HYDROLOGY REPORT

for

TRACT 38236 & 38237

Located in the City of Moreno Valley
County of Riverside

Prepared For:

D·R·HORTON
America's Builder
2280 Wardlow Circle
Corona, CA 92880
Tel: (951)272-9000

Prepared by:

adkan ENGINEERS
6879 Airport Drive
Riverside, CA 92504
Tel (951) 688-0241
Fax (951) 688-0599

Job No. 9971
August 17, 2021

adkan ENGINEERS
CIVIL ENGINEERING • SURVEYING • PLANNING
6879 AIRPORT DRIVE, RIVERSIDE, CA 92504
Tel: 951.688.0241 • Fax: 951.688.0599
www.adkan.com

Table of Contents

1. Purpose 1
2. Project Description 1
   A. Vicinity Map 1
3. Pre-Development Hydrology/Hydraulic Conditions 1
4. Post-Development Hydrology/Hydraulic Conditions 2
5. Method of Analysis 2
6. Summary of Finding 2
7. Conclusion 3

Post-Development Onsite and Offsite 10 & 100 year (Rational Method) ..... Section 1
Catch Basin and Street Capacity ..... Section 2
Approved Offsite Hydrology Maps and MDP Storm Drain Plans ..... Section 3
Riverside County Plates ..... Section 4

1. Purpose

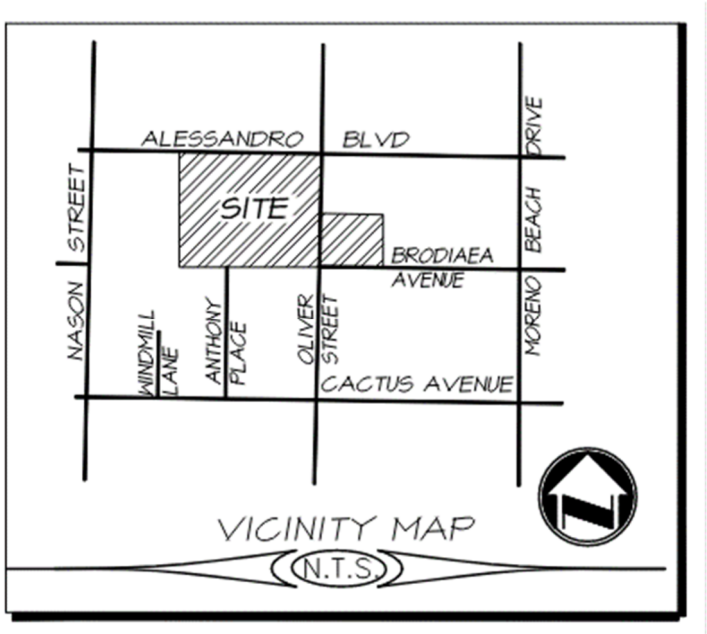
This Hydrology Report has been prepared in order to obtain entitlement approval of Tract 38236. Adkan Engineers has prepared this study to ensure that adequate size and proper operation of drainage facilities are incorporated into the Post-Development project site.

2. Project Description

Tract 38236 is located in the City of Moreno Valley north of Brodiaea Avenue, east of Nason Street, south of Alessandro Avenue and west of Oliver Street. The planned development will consist of 204 single-family residences, street improvements, and 4 onsite stormwater treatment areas (Bio-retention basins). They are located South of Lot 70, West of Lot 198, East of Lot 190 and North of Lot 183. Offsite street improvements will be done on Alessandro Avenue and Brodiaea Avenue in order to build out ultimate curb and gutter along the project frontage. All onsite runoff will flow to the south east as per the existing drainage path.

Tract 38237 is located in the City of Moreno Valley north of Brodiaea Avenue, east of Oliver Street, south of Alessandro Avenue and west of Moreno Beach Drive. The planned development will consist of 67 single-family residences, street improvements, and 2 onsite stormwater treatment areas (Bio-retention basins). They are at the intersection of Oliver Street and Brodiaea Avenue and between Lot 47 & 48. Offsite street improvements will be done on Oliver Street and Brodiaea Avenue in order to build out ultimate curb and gutter along the project frontage. All onsite runoff will flow to the south as per the existing drainage path.

A. Vicinity Map



3. Pre-Development Hydrology

Site is vacant with no existing structures or roads on the site. All flows from the site flow towards the south east Existing Q100 runoff flows are shown on the Riverside County Flood Control and Water Conservation District:

Moreno Master Drainage Plan (Adopted October 1980; Revision No.2 April 2015) in Section 3 of this report. Existing Q100 entering MDP Line H at the intersection of Cactus Avenue and Oliver Street drain lines. All major drainage paths along Alessandro Blvd and Brodiaea Avenue are earthen swales. The flows from the swales flow down Oliver Street.

4. Post-Development Hydrology

Tract 38236 Onsite low flow runoff from the proposed development will flow into 4 onsite stormwater treatment areas (Bio-retention basins). They are located South of Lot 70, West of Lot 198, East of Lot 190 and North of Lot 183. Offsite street improvements will be done on Alessandro Avenue and Brodiaea Avenue in order to build out ultimate curb and gutter along the project frontage. All onsite runoff will flow to the south east as per the existing drainage path.

MDP Line H at the intersection of Cactus Avenue and Oliver Street drain lines will be extended towards the intersection of Oliver Street and Brodiaea Avenue to collect the onsite runoff.

Tract 38237 onsite low flow runoff from the proposed development will flow into 2 onsite stormwater treatment areas (Bio-retention basins). They are at the intersection of Oliver Street and Brodiaea Avenue and between Lot 47 & 48. The site drains towards the southeast and the southwest. The east side of the site will flow towards MDP Line H-2 and the west side drains towards the proposed extended MDP Line H.

