.800
199	11.14	267.12	8.891	----	----	----	----	----	----	----	----	8.891
200	11.36	267.13	8.986	----	----	----	----	----	----	----	----	8.986
201	11.57	267.14	9.087	----	----	----	----	----	----	----	----	9.087
202	11.79	267.15	9.192	----	----	----	----	----	----	----	----	9.192
203	12.00	267.16	9.302	----	----	----	----	----	----	----	----	9.302
204	12.16	267.17	9.415	----	----	----	----	----	----	----	----	9.415
205	12.31	267.18	9.529	----	----	----	----	----	----	----	----	9.529
206	12.47	267.19	9.645	----	----	----	----	----	----	----	----	9.645
207	12.63	267.20	9.763	----	----	----	----	----	----	----	----	9.763
208	12.79	267.21	9.883	----	----	----	----	----	----	----	----	9.883
209	12.94	267.22	10.00	----	----	----	----	----	----	----	----	10.00
210	13.10	267.23	10.13	----	----	----	----	----	----	----	----	10.13

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Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
211	13.51	267.24	10.26	----	----	----	----	----	----	----	----	10.26
212	13.93	267.26	10.40	----	----	----	----	----	----	----	----	10.40
213	14.34	267.27	10.55	----	----	----	----	----	----	----	----	10.55
214	14.76	267.29	10.71	----	----	----	----	----	----	----	----	10.71
215	15.17	267.30	10.89	----	----	----	----	----	----	----	----	10.89
216	15.59	267.32	11.07	----	----	----	----	----	----	----	----	11.07
217	16.00	267.34	11.26	----	----	----	----	----	----	----	----	11.26
218	16.31	267.35	11.46	----	----	----	----	----	----	----	----	11.46
219	16.63	267.37	11.67	----	----	----	----	----	----	----	----	11.67
220	16.94	267.39	11.88	----	----	----	----	----	----	----	----	11.88
221	17.26	267.41	12.09	----	----	----	----	----	----	----	----	12.09
222	17.57	267.43	12.31	----	----	----	----	----	----	----	----	12.31
223	17.89	267.45	12.53	----	----	----	----	----	----	----	----	12.53
224	18.20	267.47	12.75	----	----	----	----	----	----	----	----	12.75
225	19.41	267.50	13.00	----	----	----	----	----	----	----	----	13.00
226	20.63	267.52	13.28	----	----	----	----	----	----	----	----	13.28
227	21.84	267.55	13.46	----	----	----	----	----	----	----	----	13.46
228	23.06	267.59	13.67	----	----	----	----	----	----	----	----	13.67
229	24.27	267.62	13.90	----	----	----	----	----	----	----	----	13.90
230	25.49	267.67	14.15	----	----	----	----	----	----	----	----	14.15
231	26.70	267.71	14.43	----	----	----	----	----	----	----	----	14.43
232	27.64	267.76	14.72	----	----	----	----	----	----	----	----	14.72
233	28.59	267.81	15.03	----	----	----	----	----	----	----	----	15.03
234	29.53	267.86	15.46	----	----	----	----	----	----	----	----	15.46
235	30.47	267.92	15.98	----	----	----	----	----	----	----	----	15.98
236	31.41	267.97	16.51	----	----	----	----	----	----	----	----	16.51
237	32.36	268.03	17.06	----	----	----	----	----	----	----	----	17.06
238	33.30	268.09	17.62	----	----	----	----	----	----	----	----	17.62
239	48.42	268.18	18.34	----	----	----	----	----	----	----	----	18.34
240	63.54	268.32	19.25	----	----	----	----	----	----	----	----	19.25
241	78.66	268.52	20.46	----	----	----	----	----	----	----	----	20.46
242	93.79	268.77	21.91	----	----	----	----	----	----	----	----	21.91
243	108.91	269.07	23.53	----	----	----	----	----	----	----	----	23.53
244	124.03	269.42	25.29	----	----	----	----	----	----	----	----	25.29
245	139.15 <<	269.82	27.16	----	----	----	----	----	----	----	----	27.16
246	122.33	270.21	28.88	----	----	----	----	----	----	----	----	28.88
247	105.51	270.53	30.20	----	----	----	----	----	----	----	----	30.20
248	88.69	270.79	31.20	----	----	----	----	----	----	----	----	31.20
249	71.86	270.97	31.92	----	----	----	----	----	----	----	----	31.92
250	55.04	271.09	32.37	----	----	----	----	----	----	----	----	32.37
251	38.22	271.14 <<	32.57	----	----	----	----	----	----	----	----	32.57 <<
252	21.40	271.13	32.53	----	----	----	----	----	----	----	----	32.53
253	20.39	271.09	32.37	----	----	----	----	----	----	----	----	32.37
254	19.37	271.04	32.19	----	----	----	----	----	----	----	----	32.19
255	18.36	270.99	32.00	----	----	----	----	----	----	----	----	32.00
256	17.34	270.94	31.79	----	----	----	----	----	----	----	----	31.79
257	16.33	270.88	31.57	----	----	----	----	----	----	----	----	31.57
258	15.31	270.82	31.35	----	----	----	----	----	----	----	----	31.35
259	14.30	270.76	31.10	----	----	----	----	----	----	----	----	31.10
260	13.86	270.70	30.85	----	----	----	----	----	----	----	----	30.85
261	13.41	270.63	30.59	----	----	----	----	----	----	----	----	30.59
262	12.97	270.57	30.33	----	----	----	----	----	----	----	----	30.33
263	12.53	270.50	30.06	----	----	----	----	----	----	----	----	30.06
264	12.09	270.43	29.79	----	----	----	----	----	----	----	----	29.79

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Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
265	11.64	270.37	29.51	----	----	----	----	----	----	----	----	29.51
266	11.20	270.30	29.23	----	----	----	----	----	----	----	----	29.23
267	10.94	270.23	28.94	----	----	----	----	----	----	----	----	28.94
268	10.69	270.16	28.65	----	----	----	----	----	----	----	----	28.65
269	10.43	270.09	28.36	----	----	----	----	----	----	----	----	28.36
270	10.17	270.02	28.06	----	----	----	----	----	----	----	----	28.06
271	9.910	269.96	27.76	----	----	----	----	----	----	----	----	27.76
272	9.660	269.89	27.46	----	----	----	----	----	----	----	----	27.46
273	9.400	269.82	27.15	----	----	----	----	----	----	----	----	27.15
274	9.230	269.75	26.85	----	----	----	----	----	----	----	----	26.85
275	9.060	269.69	26.55	----	----	----	----	----	----	----	----	26.55
276	8.890	269.62	26.23	----	----	----	----	----	----	----	----	26.23
277	8.710	269.55	25.92	----	----	----	----	----	----	----	----	25.92
278	8.540	269.49	25.61	----	----	----	----	----	----	----	----	25.61
279	8.370	269.42	25.30	----	----	----	----	----	----	----	----	25.30
280	8.200	269.36	24.99	----	----	----	----	----	----	----	----	24.99
281	8.070	269.29	24.67	----	----	----	----	----	----	----	----	24.67
282	7.940	269.23	24.35	----	----	----	----	----	----	----	----	24.35
283	7.810	269.17	24.04	----	----	----	----	----	----	----	----	24.04
284	7.690	269.11	23.73	----	----	----	----	----	----	----	----	23.73
285	7.560	269.05	23.41	----	----	----	----	----	----	----	----	23.41
286	7.430	268.98	23.09	----	----	----	----	----	----	----	----	23.09
287	7.300	268.93	22.77	----	----	----	----	----	----	----	----	22.77
288	7.200	268.87	22.45	----	----	----	----	----	----	----	----	22.45
289	7.100	268.81	22.14	----	----	----	----	----	----	----	----	22.14
290	7.000	268.75	21.83	----	----	----	----	----	----	----	----	21.83
291	6.900	268.69	21.50	----	----	----	----	----	----	----	----	21.50
292	6.800	268.64	21.18	----	----	----	----	----	----	----	----	21.18
293	6.700	268.58	20.86	----	----	----	----	----	----	----	----	20.86
294	6.600	268.53	20.55	----	----	----	----	----	----	----	----	20.55
295	6.530	268.48	20.24	----	----	----	----	----	----	----	----	20.24
296	6.460	268.43	19.92	----	----	----	----	----	----	----	----	19.92
297	6.390	268.38	19.60	----	----	----	----	----	----	----	----	19.60
298	6.310	268.32	19.28	----	----	----	----	----	----	----	----	19.28
299	6.240	268.28	18.96	----	----	----	----	----	----	----	----	18.96
300	6.170	268.23	18.65	----	----	----	----	----	----	----	----	18.65
301	6.100	268.18	18.35	----	----	----	----	----	----	----	----	18.35
302	6.030	268.13	18.03	----	----	----	----	----	----	----	----	18.03
303	5.960	268.09	17.60	----	----	----	----	----	----	----	----	17.60
304	5.890	268.04	17.19	----	----	----	----	----	----	----	----	17.19
305	5.810	268.00	16.78	----	----	----	----	----	----	----	----	16.78
306	5.740	267.96	16.39	----	----	----	----	----	----	----	----	16.39
307	5.670	267.92	16.01	----	----	----	----	----	----	----	----	16.01
308	5.600	267.88	15.64	----	----	----	----	----	----	----	----	15.64
309	5.560	267.84	15.28	----	----	----	----	----	----	----	----	15.28
310	5.510	267.81	15.01	----	----	----	----	----	----	----	----	15.01
311	5.470	267.77	14.79	----	----	----	----	----	----	----	----	14.79
312	5.430	267.74	14.58	----	----	----	----	----	----	----	----	14.58
313	5.390	267.70	14.37	----	----	----	----	----	----	----	----	14.37
314	5.340	267.67	14.16	----	----	----	----	----	----	----	----	14.16
315	5.300	267.63	13.95	----	----	----	----	----	----	----	----	13.95
316	5.260	267.60	13.75	----	----	----	----	----	----	----	----	13.75
317	5.210	267.57	13.56	----	----	----	----	----	----	----	----	13.56
318	5.170	267.54	13.36	----	----	----	----	----	----	----	----	13.36

Continues on next page...

Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
319	5.130	267.51	13.11	----	----	----	----	----	----	----	----	13.11
320	5.090	267.48	12.78	----	----	----	----	----	----	----	----	12.78
321	5.040	267.45	12.47	----	----	----	----	----	----	----	----	12.47
322	5.000	267.42	12.16	----	----	----	----	----	----	----	----	12.16
323	4.960	267.39	11.87	----	----	----	----	----	----	----	----	11.87
324	4.910	267.37	11.59	----	----	----	----	----	----	----	----	11.59
325	4.870	267.34	11.31	----	----	----	----	----	----	----	----	11.31
326	4.830	267.32	11.05	----	----	----	----	----	----	----	----	11.05
327	4.790	267.29	10.79	----	----	----	----	----	----	----	----	10.79
328	4.740	267.27	10.55	----	----	----	----	----	----	----	----	10.55
329	4.700	267.25	10.31	----	----	----	----	----	----	----	----	10.31
330	4.670	267.23	10.08	----	----	----	----	----	----	----	----	10.08
331	4.640	267.21	9.859	----	----	----	----	----	----	----	----	9.859
332	4.610	267.19	9.647	----	----	----	----	----	----	----	----	9.647
333	4.590	267.17	9.442	----	----	----	----	----	----	----	----	9.442
334	4.560	267.15	9.245	----	----	----	----	----	----	----	----	9.245
335	4.530	267.13	9.054	----	----	----	----	----	----	----	----	9.054
336	4.500	267.12	8.870	----	----	----	----	----	----	----	----	8.870
337	4.470	267.10	8.692	----	----	----	----	----	----	----	----	8.692
338	4.440	267.08	8.520	----	----	----	----	----	----	----	----	8.520
339	4.410	267.07	8.354	----	----	----	----	----	----	----	----	8.354
340	4.390	267.05	8.193	----	----	----	----	----	----	----	----	8.193
341	4.360	267.04	8.038	----	----	----	----	----	----	----	----	8.038
342	4.330	267.03	7.888	----	----	----	----	----	----	----	----	7.888
343	4.300	267.01	7.743	----	----	----	----	----	----	----	----	7.743
344	4.270	267.00	7.603	----	----	----	----	----	----	----	----	7.603
345	4.240	266.99	7.467	----	----	----	----	----	----	----	----	7.467
346	4.210	266.97	7.336	----	----	----	----	----	----	----	----	7.336
347	4.190	266.96	7.209	----	----	----	----	----	----	----	----	7.208
348	4.160	266.95	7.085	----	----	----	----	----	----	----	----	7.085
349	4.130	266.94	6.966	----	----	----	----	----	----	----	----	6.966
350	4.100	266.93	6.850	----	----	----	----	----	----	----	----	6.850
351	4.070	266.92	6.738	----	----	----	----	----	----	----	----	6.738
352	4.040	266.91	6.629	----	----	----	----	----	----	----	----	6.629
353	4.010	266.90	6.500	----	----	----	----	----	----	----	----	6.500
354	3.990	266.87	6.200	----	----	----	----	----	----	----	----	6.200
355	3.960	266.84	5.933	----	----	----	----	----	----	----	----	5.933
356	3.930	266.82	5.695	----	----	----	----	----	----	----	----	5.695
357	3.900	266.79	5.482	----	----	----	----	----	----	----	----	5.481
358	3.340	266.77	5.269	----	----	----	----	----	----	----	----	5.269
359	2.790	266.75	5.021	----	----	----	----	----	----	----	----	5.020
360	2.230	266.72	4.737	----	----	----	----	----	----	----	----	4.738
361	0.000	266.67	4.335	----	----	----	----	----	----	----	----	4.335
362	0.000	266.62	3.883	----	----	----	----	----	----	----	----	3.883
363	0.000	266.57	3.478	----	----	----	----	----	----	----	----	3.478
364	0.000	266.53	3.146	----	----	----	----	----	----	----	----	3.147
365	0.000	266.49	2.849	----	----	----	----	----	----	----	----	2.849
366	0.000	266.46	2.581	----	----	----	----	----	----	----	----	2.581
367	0.000	266.43	2.365	----	----	----	----	----	----	----	----	2.365
368	0.000	266.40	2.166	----	----	----	----	----	----	----	----	2.166
369	0.000	266.37	1.984	----	----	----	----	----	----	----	----	1.984
370	0.000	266.35	1.820	----	----	----	----	----	----	----	----	1.820
371	0.000	266.33	1.691	----	----	----	----	----	----	----	----	1.691
372	0.000	266.30	1.571	----	----	----	----	----	----	----	----	1.571

Continues on next page...

Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
373	0.000	266.29	1.460	----	----	----	----	----	----	----	----	1.460
374	0.000	266.27	1.357	----	----	----	----	----	----	----	----	1.357
375	0.000	266.25	1.261	----	----	----	----	----	----	----	----	1.260
376	0.000	266.24	1.176	----	----	----	----	----	----	----	----	1.176
377	0.000	266.22	1.109	----	----	----	----	----	----	----	----	1.109
378	0.000	266.21	1.045	----	----	----	----	----	----	----	----	1.045
379	0.000	266.19	0.985	----	----	----	----	----	----	----	----	0.985
380	0.000	266.18	0.929	----	----	----	----	----	----	----	----	0.929
381	0.000	266.17	0.875	----	----	----	----	----	----	----	----	0.875
382	0.000	266.16	0.825	----	----	----	----	----	----	----	----	0.825
383	0.000	266.15	0.778	----	----	----	----	----	----	----	----	0.778
384	0.000	266.14	0.733	----	----	----	----	----	----	----	----	0.733
385	0.000	266.13	0.691	----	----	----	----	----	----	----	----	0.691
386	0.000	266.12	0.661	----	----	----	----	----	----	----	----	0.661
387	0.000	266.11	0.633	----	----	----	----	----	----	----	----	0.633
388	0.000	266.11	0.606	----	----	----	----	----	----	----	----	0.606
389	0.000	266.10	0.580	----	----	----	----	----	----	----	----	0.580
390	0.000	266.09	0.555	----	----	----	----	----	----	----	----	0.555
391	0.000	266.08	0.532	----	----	----	----	----	----	----	----	0.532
392	0.000	266.08	0.509	----	----	----	----	----	----	----	----	0.509
393	0.000	266.07	0.487	----	----	----	----	----	----	----	----	0.487
394	0.000	266.07	0.467	----	----	----	----	----	----	----	----	0.467
395	0.000	266.06	0.447	----	----	----	----	----	----	----	----	0.447
396	0.000	266.05	0.428	----	----	----	----	----	----	----	----	0.428
397	0.000	266.05	0.410	----	----	----	----	----	----	----	----	0.410
398	0.000	266.04	0.392	----	----	----	----	----	----	----	----	0.392
399	0.000	266.04	0.376	----	----	----	----	----	----	----	----	0.376
400	0.000	266.03	0.360	----	----	----	----	----	----	----	----	0.360
401	0.000	266.03	0.344	----	----	----	----	----	----	----	----	0.344
402	0.000	266.03	0.330	----	----	----	----	----	----	----	----	0.330

...End

Hydrograph Report

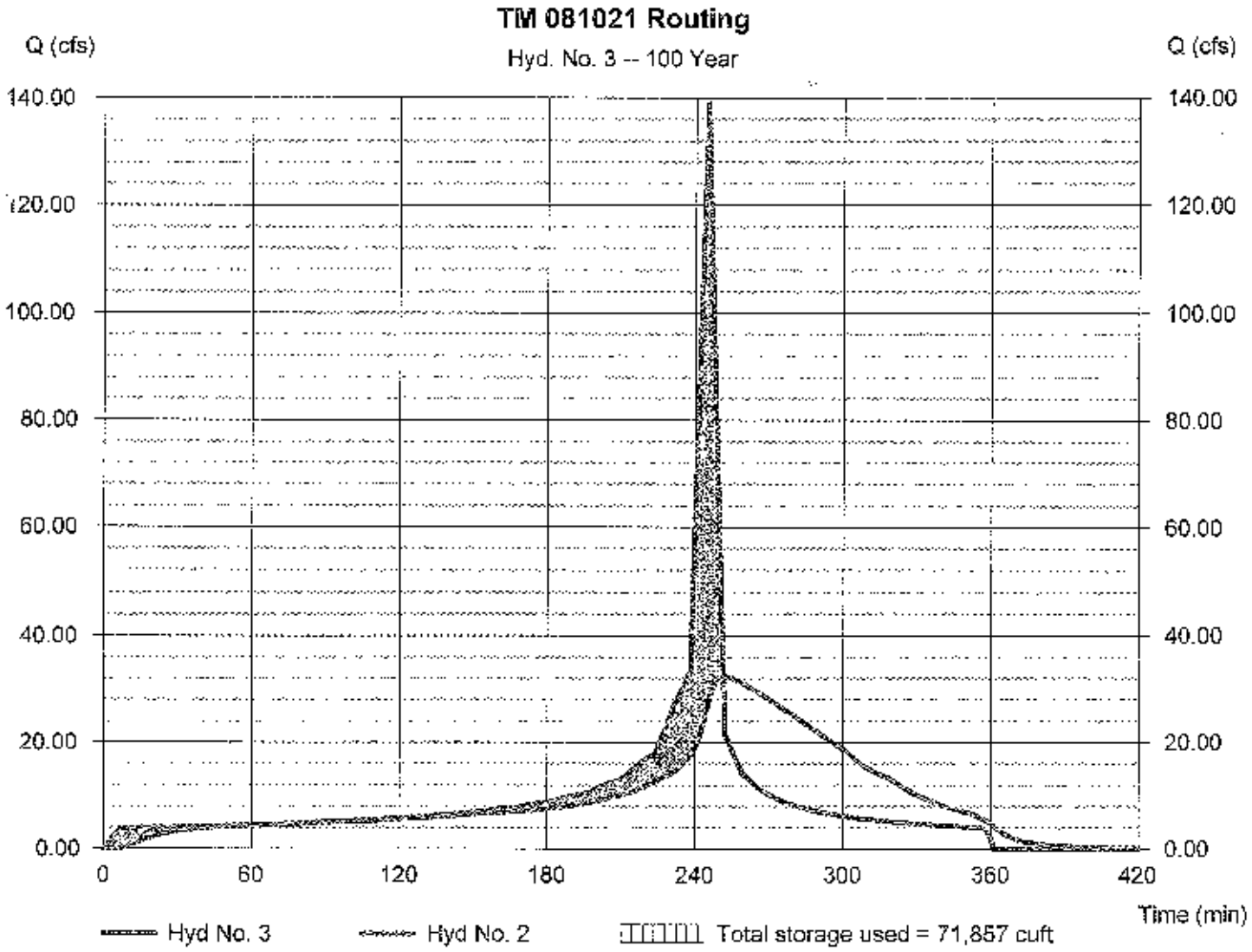
Hydraflow Hydrographs by Intelisolve v9.22 — Tuesday, Nov 18, 2008

Hyd. No. 3

TM 081021 Routing

Hydrograph type	= Reservoir	Peak discharge	= 32.57 cfs
Storm frequency	= 100 yrs	Time to peak	= 251 min
Time interval	= 1 min	Hyd. volume	= 228,420 cuft
Inflow hyd. No.	= 2 - 100-Year TM	Max. Elevation	= 271.15 ft
Reservoir name	= TM Basin 2 - 081021	Max. Storage	= 71,857 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs by Intelisolve v9.22 — Tuesday, Nov 18, 2008

Pond No. 1 - TM Basin 2 - 081021

Pond Data

Pond storage is based on user-defined values.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	265.80	n/a	0	0
1.10	266.90	n/a	5,189	5,189
4.20	270.00	n/a	48,591	53,780
6.20	272.00	n/a	31,626	85,406

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	0.00	0.00	0.00
Span (in)	= 24.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 265.80	0.00	0.00	0.00
Length (ft)	= 19.81	0.00	0.00	0.00
Slope (%)	= 3.03	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.62	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (o) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	265.80	0.00	---	---	---	---	---	---	---	---	---	0.000
0.11	519	265.91	0.08 ic	---	---	---	---	---	---	---	---	---	0.079
0.22	1,038	266.02	0.31 ic	---	---	---	---	---	---	---	---	---	0.311
0.33	1,557	266.13	0.69 ic	---	---	---	---	---	---	---	---	---	0.687
0.44	2,076	266.24	1.20 ic	---	---	---	---	---	---	---	---	---	1.198
0.55	2,595	266.35	1.83 ic	---	---	---	---	---	---	---	---	---	1.833
0.66	3,113	266.46	2.59 ic	---	---	---	---	---	---	---	---	---	2.591
0.77	3,632	266.57	3.45 ic	---	---	---	---	---	---	---	---	---	3.448
0.88	4,151	266.68	4.40 ic	---	---	---	---	---	---	---	---	---	4.400
0.99	4,670	266.79	5.43 ic	---	---	---	---	---	---	---	---	---	5.432
1.10	5,189	266.90	6.54 ic	---	---	---	---	---	---	---	---	---	6.536
1.41	10,048	267.21	9.89 ic	---	---	---	---	---	---	---	---	---	9.890
1.72	14,907	267.52	13.26 ic	---	---	---	---	---	---	---	---	---	13.26
2.03	19,766	267.83	15.15 oc	---	---	---	---	---	---	---	---	---	15.15
2.34	24,625	268.14	18.09 ic	---	---	---	---	---	---	---	---	---	18.09
2.65	29,485	268.45	20.08 ic	---	---	---	---	---	---	---	---	---	20.08
2.96	34,344	268.76	21.88 ic	---	---	---	---	---	---	---	---	---	21.88
3.27	39,203	269.07	23.55 ic	---	---	---	---	---	---	---	---	---	23.55
3.58	44,062	269.38	25.10 ic	---	---	---	---	---	---	---	---	---	25.10
3.89	48,921	269.69	26.57 ic	---	---	---	---	---	---	---	---	---	26.57
4.20	53,780	270.00	27.96 ic	---	---	---	---	---	---	---	---	---	27.96
4.40	56,943	270.20	28.82 ic	---	---	---	---	---	---	---	---	---	28.82
4.60	60,105	270.40	29.65 ic	---	---	---	---	---	---	---	---	---	29.65
4.80	63,268	270.60	30.47 ic	---	---	---	---	---	---	---	---	---	30.47
5.00	66,430	270.80	31.26 ic	---	---	---	---	---	---	---	---	---	31.26
5.20	69,593	271.00	32.03 ic	---	---	---	---	---	---	---	---	---	32.03
5.40	72,756	271.20	32.78 ic	---	---	---	---	---	---	---	---	---	32.78
5.60	75,918	271.40	33.52 ic	---	---	---	---	---	---	---	---	---	33.52
5.80	79,081	271.60	34.24 ic	---	---	---	---	---	---	---	---	---	34.24
6.00	82,243	271.80	34.95 ic	---	---	---	---	---	---	---	---	---	34.95
6.20	85,406	272.00	35.64 ic	---	---	---	---	---	---	---	---	---	35.64

M E M O R A N D U M

Date: April 1, 2003

To: Tim O'Grady

From: Tory Walker, Water Resources Consultant

Subject: Villages of La Costa – The Oaks South – Storm drain issues adjacent to proposed La Costa Town Center

CC: Dave Hammar
Ray Martin

---

w.o. 2352-06

At your request, we have prepared this memorandum to clarify the general understanding of the drainage plan at La Costa Avenue and Camino De Los Coches. This understanding is based on our December 2001 Addendum[1] to our Preliminary Hydrology[2] for The Villages of La Costa. The most important points can be summarized as follows:

1. A 48-inch storm drain was designed crossing La Costa Avenue upstream of Camino De Los Coches. This storm drain was designed to convey undetained peak runoff from a portion of the La Costa Town Center site, including peak runoff from Rancho Santa Fe Road. This 48-inch storm drain is shown on the attached plans, Drawing 397-1A, Sheet 12, and Drawing 397-1B, Sheet 8, for The Villages of La Costa.

2. A metal plate must be installed over the top 1.5 feet of the existing 10-foot by 5-foot box culvert under Camino De Los Coches, making the inlet 10-foot wide and 3.5 feet high to achieve the desired flood attenuation for your development. The work would be confined within an existing storm drain easement, and may not require permission of the underlying landowner to improve the existing storm drain system. The plans prepared by this office do not include this improvement, and therefore the work has not yet been done.

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[1] "Addendum to Preliminary Hydrology for Villages of La Costa, The Ridge & The Oaks," revised December 21, 2001

[2] "Preliminary Hydrology for Villages of La Costa, The Ridge & The Oaks," dated April 25, 2001

One of the reasons for the addendum was to demonstrate the development of the project would not result in an increase in the 100-year storm at the downstream property boundary, even with a portion of proposed La Costa Town Center being included. The Addendum was also based upon a hydrology report prepared by O"Day Consultants[3].

Since the Addendum was based upon those two previous reports, any significant changes to the hydrology of areas draining to La Costa Avenue in the vicinity of Camino De Los Coches would require additional hydrologic analysis to ensure that the post-developed 100-year peak flows are still not greater than pre-developed peak flows. Specifically, two storm drain systems within Rancho Santa Fe Road were to discharge onto the La Costa Town Center site. Both of these systems were proposed to be extended by the La Costa Town Center project to the new 48-inch undercrossing. Changes to the tributary areas or drainage plans presented in the aforementioned O'Day report could alter the results obtained in the Addendum, and would need to be separately analyzed.

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[3] "Hydrology and Hydraulic Study for La Costa Town Center Tentative Map," dated February 22, 2001

Powell/PBSJ

HUNSAKER & ASSOCIATES
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EXCERPT

3rd ✓
Notwithstanding Revisions

ADDENDUM TO PRELIMINARY HYDROLOGY STUDY for VILLAGES OF LA COSTA THE RIDGE & THE OAKS

City of Carlsbad, California

Prepared for:
Real Estate Collateral Management Company
c/o Morrow Development
1903 Wright Place
Suite 180
Carlsbad, CA 92008

W.O. 2352-11

August 16, 2001
Revised October 23, 2001
Revised December 21, 2001

DAVE HAMMAR
LEX WILLIMAN
ALISA VIALPANDO
DANA SEGUIN

Raymond L. Martin, R.C.E.
Project Manager
Hunsaker & Associates San Diego, Inc.

REGISTERED PROFESSIONAL ENGINEER
RAYMOND L. MARTIN
NO. 48670
Exp. 6/30/04
CIVIL
STATE OF CALIFORNIA

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wo 2352-11

THE VILLAGES OF LA COSTA
DEVELOPED CONDITION HYDROLOGY

HYDROGRAPH PARAMETERS

PRECIPITATION (from County Hydrology Manual and NOAA Atlas)

Freq.	Duration							
	5-min.	15-min.	1-hr.	2-hr.	3-hr.	6-hr.	12-hr.	24-hr.
100-YR	0.37	0.73	1.32	1.72	2.01	2.90	4.00	5.05

SCS CURVE NUMBER (from County Hydrology Manual)

SUB1 (at Node 124)

LAND USE	AREA (ac)	SOIL	CN
OPEN SPACE[1]	45.3	D	86
MED. RESID.	0.0	D	88
TOTAL AREA	45.3		86.0 (avg)

SUB2 (Developed area at Node 105)

LAND USE	AREA (ac)	SOIL	CN
OPEN SPACE[1]	94.3	D	86
MED. RESID.	61.4	D	88
COMMERCIAL	5.5	D	92
TOTAL AREA	161.2		87.0 (avg)

AREA

TOTAL AREA = 0.071 sq. mi.

TOTAL AREA = 0.252 sq. mi.

INITIAL ABSTRACTION ($I_a = 0.2S$, where $S = 1000/CN - 10$)

SUB1

I_a = 0.33 inches

SUB2

I_a = 0.30 inches

LAG (from Rational Method results)

SUB1

Tc = 13.8 min.
lag = 0.8 x Tc = 11.0 min.
= 0.18 hrs.

SUB2

Tc = 18.8 min.
lag = 0.8 x Tc = 15.0 min.
= 0.25 hrs.