5. Method of Analysis

The site hydrology was based upon Riverside County Flood Control and Water Conversation District Hydrology Manual, from which pertinent soil and rainfall information was obtained.

Storm flows were determined by the “RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM”, Riverside County Flood Control & Water Conservation District 1978 Hydrology Manual, produced by Bondamin Engineering.

6. Summary of Findings

Tract 38236 offsite and onsite flows surrounding the site will be collected by MDP Line H will be adequately sized to convey the 100-year storm event. All onsite flows will be collected by proposed catch basins and storm drain system to pretreat storm flows using the proposed Bio-retention basin prior to discharging into MDP Line H.

Tract 38237 offsite and onsite flows surrounding the site with flow towards the east side of the site will flow towards MDP Line H-2 and the west side drains towards the proposed extended MDP Line H. The extended Line H be adequately sized to convey the 100-year storm event. All onsite flows will be collected by proposed catch basins and storm drain system to pretreat storm flows using the proposed Bio-retention basins in the east and the west prior to discharging into MDP Line H or Line H-2.

Runoff Q’s for the proposed storm drain lines on the Moreno Master Drainage Plan (Line H, H-5 &H-5a) are proposed and not existing facilities.

7. Conclusion

The hydrologic calculations provided herein substantiate the design of the Post-Development project and indicate the following:

- The Post-Development facilities demonstrate the ability to convey the 100 year storm events

Based on the Hydrology and Hydraulic analysis conducted and results shown herein and part thereof, it is our conclusion this project **does not** negatively impact the local community or watershed goals.