1 Narrowleaf chaparral

THE VILLAGES OF LA COSTA
DEVELOPED CONDITION HYDROLOGY

HYDROGRAPH PARAMETERS

PRECIPITATION (from County Hydrology Manual and NOAA Atlas)

Freq.	Duration							
	5-min.	15-min.	1-hr.	2-hr.	3-hr.	6-hr.	12-hr.	24-hr.
100-YR	0.37	0.73	1.32	1.72	2.01	2.90	4.00	5.05

SCS CURVE NUMBER (from County Hydrology Manual)

SUB3 (Natural area at Node 105)

LAND USE	AREA (ac)	SOIL	CN
OPEN SPACE[1]	85.8	D	86
MED. RESID.	0	D	88
TOTAL AREA	85.8		86.0 (avg)

SUB4 (at Node 106 - The Oaks)

LAND USE	AREA (ac)	SOIL	CN
OPEN SPACE[1]	6.2	D	86
MED. RESID.	102.4	D	88
TOTAL AREA	108.6		87.9 (avg)

AREA

TOTAL AREA = 0.134 sq. mi.

TOTAL AREA = 0.170 sq. mi.

INITIAL ABSTRACTION ($I_a = 0.2S$, where $S = 1000/CN - 10$)

SUB3

I_a = 0.33 inches

SUB4

I_a = 0.28 inches

LAG (from Rational Method results)

SUB3

Tc = 18.8 min.
lag = 0.8 x Tc = 15.0 min.
= 0.25 hrs.

SUB4

Tc = 15.2 min.
lag = 0.8 x Tc = 12.2 min.
= 0.20 hrs.

1 Narrowleaf chaparral

THE VILLAGES OF LA COSTA
DEVELOPED CONDITION HYDROLOGY

HYDROGRAPH PARAMETERS

PRECIPITATION (from County Hydrology Manual and NOAA Atlas)

Freq.	Duration							
	5-min.	15-min.	1-hr.	2-hr.	3-hr.	6-hr.	12-hr.	24-hr.
100-YR	0.37	0.73	1.32	1.72	2.01	2.90	4.00	5.05

SCS CURVE NUMBER (from County Hydrology Manual)

SUB7 (at Node 108 - The Oaks)

LAND USE	AREA (ac)	SOIL	CN
OPEN SPACE[1]	30.3	D	86
MED. RESID.	10.2	D	88
TOTAL AREA	40.5		86.5 (avg)

SUB8 (at Node 109 - The Oaks)

LAND USE	AREA (ac)	SOIL	CN
OPEN SPACE[1]	4.4	D	86
MED. RESID.	21.0	D	88
HIGH RESID.	9.7	D	90
COMMERCIAL	33.9	D	92
TOTAL AREA	69.0		90.1 (avg)

AREA

TOTAL AREA = 0.063 sq. mi.

TOTAL AREA = 0.108 sq. mi.

INITIAL ABSTRACTION ($I_a = 0.2S$, where $S = 1000/CN - 10$)

SUB7

I_a = 0.31 inches

SUB8

I_a = 0.22 inches

LAG (from Rational Method results)

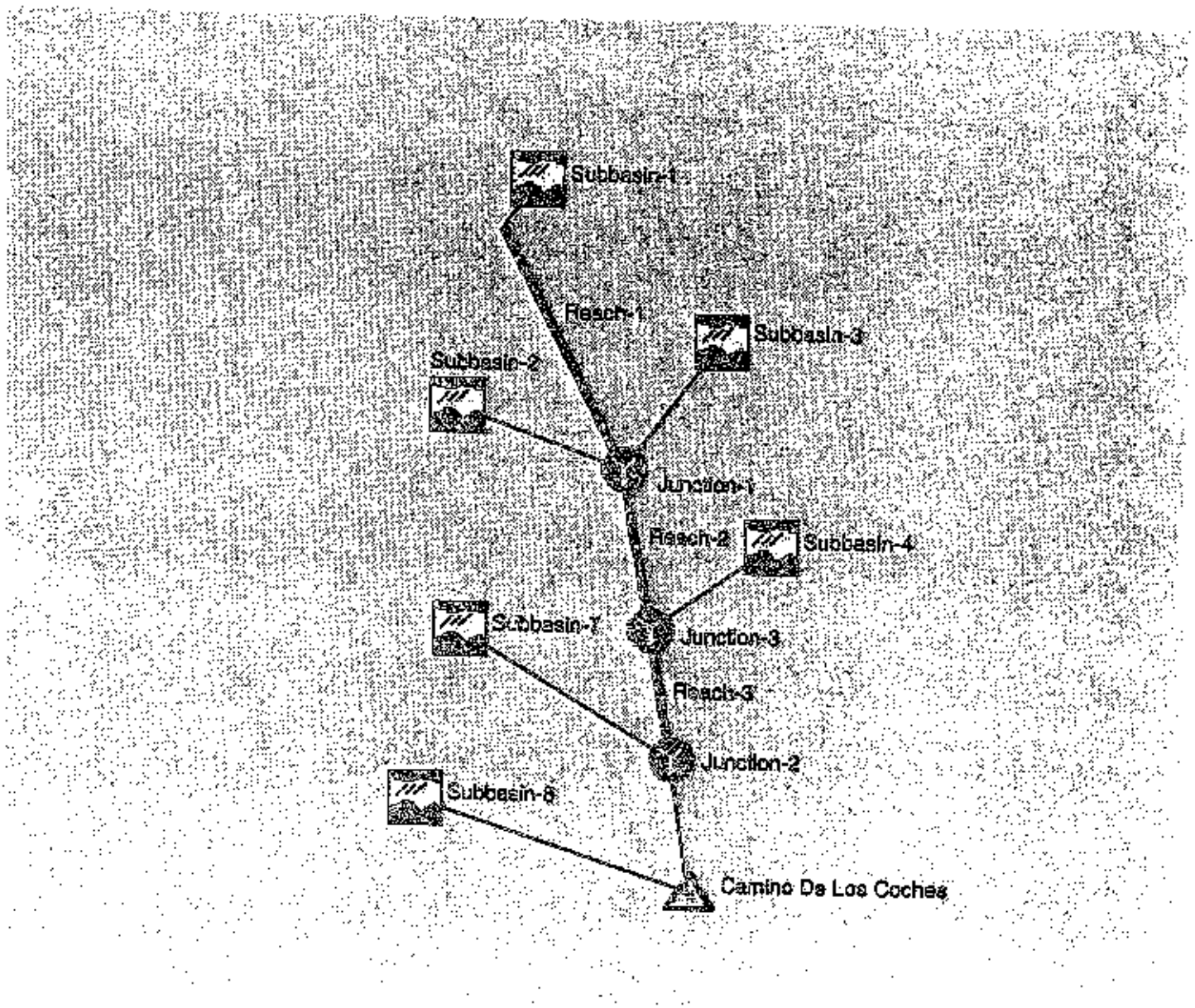
SUB7

Tc = 23.9 min.
lag = 0.8 x Tc = 19.1 min.
= 0.32 hrs.

SUB8

Tc = 14.1 min.
lag = 0.8 x Tc = 11.3 min.
= 0.19 hrs.

1 Narrowleaf chaparral


Subbasin-1
Reach-1
Subbasin-3
Subbasin-2
Junction-1
Reach-2
Subbasin-4
Subbasin-7
Junction-3
Reach-3
Junction-2
Subbasin-8
Camino De Los Coches

HMS * Summary of Results

Project : La Costa Oaks Run Name : Run 5

Start of Run	: 01Jan00 0000	Basin Model	: La Costa Oaks - dev.
End of Run	: 01Jan00 2400	Met. Model	: LC - 100-yr, 24-hr
Execution Time	: 15Aug01 1334	Control Specs	: Control 1

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
Subbasin-1	93.000	01 Jan 00 1212	13.003	0.071
Reach-1	91.596	01 Jan 00 1216	13.986	0.071
Subbasin-2	289.35	01 Jan 00 1216	47.464	0.252
Subbasin-3	150.05	01 Jan 00 1216	24.503	0.134
Junction-1	531.10	01 Jan 00 1216	84.953	0.457
Reach-2	530.25	01 Jan 00 1218	84.884	0.457
Subbasin-4	219.00	01 Jan 00 1212	32.353	0.170
Junction-3	736.33	01 Jan 00 1216	117.74	0.627
Reach-3	734.36	01 Jan 00 1218	117.61	0.627
Subbasin-7	64.631	01 Jan 00 1221	13.104	0.063
Junction-2	799.30	01 Jan 00 1219	129.80	0.690
Subbasin-8	151.67	01 Jan 00 1212	22.315	0.104
amino De Los Coches	805.39	01 Jan 00 1224	152.00	0.798

HMS * Summary of Results for Camino De Los Cochos

Project : La Costa Oaks Run Name : Run 4

Start of Run : 01Jan00 0000 Basin Model : La Costa Oaks - dev.

End of Run : 01Jan00 2400 Met. Model : LC - 100-yr, 24-hr

Execution Time : 15Aug01 1340 Control Specs : Control 1

Computed Results

Peak Inflow : 327.02 (cfs) Date/Time of Peak Inflow : 01 Jan 00 1218

Peak Outflow : 309.33 (cfs) Date/Time of Peak Outflow : 01 Jan 00 1224

Total Inflow : 152.01 (ac-ft) Peak Storage : 3.0439(ac-ft)

Total Outflow : 152.00 (ac-ft) Peak Elevation : 354.95(ft)

HMS * Summary of Results

Project : La Costa Oaks Run Name : Run 6

Start of Run	: 01Jan00 0000	Basin Model	: La Costa Oaks - dev.
End of Run	: 01Jan00 2400	Met. Model	: LC - 100-yr, 6-hr
Execution Time	: 15Aug01 1336	Control Specs	: Control 1

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
Subbasin-1	72.332	01 Jan 00 0312	5.7376	0.071
Reach-1	71.177	01 Jan 00 0316	5.7374	0.071
Subbasin-2	229.20	01 Jan 00 0317	21.393	0.253
Subbasin-3	115.95	01 Jan 00 0317	10.829	0.134
Junction-1	416.19	01 Jan 00 0317	37.959	0.457
Reach-2	415.30	01 Jan 00 0319	37.958	0.457
Subbasin-4	178.20	01 Jan 00 0314	15.023	0.170
Junction-2	581.69	01 Jan 00 0317	52.984	0.627
Reach-3	579.87	01 Jan 00 0319	52.982	0.627
Subbasin-7	52.105	01 Jan 00 0321	5.6607	0.063
Junction-2	631.15	01 Jan 00 0319	58.643	0.690
Subbasin-8	129.60	01 Jan 00 0313	10.587	0.100
Camino De Los Coches	698.66	01 Jan 00 0322	69.230	0.798

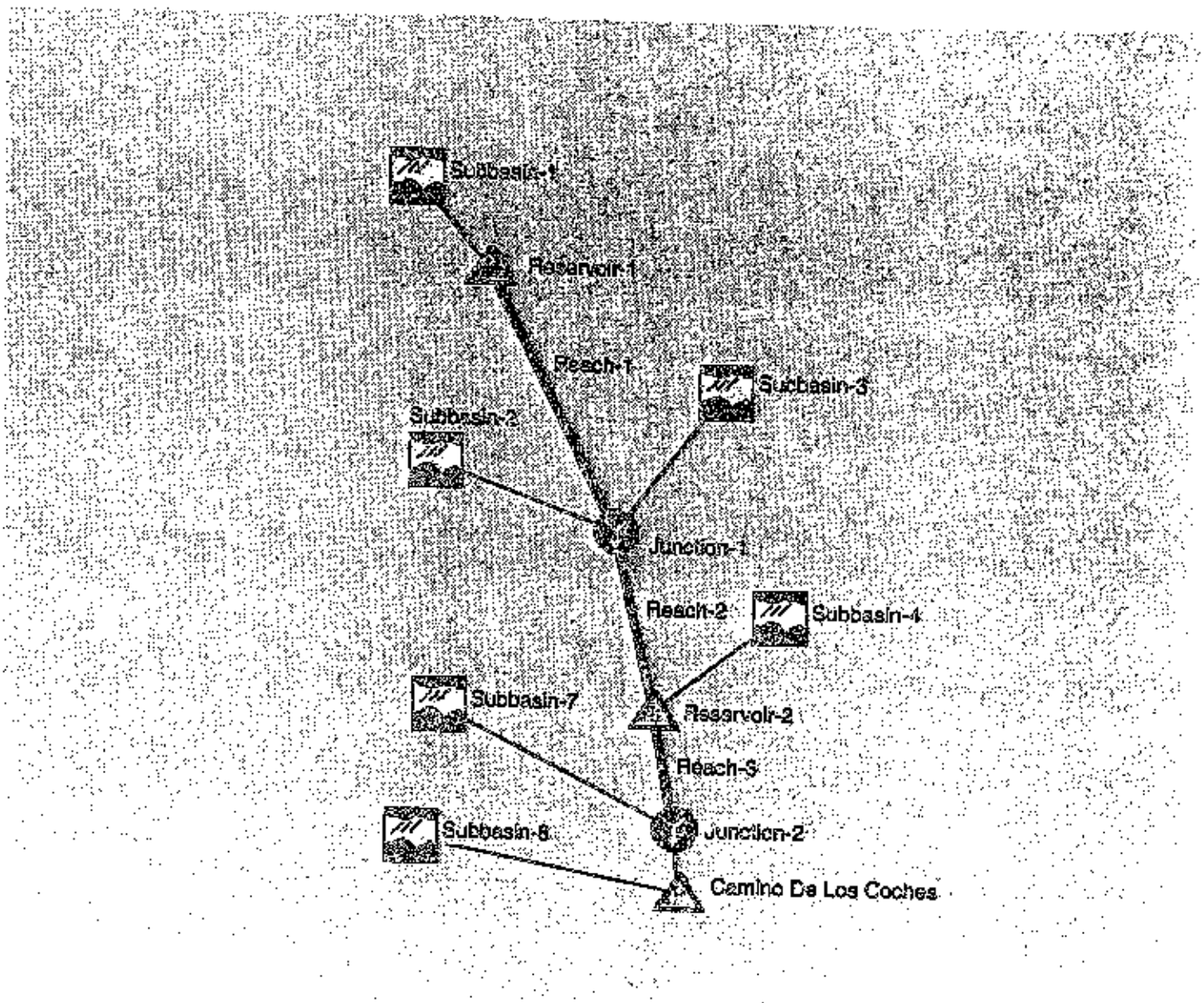
UMS - Summary of Results for Canine Da Los Cochez

Project : La Costa Oaks Run Name : Run 6

Start of Run	: 01Jan00 0000	Basin Model	: La Costa Oaks - dev.
End of Run	: 01Jan00 2400	Met. Model	: LC - 100-yr, 6-hr
Execution Time	: 15Aug01 1330	Control Specs	: Control 1

Computed Results

Peak Inflow	: 738.59 (cfs)	Date/Time of Peak Inflow	: 01 Jan 00 0310
Peak Outflow	: 608.68 (cfs)	Date/Time of Peak Outflow	: 01 Jan 00 0322
Total Inflow	: 69.230 (ac-ft)	Peak Storage	: 1.3024(ac-ft)
Total Outflow	: 69.230 (ac-ft)	Peak Elevation	: 251.86(ft)


Subbasin-1
Reservoir-1
Reach-1
Subbasin-3
Subbasin-2
Junction-1
Reach-2
Subbasin-4
Subbasin-7
Reservoir-2
Reach-3
Subbasin-6
Junction-2
Camino De Los Coches

HEC - Summary of Results

Project : La Costa Oaks Run Name : Run 9

Start of Run : 01Jan00 0000 Basin Model : La Costa Oaks - dot.
End of Run : 01Jan03 2400 Met. Model : LC - 100-yr, 24-hr
Execution Time : 13Aug01 0856 Control Spec : Control 1

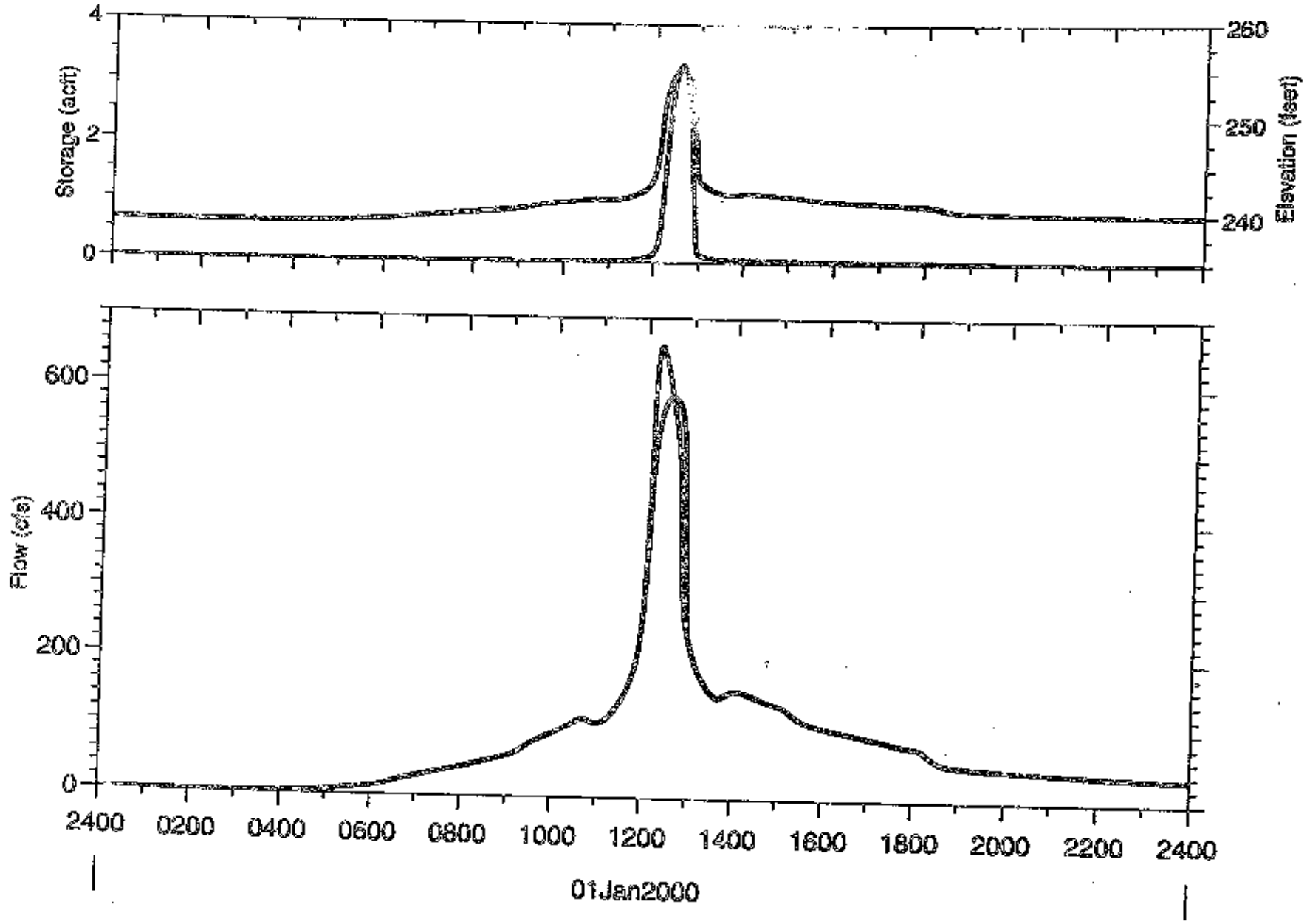
Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
Subbasin-1	93.000	01 Jan 00 1212	13.005	0.071
Reservoir-1	20.671	01 Jan 00 1247	12.997	0.071
Reach-1	20.671	01 Jan 00 1251	12.971	0.071
Subbasin-2	289.35	01 Jan 00 1216	47.464	0.252
Subbasin-3	150.05	01 Jan 00 1216	24.503	0.134
Junction-1	437.17	01 Jan 00 1216	84.940	0.457
Reach-2	437.03	01 Jan 00 1218	84.868	0.457
Subbasin-4	219.00	01 Jan 00 1213	32.853	0.170
Reservoir-2	495.26	01 Jan 00 1227	117.51	0.627
Reach-3	495.14	01 Jan 00 1229	117.37	0.627
Subbasin-7	54.631	01 Jan 00 1221	12.184	0.063
Junction-2	553.74	01 Jan 00 1226	129.56	0.690
Subbasin-8	151.67	01 Jan 00 1212	22.213	0.103
Camino De Los Coches	585.90	01 Jan 00 1224	151.76	0.793

HMS - Summary of Results

Project : La Costa Oaks Run Name : Run 10

Start of Run : 01Jan00 0000 Basin Model : La Costa Oaks - det.
End of Run : 01Jan00 2400 Met. Model : LC - 100-yr, 6-hr
Execution Time : 15Aug01 0850 Control Specs : Control 1

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
Subbasin-1	71.332	01 Jan 00 0313	5.7376	0.071
Reservoir-1	19.009	01 Jan 00 0345	5.7376	0.071
Reach-1	19.009	01 Jan 00 0349	5.7383	0.071
Subbasin-2	229.28	01 Jan 00 0317	21.393	0.252
Subbasin-3	115.95	01 Jan 00 0317	10.829	0.134
Junction-1	361.33	01 Jan 00 0317	37.960	0.457
Reach-2	361.16	01 Jan 00 0319	37.962	0.457
Subbasin-4	176.28	01 Jan 00 0314	15.025	0.170
Reservoir-2	456.04	01 Jan 00 0324	52.987	0.627
Reach-3	455.90	01 Jan 00 0326	52.986	0.627
Subbasin-7	52.105	01 Jan 00 0321	5.3607	0.063
Junction-2	506.20	01 Jan 00 0325	58.646	0.690
Subbasin-8	128.60	01 Jan 00 0313	10.587	0.105
Camino De Los Cochas	545.90	01 Jan 00 0331	69.233	0.795



HEC HMS

Storage
Elevation
Inflow

Camino De Los Coches

Basin: La Costa Oaks - del.
Run: Run 8
Time: 15Aug01, 08:56

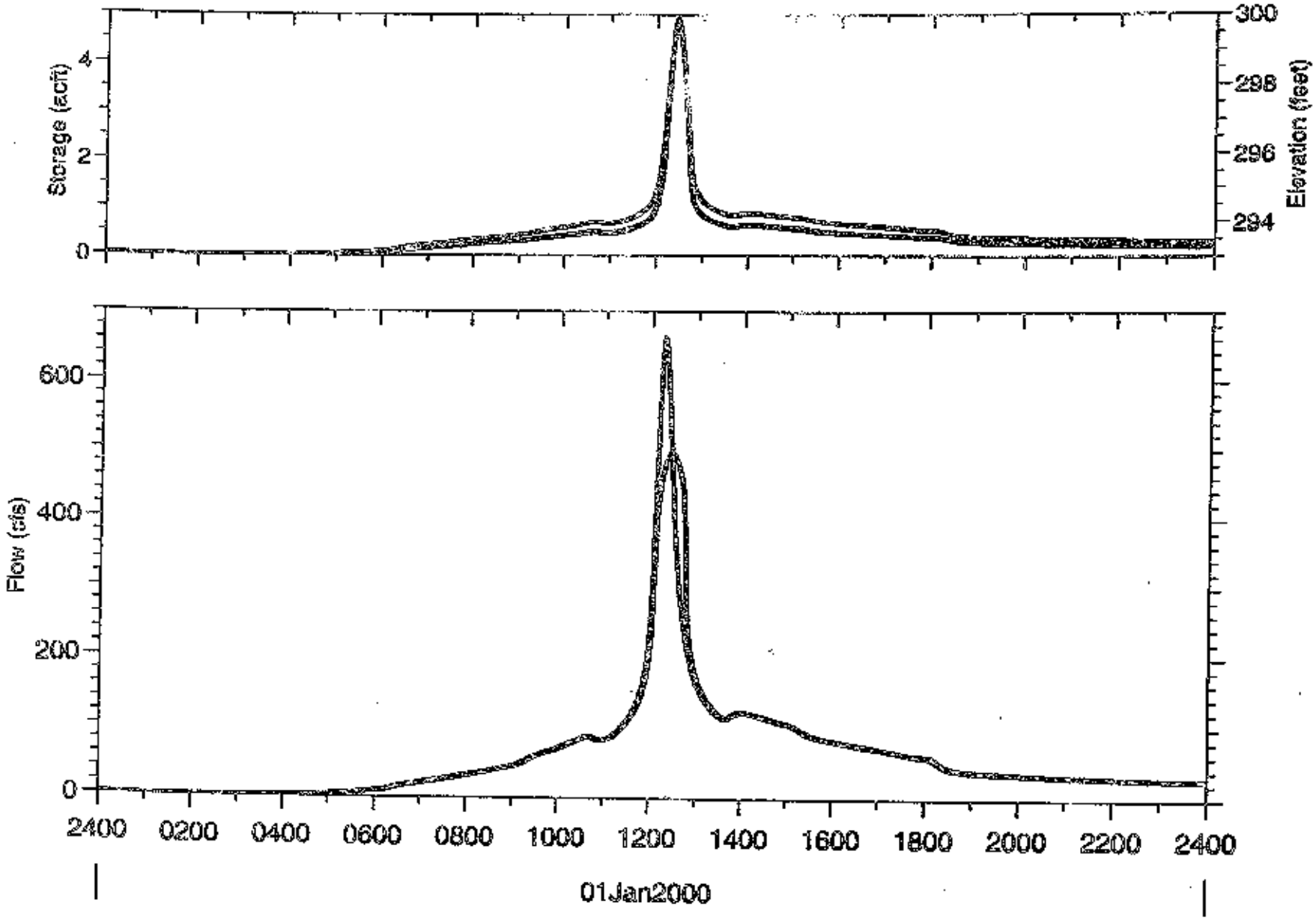
HMS * Summary of Results for Camino De Los Cochos

Project : La Costa Oaks Run Name : Run 2

Start of Run	: 01Jan00 0000	Basin Model	: La Costa Oaks - det.
End of Run	: 01Jan00 2400	Met. Model	: LC - 100-yr, 24-hr
Execution Time	: 13Aug01 1041	Control Spec	: Control 1

Computed Results

Peak Inflow	: 652.72 (cfs)	Date/Time of Peak Inflow	: 01 Jan 00 1217
Peak Outflow	: 505.90 (cfs)	Date/Time of Peak Outflow	: 01 Jan 00 1224
Total Inflow	: 151.77 (ac-ft)	Peak Storage	: 3.3249(ac-ft)
Total Outflow	: 151.76 (ac-ft)	Peak Elevation	: 253.30(ft)



HEC HMS

Storage
Elevation
Inflow
Reservoir-2

Basin: La Costa Oaks - del.
Run: Run 9
Time: 15Aug01, 09:57

HMS - Summary of Results for Reservoir-2

Project : La Costa Oaks Run Name : Run 9

Start of Run : 01Jan00 0000 Basin Model : La Costa Oaks - det.

End of Run : 01Jan00 2400 Met. Model : LC - 100-yr, 24-hr

Execution Time : 15Aug01 1041 Control Specs : Control 1

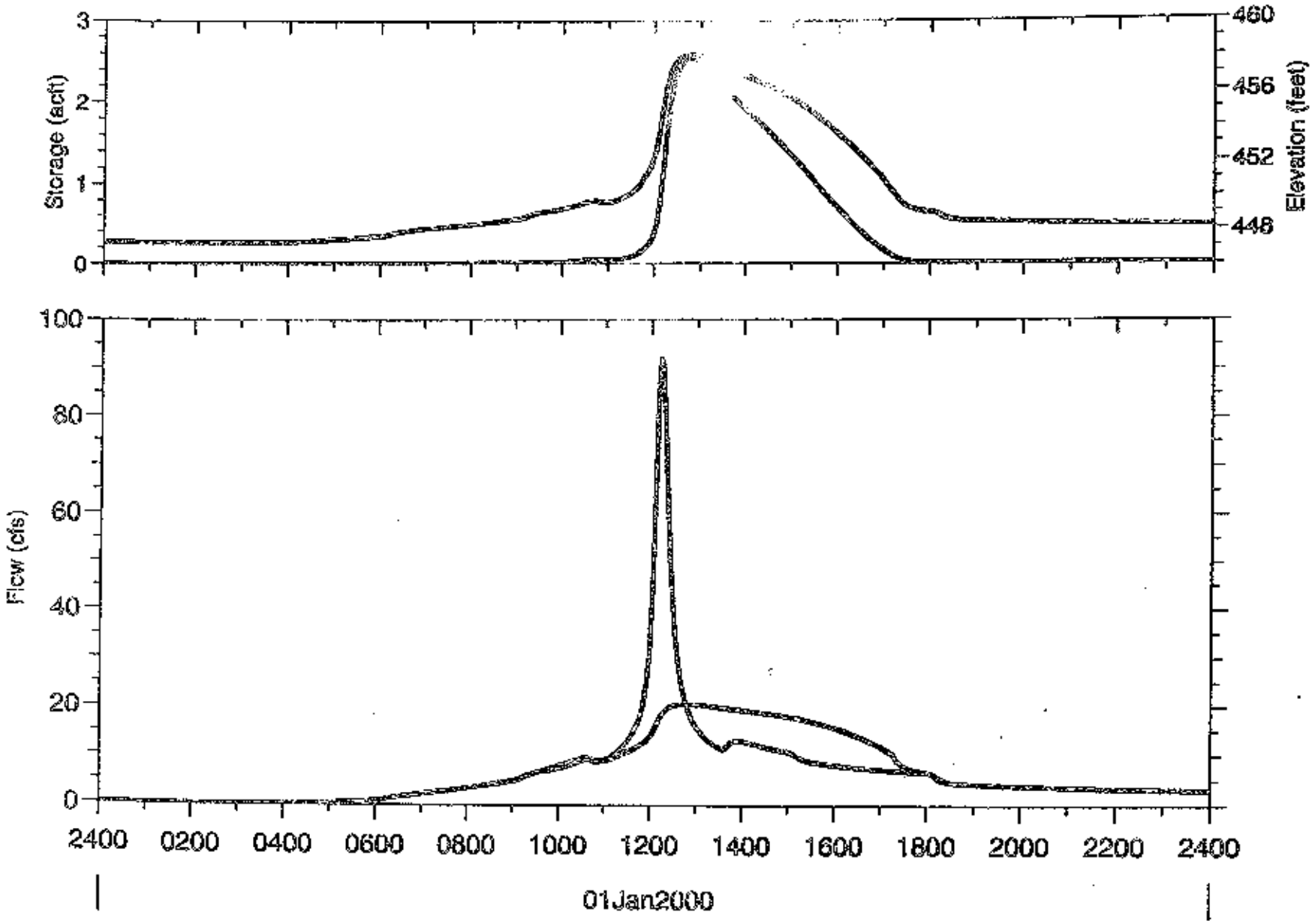
Computed Results

Peak Inflow : 662.22 (cfs) Date/Time of Peak Inflow : 01 Jan 00 1216

Peak Outflow : 495.26 (cfs) Date/Time of Peak Outflow : 01 Jan 00 1227

Total Inflow : 117.72 (ac-ft) Peak Storage : 4.9197(ac-ft)

Total Outflow : 117.51 (ac-ft) Peak Elevation : 299.60(ft)



HEC HMS

Storage
Elevation
Inflow
Reservoir-1

Basin: La Costa Oaks - det.
Run: Run 0
Time: 15Aug01, 09:57

HMS * Summary of Results for Reservoir-1

Project : La Costa Oaks Run Name : Run 9

Start of Run : 01Jan00 0000 Basin Model : La Costa Oaks - dev.