Section 1

Post-Development 10 & 100 year Hydrology Offsite & Onsite (Rational Method)

```
                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
        Rational Hydrology Study        Date: 08/16/21  File:pro10.out
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

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

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


Program License Serial Number 5006

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

Storm event (year) =   10.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)
For the [ Sunnymead-Moreno ] area used.
10 year storm 10 minute intensity =  2.010(In/Hr)
10 year storm 60 minute intensity =  0.820(In/Hr)
100 year storm 10 minute intensity =  2.940(In/Hr)
100 year storm 60 minute intensity =  1.200(In/Hr)

Storm event year =  10.0
Calculated rainfall intensity data:
1 hour intensity =  0.820(In/Hr)
Slope of intensity duration curve = 0.5000



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station        1.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
____________________________________________________________________________
Rainfall intensity =      1.420(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.709
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
User specified values are as follows:
TC =  20.00 min.  Rain intensity =       1.42(In/Hr)
Total area =         0.00(Ac.)  Total runoff =    355.00(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station        2.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
____________________________________________________________________________
Upstream point/station elevation =  1580.500(Ft.)
Downstream point/station elevation =  1564.000(Ft.)
Pipe length  =   931.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   355.000(CFS)
Nearest computed pipe diameter  =     60.00(In.)
Calculated individual pipe flow  =   355.000(CFS)
Normal flow depth in pipe =   50.63(In.)
Flow top width inside pipe =   43.57(In.)
Critical depth could not be calculated.
Pipe flow velocity =     20.10(Ft/s)
Travel time through pipe =    0.77 min.
Time of concentration (TC) =    20.77 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.000 to Point/Station        2.000
**** CONFLUENCE OF MAIN STREAMS ****
____________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      0.000(Ac.)
Runoff from this stream =    355.000(CFS)
Time of concentration =   20.77 min.
Rainfall intensity =     1.394(In/Hr)
Program is now starting with Main Stream No. 2
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.000 to Point/Station        4.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   709.000(Ft.)
Top (of initial area) elevation =  1584.000(Ft.)
Bottom (of initial area) elevation =  1573.500(Ft.)
Difference in elevation =    10.500(Ft.)
Slope =    0.01481  s(percent)=       1.48
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.622 min.
Rainfall intensity =      2.048(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.870
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.531(CFS)
Total initial stream area =        0.860(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.000 to Point/Station        5.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1573.500(Ft.)
Downstream point/station elevation =  1569.000(Ft.)
Pipe length  =    65.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.531(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.531(CFS)
Normal flow depth in pipe =    3.69(In.)
Flow top width inside pipe =    8.85(In.)
Critical Depth =    6.84(In.)
Pipe flow velocity =      8.99(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =     9.74 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.000 to Point/Station        5.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      0.860(Ac.)
Runoff from this stream =      1.531(CFS)
Time of concentration =    9.74 min.
Rainfall intensity =     2.035(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        6.000 to Point/Station        7.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   370.000(Ft.)
Top (of initial area) elevation =  1581.300(Ft.)
Bottom (of initial area) elevation =  1573.500(Ft.)
Difference in elevation =     7.800(Ft.)
Slope =    0.02108  s(percent)=       2.11
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.912 min.
Rainfall intensity =      2.416(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.873
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      0.548(CFS)
Total initial stream area =        0.260(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        7.000 to Point/Station        5.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1573.500(Ft.)
Downstream point/station elevation =  1469.000(Ft.)
Pipe length  =    44.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.548(CFS)
```

```
Nearest computed pipe diameter  =      3.00(In.)
Calculated individual pipe flow  =     0.548(CFS)
Normal flow depth in pipe =    1.32(In.)
Flow top width inside pipe =    2.98(In.)
Critical depth could not be calculated.
Pipe flow velocity =     26.23(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =     6.94 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.000 to Point/Station        5.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.260(Ac.)
Runoff from this stream =      0.548(CFS)
Time of concentration =    6.94 min.
Rainfall intensity =     2.411(In/Hr)
Summary of stream data:

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


1        1.531      9.74                  2.035
2        0.548      6.94                  2.411
Largest stream flow has longer time of concentration
Qp =      1.531 + sum of
          Qb         Ia/Ib
           0.548 *    0.844 =      0.463
Qp =      1.994

Total of 2 streams to confluence:
Flow rates before confluence point:
       1.531       0.548
Area of streams before confluence:
        0.860        0.260
Results of confluence:
Total flow rate =      1.994(CFS)
Time of concentration =     9.743 min.
Effective stream area after confluence =      1.120(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.000 to Point/Station        8.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1569.000(Ft.)
Downstream point/station elevation =  1568.300(Ft.)
Pipe length  =   139.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.994(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     1.994(CFS)
Normal flow depth in pipe =    8.04(In.)
Flow top width inside pipe =   11.29(In.)
Critical Depth =    7.23(In.)
Pipe flow velocity =      3.57(Ft/s)
Travel time through pipe =    0.65 min.
Time of concentration (TC) =    10.39 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        8.000 to Point/Station        9.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1568.300(Ft.)
End of natural channel elevation =   1568.000(Ft.)
Length of natural channel  =   166.000(Ft.)
Estimated mean flow rate at midpoint of channel =      2.216(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   0.75(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0018
Corrected/adjusted channel slope =  0.0018
Travel time =    3.70 min.     TC =   14.09  min.


 Adding area flow to channel
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.598
Decimal fraction soil group A = 0.000
```

```
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.692(In/Hr) for a    10.0 year storm
Subarea runoff =      0.253(CFS) for      0.250(Ac.)
Total runoff =      2.247(CFS)       Total area =       1.370(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        9.000 to Point/Station        9.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      1.370(Ac.)
Runoff from this stream =      2.247(CFS)
Time of concentration =   14.09 min.
Rainfall intensity =     1.692(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station       11.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   616.000(Ft.)
Top (of initial area) elevation =  1579.600(Ft.)
Bottom (of initial area) elevation =  1570.300(Ft.)
Difference in elevation =     9.300(Ft.)
Slope =    0.01510  s(percent)=       1.51
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.779 min.
Rainfall intensity =      1.851(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.737
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      3.152(CFS)
Total initial stream area =        2.310(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station       12.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1570.300(Ft.)
Downstream point/station elevation =  1568.300(Ft.)
Pipe length  =    60.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.152(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     3.152(CFS)
Normal flow depth in pipe =    5.89(In.)
Flow top width inside pipe =   12.00(In.)
Critical Depth =    9.12(In.)
Pipe flow velocity =      8.22(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =    11.90 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station        9.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1568.300(Ft.)
End of natural channel elevation =   1568.000(Ft.)
Length of natural channel  =   161.000(Ft.)
Estimated mean flow rate at midpoint of channel =      3.152(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   0.82(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0019