End of Run : 01Jan00 2400 Met. Model : LC - 100-yr, 24-hr

Execution Time : 13Aug01 1041 Control Spec : Control 1

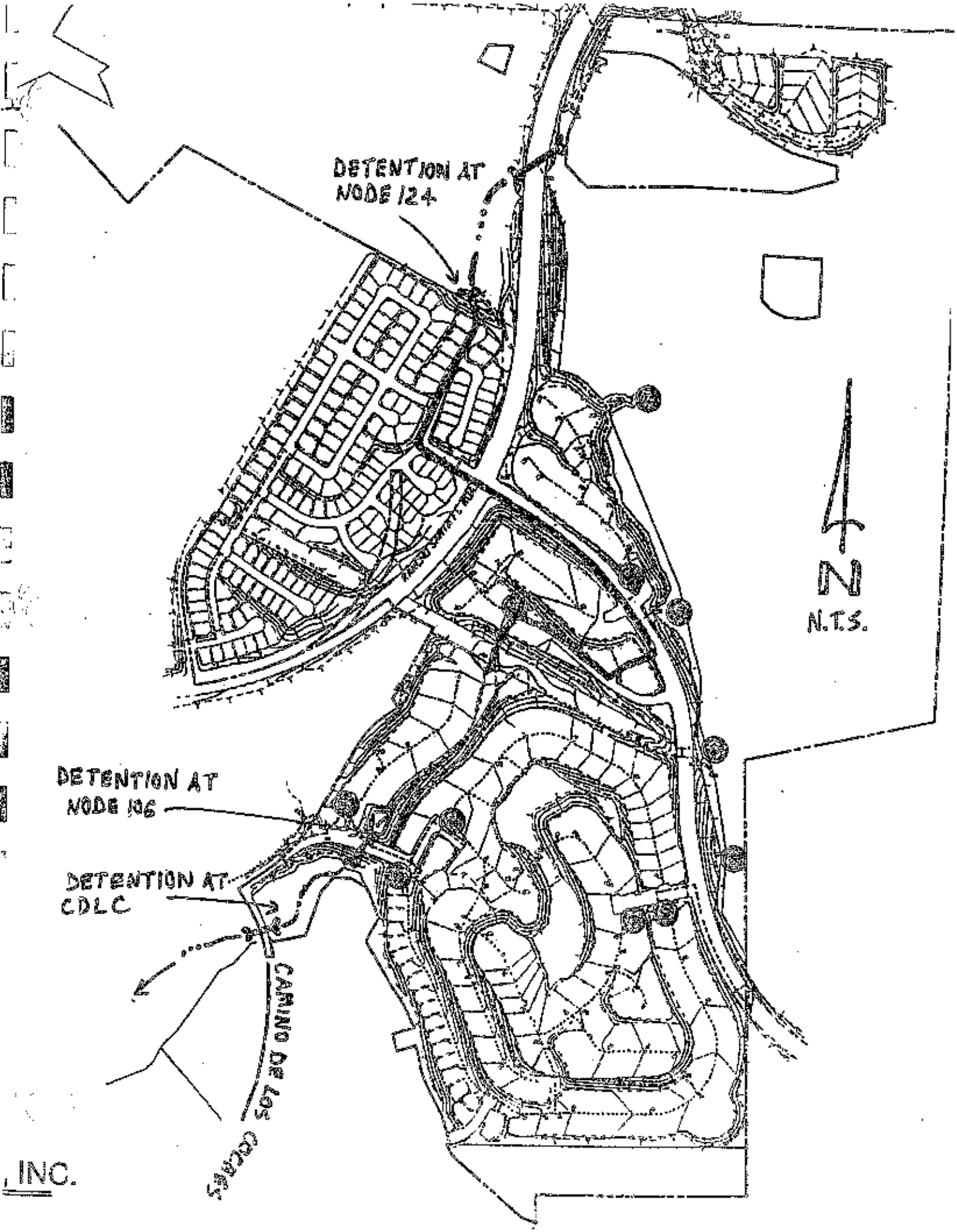
Computed Results

Peak Inflow : 92.009 (cfs) Date/Time of Peak Inflow : 01 Jan 00 1312

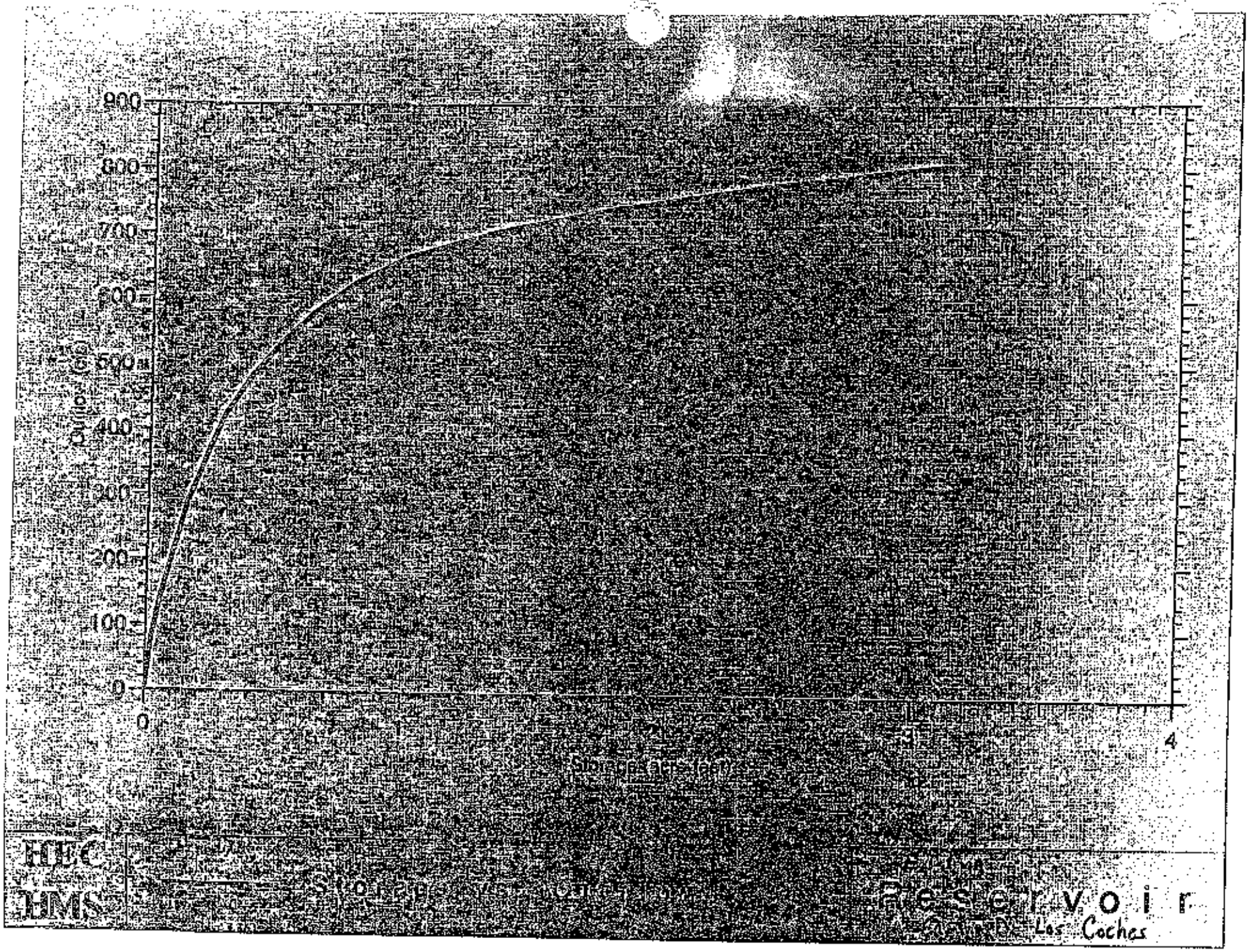
Peak Outflow : 20.671 (cfs) Date/Time of Peak Outflow : 01 Jan 00 1267

Total Inflow : 13.005 (ac-ft) Peak Storage : 2.5441(ac-ft)

Total Outflow : 12.997 (ac-ft) Peak Elevation : 458.09(ft)


DETENTION AT NODE 124
N
N.T.S.
DETENTION AT NODE 106
DETENTION AT CDLC
CAMINO DE LOS COCAGES

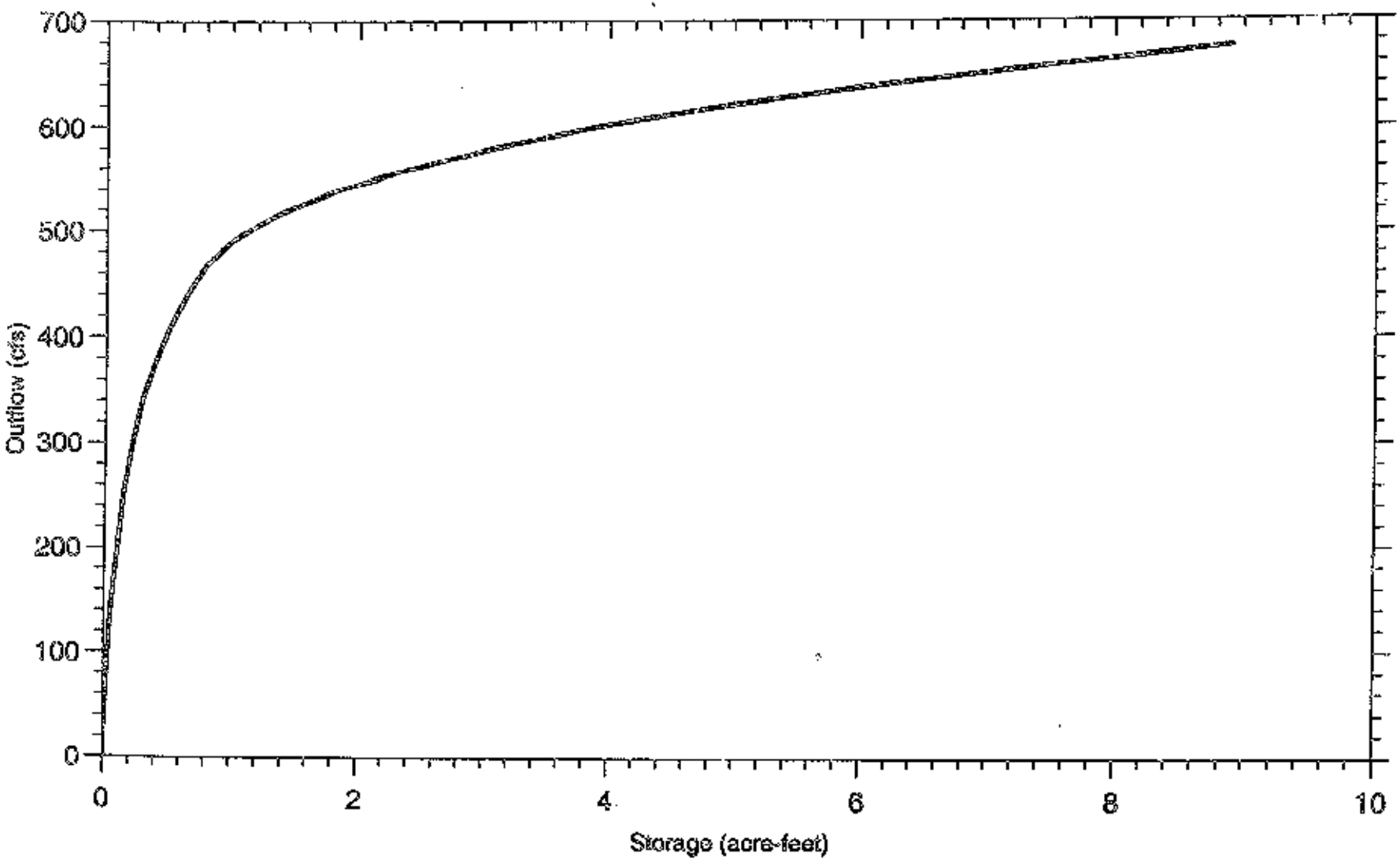
INC.