Corrected/adjusted channel slope =  0.0019
Travel time =    3.27 min.     TC =   15.18  min.


 Adding area flow to channel
UNDEVELOPED (good cover) subarea
```

```
Runoff Coefficient = 0.591
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.630(In/Hr) for a    10.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =      3.152(CFS)       Total area =       2.310(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        9.000 to Point/Station        9.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      2.310(Ac.)
Runoff from this stream =      3.152(CFS)
Time of concentration =   15.18 min.
Rainfall intensity =     1.630(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        7.000 to Point/Station       13.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   207.000(Ft.)
Top (of initial area) elevation =  1573.500(Ft.)
Bottom (of initial area) elevation =  1570.300(Ft.)
Difference in elevation =     3.200(Ft.)
Slope =    0.01546  s(percent)=       1.55
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    5.830 min.
Rainfall intensity =      2.631(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.874
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      0.483(CFS)
Total initial stream area =        0.210(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station        9.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1570.300(Ft.)
End of natural channel elevation =   1568.000(Ft.)
Length of natural channel  =   161.000(Ft.)
Estimated mean flow rate at midpoint of channel =      0.483(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.58(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0143
Corrected/adjusted channel slope =  0.0143
Travel time =    1.70 min.     TC =    7.53  min.


 Adding area flow to channel
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.658
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.314(In/Hr) for a    10.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =      0.483(CFS)       Total area =       0.210(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        9.000 to Point/Station        9.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
```

```
Along Main Stream number: 2 in normal stream number 3
Stream flow area =      0.210(Ac.)
Runoff from this stream =      0.483(CFS)
Time of concentration =    7.53 min.
Rainfall intensity =     2.314(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       15.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   806.000(Ft.)
Top (of initial area) elevation =  1581.700(Ft.)
Bottom (of initial area) elevation =  1569.800(Ft.)
Difference in elevation =    11.900(Ft.)
Slope =    0.01476  s(percent)=       1.48
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.175 min.
Rainfall intensity =      1.750(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.731
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      3.738(CFS)
Total initial stream area =        2.920(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.000 to Point/Station       16.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1569.800(Ft.)
Downstream point/station elevation =  1568.300(Ft.)
Pipe length  =   106.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.738(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     3.738(CFS)
Normal flow depth in pipe =    8.75(In.)
Flow top width inside pipe =   10.66(In.)
Critical Depth =    9.87(In.)
Pipe flow velocity =      6.09(Ft/s)
Travel time through pipe =    0.29 min.
Time of concentration (TC) =    13.47 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       16.000 to Point/Station        9.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
Top of natural channel elevation =   1568.300(Ft.)
End of natural channel elevation =   1568.000(Ft.)
Length of natural channel  =   148.000(Ft.)
Estimated mean flow rate at midpoint of channel =      3.738(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   0.89(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0020
Corrected/adjusted channel slope =  0.0020
Travel time =    2.78 min.     TC =   16.24  min.


 Adding area flow to channel
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.584
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.576(In/Hr) for a    10.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =      3.738(CFS)       Total area =       2.920(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        9.000 to Point/Station        9.000
```

```
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________________
Along Main Stream number: 2 in normal stream number 4
Stream flow area =      2.920(Ac.)
Runoff from this stream =      3.738(CFS)
Time of concentration =   16.24 min.
Rainfall intensity =     1.576(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       17.000 to Point/Station       18.000
**** INITIAL AREA EVALUATION ****
____________________________________________________________________________
Initial area flow distance =   483.000(Ft.)
Top (of initial area) elevation =  1575.300(Ft.)
Bottom (of initial area) elevation =  1570.500(Ft.)
Difference in elevation =     4.800(Ft.)
Slope =    0.00994  s(percent)=       0.99
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.619 min.
Rainfall intensity =      1.863(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.738
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      3.191(CFS)
Total initial stream area =        2.320(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       18.000 to Point/Station        9.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
____________________________________________________________________________
Top of natural channel elevation =   1570.500(Ft.)
End of natural channel elevation =   1568.000(Ft.)
Length of natural channel  =    76.000(Ft.)
Estimated mean flow rate at midpoint of channel =      3.191(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.45(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0329
Corrected/adjusted channel slope =  0.0329
Travel time =    0.37 min.     TC =   11.99  min.


 Adding area flow to channel
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.614
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.835(In/Hr) for a    10.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =      3.191(CFS)       Total area =       2.320(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        9.000 to Point/Station        9.000
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________________
Along Main Stream number: 2 in normal stream number 5
Stream flow area =      2.320(Ac.)
Runoff from this stream =      3.191(CFS)
Time of concentration =   11.99 min.
Rainfall intensity =     1.835(In/Hr)
Summary of stream data:

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


1        2.247     14.09                1.692
2        3.152     15.18                1.630
3        0.483      7.53                2.314
```

```
4        3.738     16.24                 1.576
5        3.191     11.99                 1.835
Largest stream flow has longer time of concentration
Qp =      3.738 + sum of
          Qb         Ia/Ib
           2.247 *    0.931 =      2.093
          Qb         Ia/Ib
           3.152 *    0.967 =      3.047
          Qb         Ia/Ib
           0.483 *    0.681 =      0.329
          Qb         Ia/Ib
           3.191 *    0.859 =      2.741
Qp =     11.947

Total of 5 streams to confluence:
Flow rates before confluence point:
       2.247       3.152       0.483       3.738       3.191
Area of streams before confluence:
        1.370       2.310       0.210       2.920       2.320
Results of confluence:
Total flow rate =     11.947(CFS)
Time of concentration =    16.243 min.
Effective stream area after confluence =      9.130(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        9.000 to Point/Station        2.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1568.000(Ft.)
Downstream point/station elevation =  1564.000(Ft.)
Pipe length  =    53.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.947(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =    11.947(CFS)
Normal flow depth in pipe =    9.01(In.)
Flow top width inside pipe =   14.69(In.)
Critical depth could not be calculated.
Pipe flow velocity =     15.52(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =    16.30 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.000 to Point/Station        2.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      9.130(Ac.)
Runoff from this stream =     11.947(CFS)
Time of concentration =   16.30 min.
Rainfall intensity =     1.573(In/Hr)
Summary of stream data:

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


1      355.000     20.77                1.394
2       11.947     16.30                1.573
Largest stream flow has longer time of concentration
Qp =    355.000 + sum of
          Qb         Ia/Ib
          11.947 *    0.886 =     10.583
Qp =    365.583

Total of 2 main streams to confluence:
Flow rates before confluence point:
     355.000      11.947
Area of streams before confluence:
        0.000       9.130


Results of confluence:
Total flow rate =    365.583(CFS)
Time of concentration =    20.772 min.