900
800
700
600
500
400
300
200
100
0
0
4
HEC
HMS
Reservoir
Los Coches

VILLAGES OF LA COSTA
STAGE - STORAGE - DISCHARGE DATA

DETENTION BASIN AT CAMINO DE LOS COCHES

ELEV. (ft)	AREA (ac)	A.S. (ac-ft)	STORAGE (ac-ft)	Q (cfs)
239.0	0.00	0.00	0.00	0.00
240.0	0.012	0.01	0.01	37
241.0	0.02	0.02	0.02	74
241.0				75
242.0	0.04	0.03	0.05	138
242.2				150
243.0	0.05	0.04	0.10	212
243.2				225
244.0	0.06	0.05	0.15	287
244.2				300
245.0	0.07	0.07	0.22	359
245.2				375
246.0	0.09	0.08	0.29	423
246.4				450
247.0	0.11	0.10	0.39	481
247.8				525
248.0	0.12	0.12	0.51	534
248.7				570
249.0	0.14	0.13	0.64	581
250.0	0.16	0.15	0.79	624
251.0	0.28	0.22	1.01	666
251.2				675
252.0	0.40	0.34	1.35	704
253.0	0.52	0.46	1.81	741
253.2				750
254.0	0.64	0.58	2.39	775
255.0	0.74	0.69	3.08	807



HEC HMS

Storage vs. Outflow

Modified
Reservoir
at Camino De Los Coches

VILLAGES OF LA COSTA
STAGE - STORAGE - DISCHARGE DATA

DETENTION BASIN AT CAMINO DE LOS COCHES

ELEV (ft)	AREA (ac)	Δ (ac-ft)	STORAGE (ac-ft)	Q (cfs)
239.0	0.00	0.00	0.00	0.00
240.0	0.012	0.01	0.01	35
240.8				63.4
241.0	0.02	0.02	0.02	75
241.9				126.8
242.0	0.04	0.03	0.05	136
242.9				190.2
243.0	0.05	0.04	0.10	198
244.0				253.6
244.0	0.06	0.05	0.15	254
244.3				270
245.0	0.07	0.07	0.22	300
245.1				306.4
246.0	0.09	0.08	0.29	341
246.1				342.8
247.0	0.11	0.10	0.39	377
247.1				380.4
248.0	0.12	0.12	0.51	410
248.2				415.6
249.0	0.14	0.13	0.64	440
250.0	0.16	0.15	0.79	467
251.0	0.28	0.22	1.01	492
251.7				507.2
252.0	0.40	0.34	1.35	515
253.0	0.52	0.46	1.81	538
253.6				550
254.0	0.64	0.58	2.39	559
255.0	0.74	0.69	3.08	580
255.9				597.6
256.0	0.91	0.83	3.91	600
257.0	1.08	1.00	4.90	619
257.8				634
258.0	1.25	1.17	6.07	638
258.7				650
259.0	1.42	1.34	7.40	658
259.6				667.5
260.0	1.59	4.01	8.91	675

* inlet modified with metal plate to 10-foot by 3.5-foot

CURRENT DATE: 08-14-2001
TIME: 21:26:29

FILE DATE: 08-14-2001
FILE NAME: LSCOCHES ← Camino de Los Coches
Q = 0 to 600 cfs

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.1

CULV NO.	SITE DATA: INLET ELEV. (ft)	OUTLET ELEV. (ft)	CULVERT LENGTH (ft)	CULVERT SHAPE, MATERIAL, INLET: BARRELS SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	239.00	237.30	150.01	1 RCB	10.00	3.50	.016	CONVENTIONAL
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (cfs) FILE: LSCOCHES DATE: 08-14-2001

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
239.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
7.74	60.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
74	120.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
.69	180.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
243.74	240.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
244.99	300.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
246.51	360.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
248.32	420.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
250.31	475.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
253.10	540.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
256.00	600.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: LSCOCHES DATE: 08-14-2001

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
239.00	0.000	0.00	0.00	0.00
240.74	0.000	60.00	0.00	0.00
241.74	0.000	120.00	0.00	0.00
242.69	0.000	180.00	0.00	0.00
243.74	0.000	240.00	0.00	0.00
244.99	0.000	300.00	0.00	0.00
246.31	0.000	360.00	0.00	0.00
248.32	0.000	420.00	0.00	0.00
250.31	0.000	475.00	0.00	0.00
253.10	0.000	540.00	0.00	0.00
256.00	0.000	600.00	0.00	0.00

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

DATE: 08-14-2001
TIME: 21:25:25

FILE DATE: 08-14-2001
FILE NAME: LSCOCHES

PERFORMANCE CURVE FOR CULVERT 1 - 1(10.00 (ft) BY 3.50 (ft)) RCB

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	239.00	0.00	0.00	0-NF	0.00	0.00	0.00	0.00	0.00	5.26
60.00	240.74	1.74	1.74	1-S2n	0.72	1.04	0.84	0.91	9.37	2.42
120.00	241.74	2.74	2.74	1-S2n	1.12	1.65	1.05	1.36	11.42	3.10
180.00	242.69	3.69	3.69	5-S2n	1.46	2.16	1.51	1.73	11.85	3.57
240.00	243.74	4.74	4.74	5-S2n	1.77	2.62	1.87	2.03	12.83	3.93
300.00	244.99	5.99	5.95	5-S2n	2.06	3.06	2.19	2.31	13.69	4.23
360.00	246.51	7.51	7.51	5-S2n	2.33	3.43	2.51	2.56	14.32	4.48
420.00	248.32	9.32	6.93	6-S2n	2.60	3.50	2.80	2.79	15.00	4.70
475.00	250.31	11.31	8.39	6-S2n	2.83	3.50	3.05	2.99	15.57	4.89
540.00	251.10	14.10	10.31	6-S2n	3.10	3.50	3.27	3.21	16.51	5.09
600.00	256.00	17.00	12.11	6-S2n	3.50	3.50	3.40	3.41	17.55	5.26

El. inlet face invert 239.00 ft El. outlet invert 237.30 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

ITE DATA ***** CULVERT INVERT **********

INLET STATION	150.00 ft
INLET ELEVATION	239.00 ft
OUTLET STATION	0.00 ft
OUTLET ELEVATION	237.30 ft
NUMBER OF BARRELS	1
SLOPE (V/H)	0.0113
CULVERT LENGTH ALONG SLOPE	150.01 ft

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	BOX
BARREL SPAN	10.00 ft
BARREL RISE	3.50 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.014
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE (0 DEG. FLARE)
INLET DEPRESSION	NONE

DATE: 03-16-2001
TIME: 22:26:29

FILE DATE: 09-16-2001
FILE NAME: LSCOCHES

TAILWATER

******* REGULAR CHANNEL CROSS SECTION **********

BOTTOM WIDTH	25.00 ft
SIDE SLOPE H/V (X:1)	2.5
CHANNEL SLOPE V/H (ft/ft)	0.022
MANNING'S n (.01-0.1)	0.080
CHANNEL INVERT ELEVATION	237.30 ft
CULVERT NO.1 OUTLET INVERT ELEVATION	237.30 ft

******* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (cfs)	W.S.E. (ft)	FROUDE NUMBER	DEPTH (ft)	VEL. (f/s)	SHEAR (psf)
0.00	237.30	0.502	0.00	5.26	4.68
60.00	238.21	0.449	0.91	2.43	1.25
120.00	238.66	0.469	1.36	3.10	1.87
180.00	239.02	0.479	1.72	3.57	2.37
240.00	239.33	0.485	2.03	3.93	2.79
[illegible]	239.61	0.490	2.31	4.22	3.17
[illegible]	239.86	0.493	2.56	4.40	3.51
[illegible]	240.09	0.496	2.79	4.70	3.83
475.00	240.29	0.498	2.99	4.89	4.11
[illegible]	240.51	0.500	3.21	5.09	4.41
[illegible]	240.71	0.502	3.41	5.26	4.68

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	80.00 ft

***** USER DEFINED ROADWAY PROFILE

CROSS-SECTION COORD. NO.	X ft	Y ft
1	0.00	263.20
2	220.00	260.00
3	435.00	258.10
4	640.00	260.00
5	720.00	261.50

CURRENT DATE: 08-14-2001
TIME: 21:19:17

FILE DATE: 08-14-2001
FILE NAME: LSCOCHES

← Camino de Los Coches
Q = 600 to 675 cfs

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.1

C U L V NO.	SITE DATA: INLET ELEV. (ft)	OUTLET ELEV. (ft)	CULVERT LENGTH (ft)	CULVERT SHAPE, MATERIAL, INLET: BARRELS SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	239.00	237.30	150.01	1 RCB	10.00	3.50	.014	CONVENTIONAL
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (cfs) FILE: LSCOCHES DATE: 08-14-2001

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
256.00	600.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
256.38	607.5	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
[illegible]	615.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
[illegible]	622.5	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
257.[illegible]	630.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
257.[illegible]	637.5	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
257.[illegible]	645.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
258.[illegible]	650.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
259.20	660.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
259.62	667.5	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
260.05	675.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: LSCOCHES DATE: 08-14-2001

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
256.00	0.000	600.00	0.00	0.00
256.38	0.000	607.50	0.00	0.00
256.77	0.000	615.00	0.00	0.00
257.16	0.000	622.50	0.00	0.00
257.56	0.000	630.00	0.00	0.00
257.96	0.000	637.50	0.00	0.00
258.37	0.000	645.00	0.00	0.00
258.65	0.000	650.00	0.00	0.00
259.20	0.000	660.00	0.00	0.00
259.62	0.000	667.50	0.00	0.00
260.05	0.000	675.00	0.00	0.00

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

DATE: 08-14-2001
TIME: 21:19:17

FILE DATE: 08-14-2001
FILE NAME: LSCOCHES

PERFORMANCE CURVE FOR CULVERT 1 - 1(10.00 (ft) BY 3.50 (ft)) RCB

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
600.00	256.00	17.00	12.31	6-S2n	3.50	3.50	3.40	3.41	17.69	5.26
607.50	256.36	17.36	12.57	6-S2n	3.50	3.50	3.40	3.43	17.87	5.28
615.00	256.77	17.77	12.84	6-S2n	3.50	3.50	3.40	3.45	18.09	5.30
622.50	257.16	18.16	13.11	6-S2n	3.50	3.50	3.40	3.46	18.31	5.32
630.00	257.56	18.56	13.39	6-S2n	3.50	3.50	3.40	3.50	18.53	5.34
637.50	257.96	18.96	13.69	4-S2n	3.50	3.50	3.40	3.52	18.75	5.35
645.00	258.37	19.37	14.00	4-S2n	3.50	3.50	3.40	3.54	18.97	5.37
650.00	258.65	19.65	14.20	4-S2n	3.50	3.50	3.40	3.56	19.12	5.39
660.00	259.20	20.20	14.61	4-S2n	3.50	3.50	3.40	3.59	19.41	5.41
667.50	259.62	20.62	14.91	4-S2n	3.50	3.50	3.40	3.61	19.63	5.43
675.00	260.05	21.05	15.24	4-S2n	3.50	3.50	3.40	3.63	19.85	5.45

El. inlet face invert 239.00 ft El. outlet invert 237.30 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

SITE DATA ***** CULVERT INVERT **********

INLET STATION	150.00 ft
INLET ELEVATION	239.00 ft
OUTLET STATION	0.00 ft
OUTLET ELEVATION	237.30 ft
NUMBER OF BARRELS	1
SLOPE (V/H)	0.0113
CULVERT LENGTH ALONG SLOPE	150.01 ft

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	BOX
BARREL SPAN	10.00 ft
BARREL RISE	3.50 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.014
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE (0 DEG. FLARE)
INLET DEPRESSION	NONE

DATE: 08-14-2001
TIME: 21:19:17

FILE DATE: 06-14-2001
FILE NAME: LSCOCHES

TAILWATER

******* REGULAR CHANNEL CROSS SECTION **********

BOTTOM WIDTH	25.00 ft
SIDE SLOPE H/V (X:1)	2.5
CHANNEL SLOPE V/H (ft/ft)	0.022
MANNING'S n (.01-0.1)	0.080
CHANNEL INVERT ELEVATION	237.30 ft
CULVERT NO.1 OUTLET INVERT ELEVATION	237.30 ft

******* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (cfs)	W.S.E. (ft)	FROUDE NUMBER	DEPTH (ft)	VEL. (ft/s)	SHEAR (psf)
600.00	240.71	0.503	3.41	5.26	4.68
607.50	240.73	0.502	3.43	5.28	4.71
615.00	240.75	0.503	3.45	5.30	4.74
622.50	240.78	0.503	3.48	5.32	4.77
630.00	240.80	0.503	3.50	5.34	4.80
637.50	240.82	0.503	3.52	5.35	4.84
645.00	240.85	0.503	3.54	5.37	4.87
650.00	240.86	0.503	3.55	5.39	4.89
660.00	240.89	0.503	3.59	5.41	4.93
667.50	240.91	0.503	3.61	5.43	4.96
675.00	240.93	0.504	3.63	5.45	4.99

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	80.00 ft

***** USER DEFINED ROADWAY PROFILE

CROSS-SECTION COORD. NO.	X ft	Y ft
1	0.00	263.20
2	220.00	260.00
3	435.00	256.10
4	640.00	260.00
5	720.00	261.50

STREET SIGN

"END" 0 REG.

AS BUILT

Tom R. McGannon 11-20-87

Tom R. McGannon RCE 23956 DATE

REGISTERED PROFESSIONAL ENGINEER
TOM R. McGANNON
R.C.E. 23956
Expires 12-31-88
CIVIL
STATE OF CALIFORNIA

ENGINEER OF WORK AS OF:

Tom R. McGannon 6-10-85

Tom R. McGannon RCE 23956 DATE

"AS BUILT"

~~RICK ENGINEERING COMPANY~~
~~PLANNERS - CIVIL ENGINEERS - LAND SURVEYORS~~
~~3088 PIO PICO DRIVE, SUITE 103, CARLSBAD, CALIF. 92008~~
~~TELEPHONE (714) 729-4987~~