Effective stream area after confluence  =      9.130(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.000 to Point/Station       19.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1564.000(Ft.)
Downstream point/station elevation =  1553.000(Ft.)
Pipe length  =   861.00(Ft.)   Manning's N = 0.013
```

```
No. of pipes = 1  Required pipe flow  =   365.583(CFS)
Nearest computed pipe diameter  =     66.00(In.)
Calculated individual pipe flow  =   365.583(CFS)
Normal flow depth in pipe =   52.03(In.)
Flow top width inside pipe =   53.92(In.)
Critical Depth =   61.00(In.)
Pipe flow velocity =     18.20(Ft/s)
Travel time through pipe =    0.79 min.
Time of concentration (TC) =    21.56 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       19.000 to Point/Station       19.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      9.130(Ac.)
Runoff from this stream =    365.583(CFS)
Time of concentration =   21.56 min.
Rainfall intensity =     1.368(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       18.000 to Point/Station       19.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   662.000(Ft.)
Top (of initial area) elevation =  1573.900(Ft.)
Bottom (of initial area) elevation =  1567.800(Ft.)
Difference in elevation =     6.100(Ft.)
Slope =    0.00921  s(percent)=       0.92
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.294 min.
Rainfall intensity =      1.980(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.869
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      0.705(CFS)
Total initial stream area =        0.410(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       19.000 to Point/Station       20.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1567.800(Ft.)
End of street segment elevation =  1557.500(Ft.)
Length of street segment  =   589.000(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  =  16.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [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 =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      1.030(CFS)
Depth of flow =   0.239(Ft.), Average velocity =   2.337(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   5.603(Ft.)
Flow velocity =   2.34(Ft/s)
Travel time =    4.20 min.     TC =   14.49  min.
 Adding area flow to street
COMMERCIAL subarea type
Runoff Coefficient = 0.865
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      1.668(In/Hr) for a    10.0 year storm
Subarea runoff =      0.592(CFS) for      0.410(Ac.)
Total runoff =      1.297(CFS)       Total area =       0.820(Ac.)
```

```
Street flow at end of street =      1.297(CFS)
Half street flow at end of street =      1.297(CFS)
Depth of flow =   0.254(Ft.), Average velocity =   2.438(Ft/s)
Flow width (from curb towards crown)=   6.367(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       20.000 to Point/Station       21.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1557.500(Ft.)
Downstream point/station elevation =  1556.500(Ft.)
Pipe length  =    71.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.297(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.297(CFS)
Normal flow depth in pipe =    5.34(In.)
Flow top width inside pipe =    8.84(In.)
Critical Depth =    6.29(In.)
Pipe flow velocity =      4.75(Ft/s)
Travel time through pipe =    0.25 min.
Time of concentration (TC) =    14.74 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       21.000 to Point/Station       23.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1556.500(Ft.)
End of natural channel elevation =   1556.000(Ft.)
Length of natural channel  =    38.000(Ft.)
Estimated mean flow rate at midpoint of channel =      1.479(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.86(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0132
Corrected/adjusted channel slope =  0.0132
Travel time =    0.34 min.     TC =   15.09  min.


 Adding area flow to channel
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.592
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.635(In/Hr) for a    10.0 year storm
Subarea runoff =      0.223(CFS) for      0.230(Ac.)
Total runoff =      1.520(CFS)       Total area =       1.050(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       23.000 to Point/Station       23.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      1.050(Ac.)
Runoff from this stream =      1.520(CFS)
Time of concentration =   15.09 min.
Rainfall intensity =     1.635(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       22.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   922.000(Ft.)
Top (of initial area) elevation =  1570.300(Ft.)
Bottom (of initial area) elevation =  1557.500(Ft.)
Difference in elevation =    12.800(Ft.)
Slope =    0.01388  s(percent)=       1.39
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.827 min.
Rainfall intensity =      1.930(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.868
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
```

```
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.274(CFS)
Total initial stream area =        0.760(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       22.000 to Point/Station       21.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1557.500(Ft.)
Downstream point/station elevation =  1556.500(Ft.)
Pipe length  =    31.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.274(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.274(CFS)
Normal flow depth in pipe =    4.12(In.)
Flow top width inside pipe =    8.97(In.)
Critical Depth =    6.24(In.)
Pipe flow velocity =      6.47(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    10.91 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       21.000 to Point/Station       23.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1556.500(Ft.)
End of natural channel elevation =   1556.000(Ft.)
Length of natural channel  =    38.000(Ft.)
Estimated mean flow rate at midpoint of channel =      1.274(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.80(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0132
Corrected/adjusted channel slope =  0.0132
Travel time =    0.35 min.     TC =   11.26  min.


 Adding area flow to channel
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.621
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.893(In/Hr) for a    10.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =      1.274(CFS)       Total area =       0.760(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       23.000 to Point/Station       23.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.760(Ac.)
Runoff from this stream =      1.274(CFS)
Time of concentration =   11.26 min.
Rainfall intensity =     1.893(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       24.000 to Point/Station       25.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   328.000(Ft.)
Top (of initial area) elevation =  1570.500(Ft.)
Bottom (of initial area) elevation =  1566.500(Ft.)
Difference in elevation =     4.000(Ft.)
Slope =    0.01220  s(percent)=       1.22
TC = k(0.940)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   23.027 min.
Rainfall intensity =      1.324(In/Hr) for a    10.0 year storm
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.547
Decimal fraction soil group A = 0.000
```

```
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      0.507(CFS)
Total initial stream area =        0.700(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       25.000 to Point/Station       26.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1566.500(Ft.)
Downstream point/station elevation =  1557.500(Ft.)
Pipe length  =   293.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.507(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.507(CFS)
Normal flow depth in pipe =    3.06(In.)
Flow top width inside pipe =    6.00(In.)
Critical Depth =    4.35(In.)
Pipe flow velocity =      5.05(Ft/s)
Travel time through pipe =    0.97 min.
Time of concentration (TC) =    23.99 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       27.000 to Point/Station       26.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.699
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    23.99 min.
Rainfall intensity =      1.297(In/Hr) for a    10.0 year storm
Subarea runoff =      0.435(CFS) for      0.480(Ac.)
Total runoff =      0.942(CFS)       Total area =       1.180(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       26.000 to Point/Station       29.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1557.500(Ft.)
Downstream point/station elevation =  1557.000(Ft.)
Pipe length  =    39.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.942(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     0.942(CFS)
Normal flow depth in pipe =    4.52(In.)
Flow top width inside pipe =    9.00(In.)
Critical Depth =    5.34(In.)
Pipe flow velocity =      4.25(Ft/s)
Travel time through pipe =    0.15 min.
Time of concentration (TC) =    24.15 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       30.000 to Point/Station       29.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.699
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    24.15 min.
Rainfall intensity =      1.293(In/Hr) for a    10.0 year storm
Subarea runoff =      0.614(CFS) for      0.680(Ac.)
Total runoff =      1.556(CFS)       Total area =       1.860(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       29.000 to Point/Station       32.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1557.000(Ft.)
```

```
Downstream point/station elevation =  1556.500(Ft.)
Pipe length  =    35.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.556(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.556(CFS)
Normal flow depth in pipe =    6.02(In.)
Flow top width inside pipe =    8.47(In.)
Critical Depth =    6.89(In.)
Pipe flow velocity =      4.96(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =    24.26 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       32.000 to Point/Station       23.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
Top of natural channel elevation =   1556.500(Ft.)
End of natural channel elevation =   1556.000(Ft.)
Length of natural channel  =    65.000(Ft.)
Estimated mean flow rate at midpoint of channel =      1.652(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.45(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0077
Corrected/adjusted channel slope =  0.0077
Travel time =    0.75 min.     TC =   25.01  min.


 Adding area flow to channel
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.539
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.270(In/Hr) for a    10.0 year storm
Subarea runoff =      0.157(CFS) for      0.230(Ac.)
Total runoff =      1.714(CFS)       Total area =       2.090(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       23.000 to Point/Station       23.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 3
Stream flow area =      2.090(Ac.)
Runoff from this stream =      1.714(CFS)
Time of concentration =   25.01 min.
Rainfall intensity =     1.270(In/Hr)
Summary of stream data:

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


1        1.520     15.09                 1.635
2        1.274     11.26                 1.893
3        1.714     25.01                 1.270
Largest stream flow has longer time of concentration
Qp =      1.714 + sum of
          Qb         Ia/Ib
           1.520 *    0.777 =      1.180
          Qb         Ia/Ib
           1.274 *    0.671 =      0.855
Qp =      3.748

Total of 3 streams to confluence:
Flow rates before confluence point:
       1.520       1.274       1.714
Area of streams before confluence:
       1.050       0.760       2.090
Results of confluence:
Total flow rate =      3.748(CFS)
Time of concentration =    25.011 min.
Effective stream area after confluence =      3.900(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       23.000 to Point/Station       19.000
```

```
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1556.000(Ft.)
Downstream point/station elevation =  1553.000(Ft.)
Pipe length  =    65.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.748(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     3.748(CFS)
Normal flow depth in pipe =    5.93(In.)
Flow top width inside pipe =   12.00(In.)
Critical Depth =    9.89(In.)
Pipe flow velocity =      9.70(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =    25.12 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       19.000 to Point/Station       19.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      3.900(Ac.)
Runoff from this stream =      3.748(CFS)
Time of concentration =   25.12 min.
Rainfall intensity =     1.267(In/Hr)
Summary of stream data:

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


1      365.583     21.56               1.368
2        3.748     25.12               1.267
Largest stream flow has longer or shorter time of concentration
Qp =    365.583 + sum of
          Qa          Tb/Ta
           3.748 *    0.858 =      3.217
Qp =    368.800

Total of 2 main streams to confluence:
Flow rates before confluence point:
     365.583       3.748
Area of streams before confluence:
        9.130        3.900


Results of confluence:
Total flow rate =    368.800(CFS)
Time of concentration =    21.561 min.
Effective stream area after confluence  =     13.030(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       19.000 to Point/Station       33.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1553.000(Ft.)
Downstream point/station elevation =  1547.000(Ft.)
Pipe length  =   428.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   368.800(CFS)
Nearest computed pipe diameter  =     63.00(In.)
Calculated individual pipe flow  =   368.800(CFS)
Normal flow depth in pipe =   55.13(In.)
Flow top width inside pipe =   41.67(In.)
Critical depth could not be calculated.
Pipe flow velocity =     18.37(Ft/s)
Travel time through pipe =    0.39 min.
Time of concentration (TC) =    21.95 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       33.000 to Point/Station       33.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     13.030(Ac.)
Runoff from this stream =    368.800(CFS)
Time of concentration =   21.95 min.
Rainfall intensity =     1.356(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       34.000 to Point/Station       35.000
**** INITIAL AREA EVALUATION ****
```

```
Initial area flow distance =   365.000(Ft.)
Top (of initial area) elevation =  1566.000(Ft.)
Bottom (of initial area) elevation =  1562.000(Ft.)
Difference in elevation =     4.000(Ft.)
Slope =    0.01096  s(percent)=       1.10
TC = k(0.940)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   24.552 min.
Rainfall intensity =      1.282(In/Hr) for a    10.0 year storm
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.541
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      0.831(CFS)
Total initial stream area =        1.200(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       35.000 to Point/Station       36.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1562.000(Ft.)
Downstream point/station elevation =  1553.000(Ft.)
Pipe length  =   329.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.831(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.831(CFS)
Normal flow depth in pipe =    4.43(In.)
Flow top width inside pipe =    5.27(In.)
Critical Depth =    5.40(In.)
Pipe flow velocity =      5.35(Ft/s)
Travel time through pipe =    1.03 min.
Time of concentration (TC) =    25.58 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       36.000 to Point/Station       36.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      1.200(Ac.)
Runoff from this stream =      0.831(CFS)
Time of concentration =   25.58 min.
Rainfall intensity =     1.256(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       59.000 to Point/Station       37.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   543.000(Ft.)
Top (of initial area) elevation =  1564.500(Ft.)
Bottom (of initial area) elevation =  1562.000(Ft.)
Difference in elevation =     2.500(Ft.)
Slope =    0.00460  s(percent)=       0.46
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.202 min.
Rainfall intensity =      1.685(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.728
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      2.514(CFS)
Total initial stream area =        2.050(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       37.000 to Point/Station       38.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1562.000(Ft.)
Downstream point/station elevation =  1552.000(Ft.)
Pipe length  =    28.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.514(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     2.514(CFS)
Normal flow depth in pipe =    3.87(In.)
```

```
Flow top width inside pipe =    5.74(In.)
Critical depth could not be calculated.
Pipe flow velocity =     18.74(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =    14.23 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       62.000 to Point/Station       38.000
**** SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------------
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.727
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    14.23 min.
Rainfall intensity =      1.684(In/Hr) for a    10.0 year storm
Subarea runoff =      2.266(CFS) for      1.850(Ac.)
Total runoff =      4.780(CFS)       Total area =       3.900(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       38.000 to Point/Station       36.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------------
Upstream point/station elevation =  1554.000(Ft.)
Downstream point/station elevation =  1553.000(Ft.)
Pipe length  =    26.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.780(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     4.780(CFS)
Normal flow depth in pipe =    7.29(In.)
Flow top width inside pipe =   11.72(In.)
Critical Depth =   10.85(In.)
Pipe flow velocity =      9.58(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =    14.27 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       36.000 to Point/Station       36.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      3.900(Ac.)
Runoff from this stream =      4.780(CFS)
Time of concentration =   14.27 min.
Rainfall intensity =     1.681(In/Hr)
Summary of stream data:

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


1        0.831     25.58                 1.256
2        4.780     14.27                 1.681