PRIVATE CONTRACT

11-20-87	[illegible]
	APP'D

SHEET 6

CITY OF CARLSBAD
ENGINEERING DEPARTMENT

SHEETS 19

PLANS FOR THE IMPROVEMENT OF
MISIÓN ESTANCIA (CAMINO DE LOS COCHES)
SANTA FE KNOLLS C.T. 75-9(B) UNIT 2

APPROVED Lester G. Evans
RE 20924 CITY ENGINEER

DATE 10-26-80

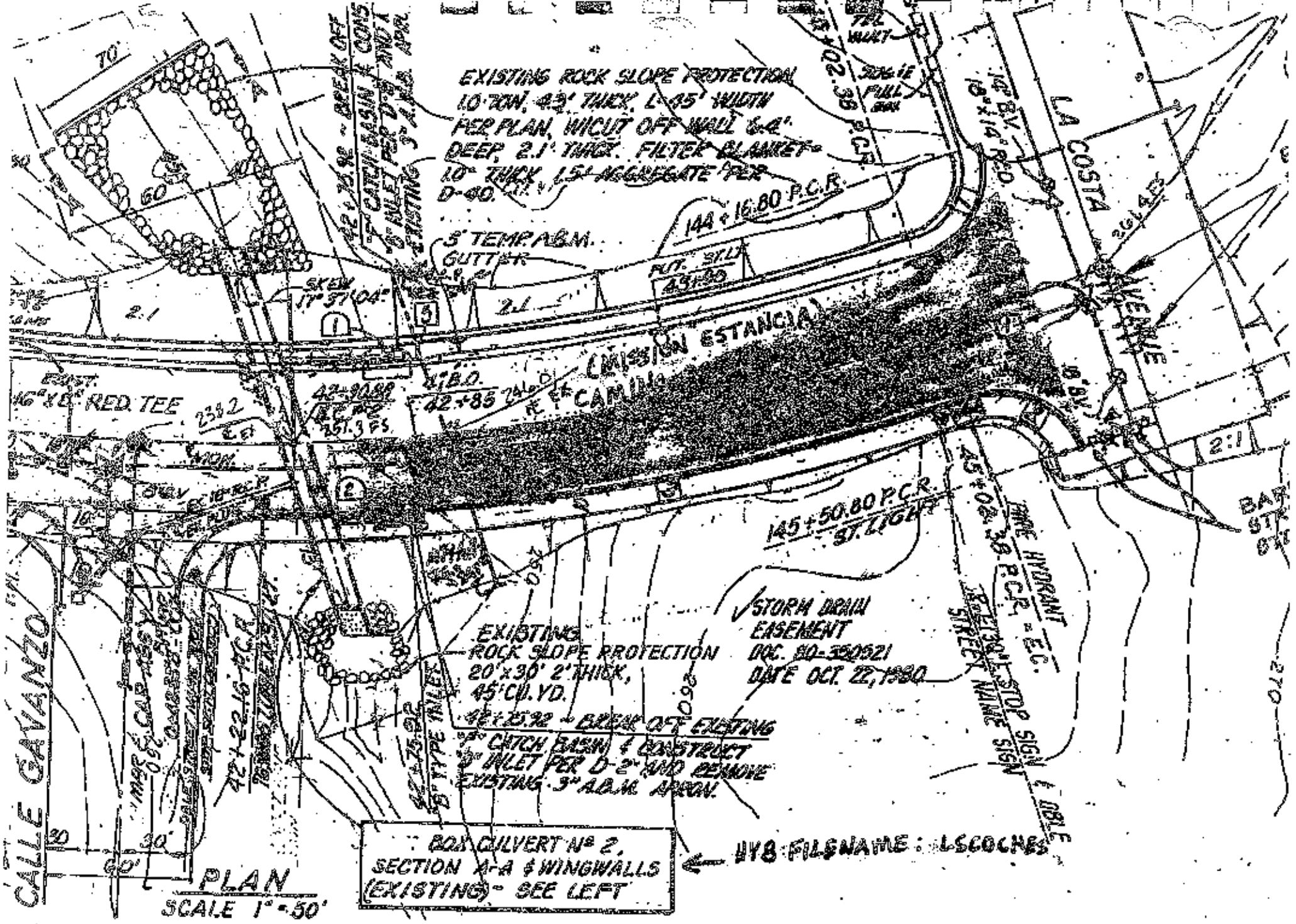
SCALES
HORIZ AS
VERT. NOTED

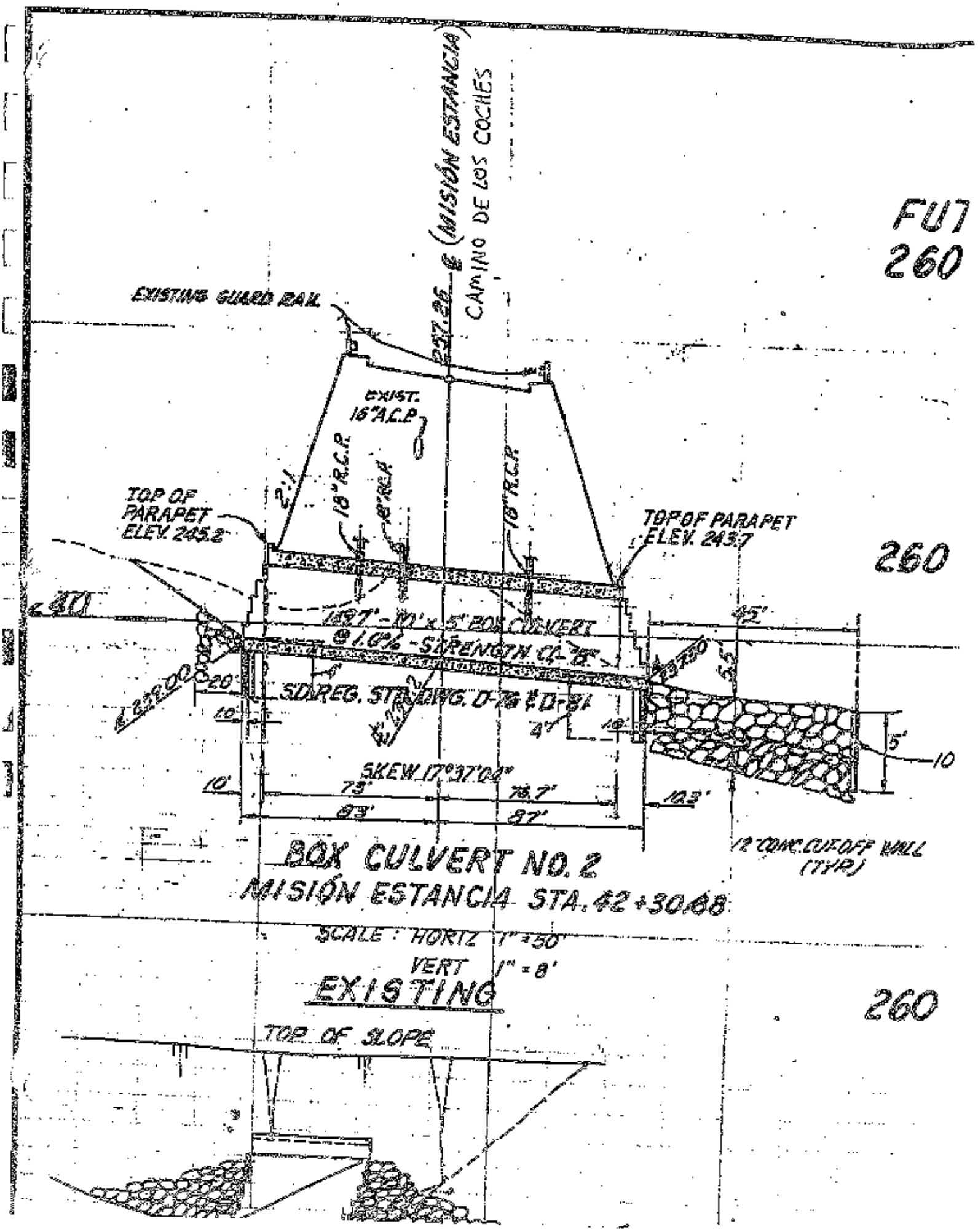
DWN BY
CHKD BY
FIELD BY

PROJECT NO.

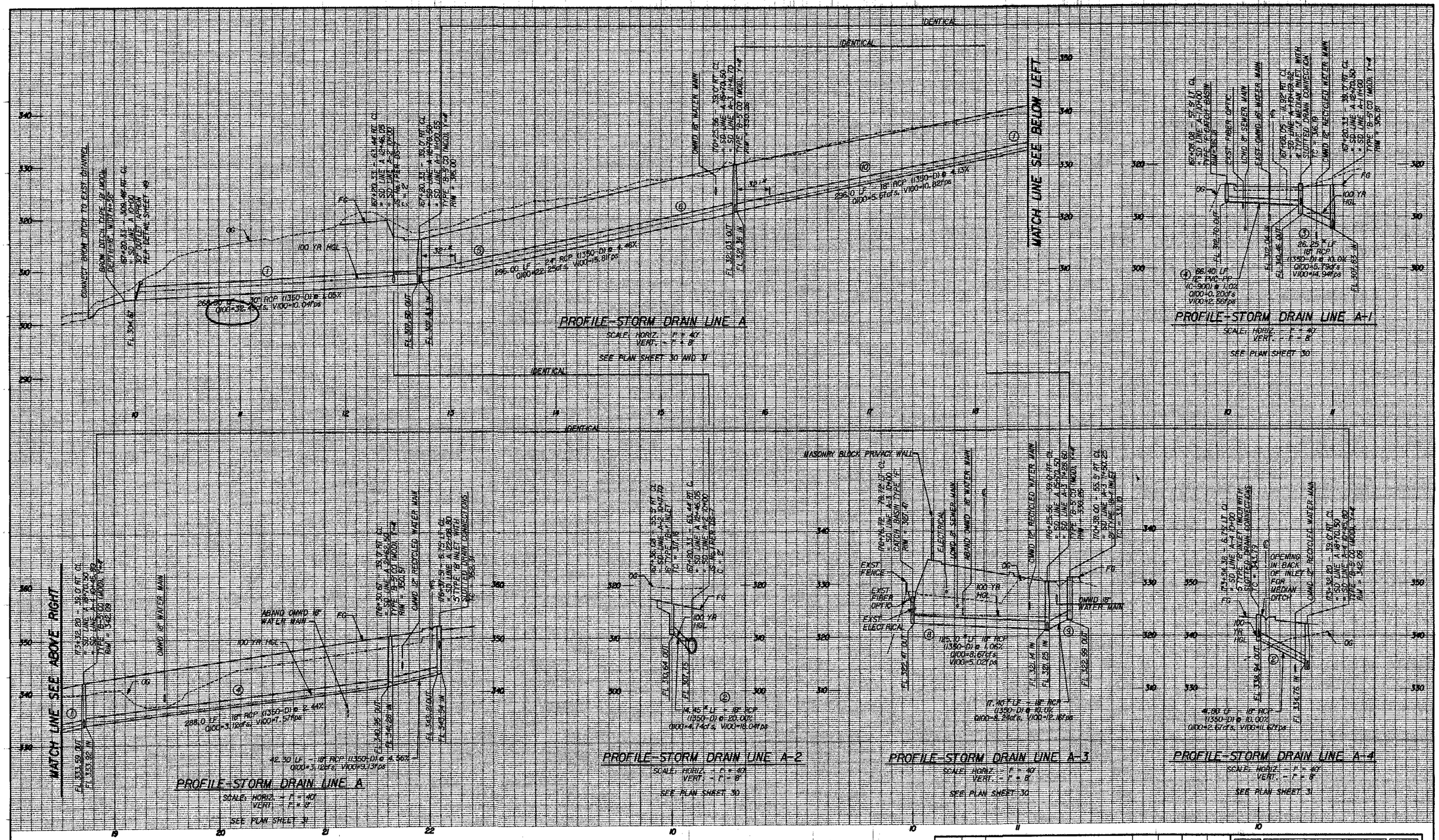
DRAWING NO. 205-3

JOB NO. 7596


EXISTING ROCK SLOPE PROTECTION 10' TOW. 4.3' THICK, L=45' WIDTH PER PLAN, W/CUT OFF WALL 6.4' DEEP, 2.1' THICK. FILTER BLANKET 1.0' THICK, 1.5" AGGREGATE PER D-40.
144+16.80 P.C.R.
5' TEMP. A.B.M. GUTTER
SKEW 17° 51' 04"
(MISSION ESTANCIA)
CAMINO
LA COSTA
AVENUE
RED TEE
145+50.80 P.C.R.
ST. LIGHT
FIRE HYDRANT
STORM DRAIN EASEMENT
DOC. 80-350521
DATE OCT. 22, 1980
EXISTING ROCK SLOPE PROTECTION 20'x30' 2' THICK, 45 CU. YD.
42+25.92 - BREAK OFF EXISTING 5' CATCH BASIN & CONSTRUCT 5' INLET PER D-2 AND REMOVE EXISTING 3" A.B.M. APRON.
5' TYPE INLET
BOX CULVERT Nº 2, SECTION A-A & WINGWALLS (EXISTING) - SEE LEFT
HYB FILENAME : LSCOCHES
CALLE GAVANZO
PLAN
SCALE 1" = 50'
ENGINEER OF WORK
11-30-81 TRM "AS BUILT



FU7
260
EXISTING GUARD RAIL
257.26 ℄ (MISIÓN ESTANCIA)
CAMINO DE LOS COCHES
EXIST. 16" A.C.P.
2:1
18" R.C.P.
18" R.C.P.
18" R.C.P.
TOP OF PARAPET ELEV. 245.2
TOP OF PARAPET ELEV. 243.7
260
℄ 40
149.7' - 10' x 5' BOX CULVERT
@ 1.0% - STRENGTH CL. "B"
45'
5.5'
20'
SD REG. STD. DWG. D-76 & D-81
10'
4'
10'
5'
10
SKEW 17°37'04"
10'
73'
76.7'
10.3'
83'
87'
12" CONC. CUT-OFF WALL (TYP.)
BOX CULVERT NO. 2
MISIÓN ESTANCIA STA. 42+30.68
SCALE: HORIZ 1" = 50'
VERT 1" = 8'
EXISTING
260
TOP OF SLOPE



* PRESSURE PIPE SHALL HAVE WATER TIGHT JOINTS PER LIMITS SHOWN

REGISTERED PROFESSIONAL ENGINEER
JASON P. HUBBARD
No. C060317
Exp. 06/30/04
CIVIL
STATE OF CALIFORNIA

DOKKEN ENGINEERING
www.dokkenengineering.com
5665 Chesapeake Drive, Suite 435 San Diego, CA 92123 (858) 514-6377

PROJECT ENGINEER: KB DATE: 7/17/02
DETAILS BY: JH SCALE: AS SHOWN
PROJECT MANAGER: RTL JOB NO.: 1058
ENGINEER OF WORK: DATE: JULY 17, 2002
JASON P. HUBBARD RCE: C060317

"AS BUILT"
P.E. 66490 EXP 6/30/06 11/22/05 DATE
REVIEWED BY: 9/10/06 DATE
INSPECTOR

BENCHMARK:

DESCRIPTION: K-302. A STANDARD DISK STAMPED K 302 1935, SET IN THE TOP OF A CONCRETE POST
ELEVATION: 533.39 NGVD 29 (MEAN SEA LEVEL) PER NGS DATA SHEET
LOCATION: FOUND U.S.C.&G.S. BRASS DISC STAMPED "K302 1935" IN CONC. MON.
POINT LIES 8.5' EASTERLY OF EASTERN BERM LINE ON RANCHO SANTA FE ROAD, 133' NORTHERLY OF ELECTRIC TRANSMISSION LINE POLE MARKED "TL23011" AND "TL13825" AND APPROXIMATELY 1.2 MILES NORTHERLY OF THE INTERSECTION OF RANCHO SANTA FE ROAD AND LA COSTA AVENUE