Largest stream flow has longer or shorter time of concentration
Qp =      4.780 + sum of
          Qa          Tb/Ta
           0.831 *    0.558 =      0.464
Qp =      5.244

Total of 2 streams to confluence:
Flow rates before confluence point:
       0.831       4.780
Area of streams before confluence:
        1.200        3.900
Results of confluence:
Total flow rate =      5.244(CFS)
Time of concentration =    14.272 min.
Effective stream area after confluence =      5.100(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       36.000 to Point/Station       40.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------------
Upstream point/station elevation =  1553.000(Ft.)
Downstream point/station elevation =  1552.500(Ft.)
Pipe length  =    21.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.244(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     5.244(CFS)
```

```
Normal flow depth in pipe =    9.38(In.)
Flow top width inside pipe =    9.92(In.)
Critical Depth =   11.15(In.)
Pipe flow velocity =      7.97(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =    14.32 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       40.000 to Point/Station       41.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1552.500(Ft.)
End of natural channel elevation =   1552.000(Ft.)
Length of natural channel  =    80.000(Ft.)
Estimated mean flow rate at midpoint of channel =      5.393(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.70(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0063
Corrected/adjusted channel slope =  0.0063
Travel time =    0.79 min.     TC =   15.10  min.


 Adding area flow to channel
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.592
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.634(In/Hr) for a    10.0 year storm
Subarea runoff =      0.280(CFS) for      0.290(Ac.)
Total runoff =      5.524(CFS)       Total area =       5.390(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       41.000 to Point/Station       41.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      5.390(Ac.)
Runoff from this stream =      5.524(CFS)
Time of concentration =   15.10 min.
Rainfall intensity =     1.634(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       55.000 to Point/Station       42.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   657.000(Ft.)
Top (of initial area) elevation =  1561.600(Ft.)
Bottom (of initial area) elevation =  1553.000(Ft.)
Difference in elevation =     8.600(Ft.)
Slope =    0.01309  s(percent)=       1.31
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.567 min.
Rainfall intensity =      2.054(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.870
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.607(CFS)
Total initial stream area =        0.900(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       42.000 to Point/Station       43.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1553.000(Ft.)
Downstream point/station elevation =  1552.500(Ft.)
Pipe length  =    23.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.607(CFS)
```

```
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.607(CFS)
Normal flow depth in pipe =    5.33(In.)
Flow top width inside pipe =    8.84(In.)
Critical Depth =    7.00(In.)
Pipe flow velocity =      5.90(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =     9.63 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       43.000 to Point/Station       41.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
Top of natural channel elevation =   1552.500(Ft.)
End of natural channel elevation =   1552.000(Ft.)
Length of natural channel  =    39.000(Ft.)
Estimated mean flow rate at midpoint of channel =      1.607(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.86(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0128
Corrected/adjusted channel slope =  0.0128
Travel time =    0.35 min.     TC =    9.98  min.


 Adding area flow to channel
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.632
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.011(In/Hr) for a    10.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =      1.607(CFS)       Total area =       0.900(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       41.000 to Point/Station       41.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.900(Ac.)
Runoff from this stream =      1.607(CFS)
Time of concentration =    9.98 min.
Rainfall intensity =     2.011(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       22.000 to Point/Station       44.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   556.000(Ft.)
Top (of initial area) elevation =  1557.500(Ft.)
Bottom (of initial area) elevation =  1553.000(Ft.)
Difference in elevation =     4.500(Ft.)
Slope =    0.00809  s(percent)=       0.81
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.852 min.
Rainfall intensity =      2.024(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.869
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      0.915(CFS)
Total initial stream area =        0.520(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       44.000 to Point/Station       45.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1553.000(Ft.)
Downstream point/station elevation =  1552.500(Ft.)
```

```
Pipe length  =    31.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.915(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     0.915(CFS)
Normal flow depth in pipe =    4.15(In.)
Flow top width inside pipe =    8.97(In.)
Critical Depth =    5.25(In.)
Pipe flow velocity =      4.59(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =     9.96 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       45.000 to Point/Station       41.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
Top of natural channel elevation =   1552.500(Ft.)
End of natural channel elevation =   1552.000(Ft.)
Length of natural channel  =    31.000(Ft.)
Estimated mean flow rate at midpoint of channel =      0.915(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.87(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0161
Corrected/adjusted channel slope =  0.0161
Travel time =    0.28 min.     TC =   10.24  min.


 Adding area flow to channel
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.630
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.985(In/Hr) for a    10.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =      0.915(CFS)       Total area =       0.520(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       41.000 to Point/Station       41.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 3
Stream flow area =      0.520(Ac.)
Runoff from this stream =      0.915(CFS)
Time of concentration =   10.24 min.
Rainfall intensity =     1.985(In/Hr)
Summary of stream data:

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


1        5.524     15.10                1.634
2        1.607      9.98                2.011
3        0.915     10.24                1.985
Largest stream flow has longer time of concentration
Qp =      5.524 + sum of
          Qb         Ia/Ib
           1.607 *    0.813 =      1.307
          Qb         Ia/Ib
           0.915 *    0.823 =      0.753
Qp =      7.584

Total of 3 streams to confluence:
Flow rates before confluence point:
       5.524       1.607       0.915
Area of streams before confluence:
        5.390        0.900        0.520
Results of confluence:
Total flow rate =      7.584(CFS)
Time of concentration =    15.102 min.
Effective stream area after confluence =      6.810(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       41.000 to Point/Station       33.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
```

```
Upstream point/station elevation =  1552.000(Ft.)
Downstream point/station elevation =  1547.000(Ft.)
Pipe length  =    71.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.584(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     7.584(CFS)
Normal flow depth in pipe =    8.13(In.)
Flow top width inside pipe =   11.22(In.)
Critical depth could not be calculated.
Pipe flow velocity =     13.38(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =    15.19 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       33.000 to Point/Station       33.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      6.810(Ac.)
Runoff from this stream =      7.584(CFS)
Time of concentration =   15.19 min.
Rainfall intensity =     1.630(In/Hr)
Summary of stream data:

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


1      368.800     21.95               1.356
2        7.584     15.19               1.630
Largest stream flow has longer time of concentration
Qp =    368.800 + sum of
          Qb         Ia/Ib
           7.584 *    0.832 =      6.309
Qp =    375.109

Total of 2 main streams to confluence:
Flow rates before confluence point:
     368.800       7.584
Area of streams before confluence:
       13.030        6.810


Results of confluence:
Total flow rate =    375.109(CFS)
Time of concentration =    21.949 min.
Effective stream area after confluence  =     19.840(Ac.)
End of computations, total study area =           19.84 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.486
Area averaged RI index number =  56.7
```