DATE	INITIAL	REVISION DESCRIPTION	DATE	INITIAL	DATE	INITIAL
ENGINEER OF WORK			OTHER APPROVAL		CITY APPROVAL	

SHEET 42 | CITY OF CARLSBAD ENGINEERING DEPARTMENT | SHEETS 138

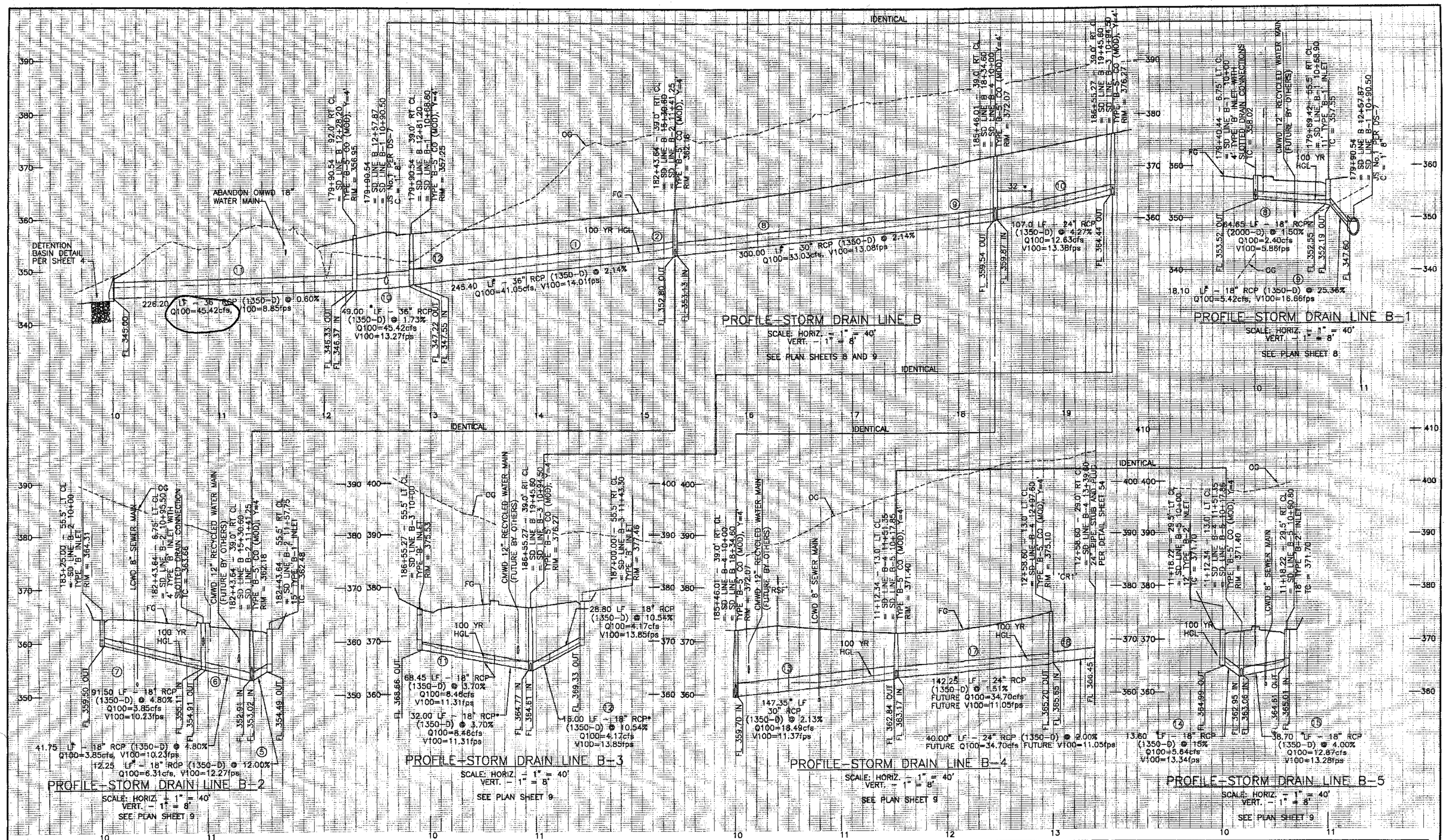
DRAINAGE PROFILES FOR:
RANCHO SANTA FE ROAD
SD LINE A AND A-1 TO A-4

APPROVED DAVID HAUSER 7/18/02
PE 33081 EXP:6-30-06 DEPUTY CITY ENGINEER DATE

DWN BY: CHKD BY: RVWD BY: | PROJECT NO. 3190 | DRAWING NO. 368-2

DATE PLOTTED => 07/17/2002

USERNAME => Jason.H DGN FILE => p:\1058_RSF\511\Stg2\1058gd14.dgn



* PRESSURE PIPE SHALL HAVE WATER TIGHT JOINTS PER LIMITS SHOWN

ENGINEER OF WORK

Raymond L. Martin 5/23/02
RAYMOND L. MARTIN DATE
R.C.E. NO. 48670 EXP. 6/30/04

REGISTERED PROFESSIONAL ENGINEER RAYMOND L. MARTIN NO. 48670 EXP. 6/30/04 CIVIL STATE OF CALIFORNIA

HUNSAKER & ASSOCIATES SAN DIEGO, INC
PLANNING 10179 Huennekens Street
ENGINEERING San Diego, Ca 92121
SURVEYING PH(858)558-4500 FX(858)558-9154

"AS BUILT"
P.E. 48670 EXP 6-30-04 — 5/30/03 DATE
REVIEWED BY: — 6/11/03
INSPECTOR DATE

BENCHMARK:

DESCRIPTION: K-302. A STANDARD DISK STAMPED K 302 1935, SET IN THE TOP OF A CONCRETE POST

ELEVATION: 533.39 NGVD 29 (MEAN SEA LEVEL) PER NGS DATA SHEET

LOCATION: FOUND U.S.C.&G.S. BRASS DISC STAMPED "K302 1935" IN CONC. MON. POINT LIES 8.5' EASTERLY OF EASTERN BERM LINE ON RANCHO SANTA FE ROAD, 133' NORTHERLY OF ELECTRIC TRANSMISSION LINE POLE MARKED "TL23011" AND "TL13825" AND APPROXIMATELY 1.2 MILES NORTHERLY OF THE INTERSECTION OF RANCHO SANTA FE ROAD AND LA COSTA AVENUE

DATE	INITIAL	REVISION DESCRIPTION	DATE	INITIAL	DATE	INITIAL
2-26-03	RLM	1 AS BUILT				
ENGINEER OF WORK			OTHER APPROVAL		CITY APPROVAL	

SHEET 14 — CITY OF CARLSBAD ENGINEERING DEPARTMENT — SHEETS 30

DRAINAGE PROFILES FOR:

RANCHO SANTA FE ROAD

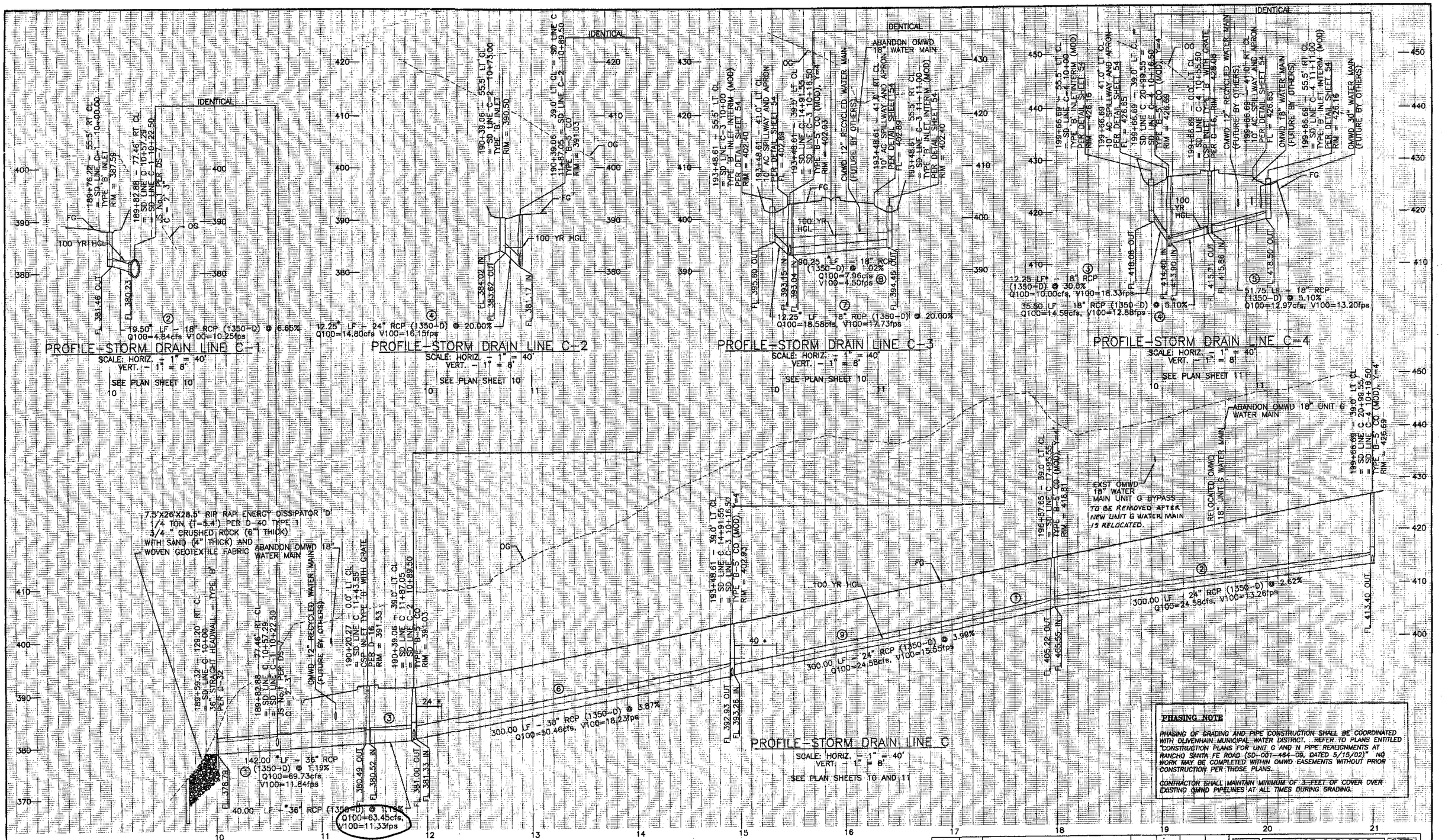
SD LINE B AND B-1 TO B-5

APPROVED DAVID HAUSER
PE 33081 EXP:6-30-02 DEPUTY CITY ENGINEER 6/3/02 DATE

DWN BY: SKH
CHKD BY: RVWD BY: DKS

PROJECT NO. 3190

DRAWING NO. 368-2C



* PRESSURE PIPE SHALL HAVE WATER TIGHT JOINTS PER LIMITS SHOWN

PHASING NOTE

PHASING OF GRADING AND PIPE CONSTRUCTION SHALL BE COORDINATED WITH OLIVENHAIN MUNICIPAL WATER DISTRICT. REFER TO PLANS ENTITLED "CONSTRUCTION PLANS FOR UNIT G AND N PIPE REALIGNMENTS AT RANCHO SANTA FE ROAD (SD-001-464-09, DATED 5/15/02)" NO WORK MAY BE COMPLETED WITHIN OMWD EASEMENTS WITHOUT PRIOR CONSTRUCTION PER THOSE PLANS.

CONTRACTOR SHALL MAINTAIN MINIMUM OF 3 FEET OF COVER OVER EXISTING OMWD PIPELINES AT ALL TIMES DURING GRADING.

ENGINEER OF WORK

Raymond L. Martin 5/23/03
RAYMOND L. MARTIN — DATE
R.C.E. NO. 48670 EXP. 6/30/04

REGISTERED PROFESSIONAL ENGINEER — RAYMOND L. MARTIN — NO. 48670 EXP. 6/30/04 — CIVIL — STATE OF CALIFORNIA

HUNSAKER & ASSOCIATES SAN DIEGO INC
PLANNING 10179 Huennekens Street
ENGINEERING San Diego, Ca 92121
SURVEYING (858)558-4500 FAX(858)558-1414

"AS BUILT"

R.E. 48670 EXP 6-30-04 — 5/30/03 DATE

REVIEWED BY: INSPECTOR — 9/11/03 DATE

BENCHMARK:

DESCRIPTION: K-302. A STANDARD DISK STAMPED K 302 1935, SET IN THE TOP OF A CONCRETE POST

ELEVATION: 533.39 NGVD 29 (MEAN SEA LEVEL) PER NGS DATA SHEET

LOCATION: FOUND U.S.C.&G.S. BRASS DISC STAMPED "K302 1935" IN CONC. MON. POINT LIES 8.5' EASTERLY OF EASTERN BERM LINE ON RANCHO SANTA FE ROAD, 133' NORTHERLY OF ELECTRIC TRANSMISSION LINE POLE MARKED "TL23011" AND "TL13825" AND APPROXIMATELY 1.2 MILES NORTHERLY OF THE INTERSECTION OF RANCHO SANTA FE ROAD AND LA COSTA AVENUE

DATE	INITIAL	REVISION DESCRIPTION	DATE	INITIAL	DATE	INITIAL
2-25-03	RLM	1 AS BUILT				
			OTHER APPROVAL		CITY APPROVAL	

ENGINEER OF WORK

SHEET 15 — CITY OF CARLSBAD, ENGINEERING DEPARTMENT — SHEETS 30

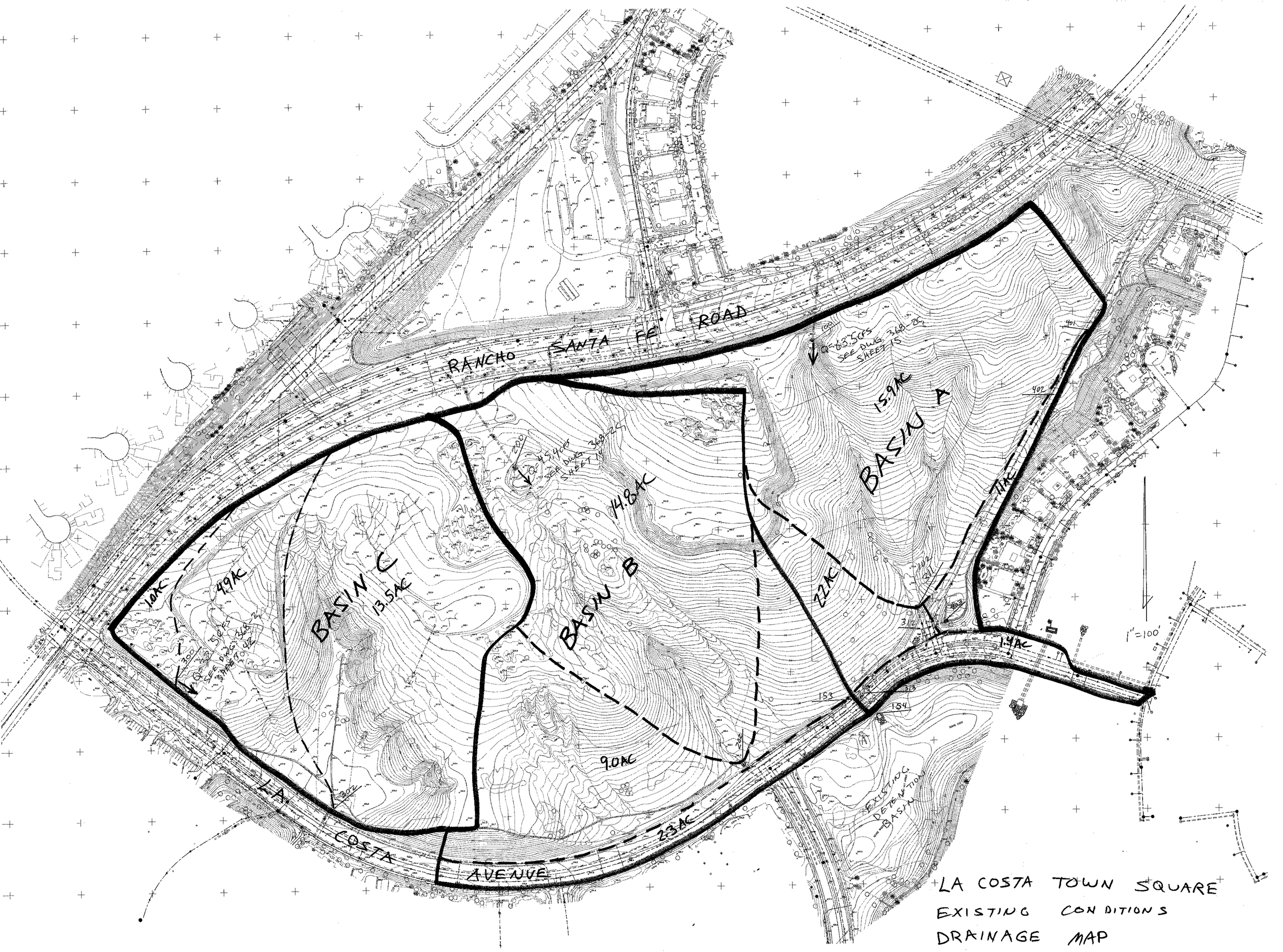
DRAINAGE PROFILES FOR:

RANCHO SANTA FE ROAD

SD LINE C AND C-1 TO C-4

APPROVED: David Hauser — DAVID HAUSER, DEPUTY CITY ENGINEER — 6/2/03 DATE
PE 33081 EXP.6-30-02

DWN BY: — CHKD BY: — RVWD BY: — PROJECT NO. 3190 — DRAWING NO. 368-2C



LA COSTA TOWN SQUARE
EXISTING CONDITIONS
DRAINAGE MAP

LA COSTA TOWN SQUARE
PROPOSED CONDITIONS
DRAINAGE MAP