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 08/16/21 File:pro110.out

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

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

Program License Serial Number 5006

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

Storm event (year) = 10.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)
For the [Sunnymead-Moreno] area used.
10 year storm 10 minute intensity = 2.010(In/Hr)
10 year storm 60 minute intensity = 0.820(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.820(In/Hr)
Slope of intensity duration curve = 0.5000

++
Process from Point/Station 58.000 to Point/Station 59.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 933.000(Ft.)
Top (of initial area) elevation = 1575.900(Ft.)
Bottom (of initial area) elevation = 1564.500(Ft.)
Difference in elevation = 11.400(Ft.)
Slope = 0.01222 s(percent)= 1.22
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 14.508 min.
Rainfall intensity = 1.668(In/Hr) for a 10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.726
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 56.00
Pervious area fraction = 0.500; Impervious fraction = 0.500
Initial subarea runoff = 2.871(CFS)
Total initial stream area = 2.370(Ac.)
Pervious area fraction = 0.500

++
Process from Point/Station 59.000 to Point/Station 60.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1564.500(Ft.)
Downstream point/station elevation = 1561.500(Ft.)
Pipe length = 22.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 2.871(CFS)
Nearest computed pipe diameter = 9.00(In.)
Calculated individual pipe flow = 2.871(CFS)
Normal flow depth in pipe = 4.34(In.)
Flow top width inside pipe = 8.99(In.)
Critical depth could not be calculated.
Pipe flow velocity = 13.62(Ft/s)
Travel time through pipe = 0.03 min.
Time of concentration (TC) = 14.54 min.

++
Process from Point/Station 60.000 to Point/Station 60.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 2.370(Ac.)

```
Runoff from this stream =      2.871(CFS)
Time of concentration =   14.54 min.
Rainfall intensity =     1.666(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       61.000 to Point/Station       62.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   542.000(Ft.)
Top (of initial area) elevation =  1572.100(Ft.)
Bottom (of initial area) elevation =  1564.500(Ft.)
Difference in elevation =     7.600(Ft.)
Slope =    0.01402  s(percent)=       1.40
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.358 min.
Rainfall intensity =      1.885(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.739
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      1.839(CFS)
Total initial stream area =        1.320(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       62.000 to Point/Station       60.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1564.500(Ft.)
Downstream point/station elevation =  1561.500(Ft.)
Pipe length  =    22.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.839(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     1.839(CFS)
Normal flow depth in pipe =    4.40(In.)
Flow top width inside pipe =    5.31(In.)
Critical depth could not be calculated.
Pipe flow velocity =     11.92(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =    11.39 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       60.000 to Point/Station       60.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.320(Ac.)
Runoff from this stream =      1.839(CFS)
Time of concentration =   11.39 min.
Rainfall intensity =     1.882(In/Hr)
Summary of stream data:

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


1        2.871     14.54                 1.666
2        1.839     11.39                 1.882
Largest stream flow has longer time of concentration
Qp =      2.871 + sum of
         Qb         Ia/Ib
          1.839 *    0.885 =      1.628
Qp =      4.499

Total of 2 streams to confluence:
Flow rates before confluence point:
       2.871       1.839
Area of streams before confluence:
        2.370        1.320
Results of confluence:
Total flow rate =      4.499(CFS)
Time of concentration =    14.535 min.
Effective stream area after confluence =      3.690(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       60.000 to Point/Station       63.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1561.500(Ft.)
```

```
Downstream point/station elevation =  1561.000(Ft.)
Pipe length  =    33.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.499(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.499(CFS)
Normal flow depth in pipe =    8.07(In.)
Flow top width inside pipe =   14.96(In.)
Critical Depth =   10.31(In.)
Pipe flow velocity =      6.68(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    14.62 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       63.000 to Point/Station       63.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      3.690(Ac.)
Runoff from this stream =      4.499(CFS)
Time of concentration =   14.62 min.
Rainfall intensity =     1.661(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       64.000 to Point/Station       65.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   888.000(Ft.)
Top (of initial area) elevation =  1575.100(Ft.)
Bottom (of initial area) elevation =  1564.500(Ft.)
Difference in elevation =    10.600(Ft.)
Slope =    0.01194  s(percent)=       1.19
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.291 min.
Rainfall intensity =      1.680(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.727
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      1.332(CFS)
Total initial stream area =        1.090(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       65.000 to Point/Station       66.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1564.500(Ft.)
Downstream point/station elevation =  1561.500(Ft.)
Pipe length  =    25.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.332(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     1.332(CFS)
Normal flow depth in pipe =    3.64(In.)
Flow top width inside pipe =    5.86(In.)
Critical depth could not be calculated.
Pipe flow velocity =     10.66(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =    14.33 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       66.000 to Point/Station       66.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      1.090(Ac.)
Runoff from this stream =      1.332(CFS)
Time of concentration =   14.33 min.
Rainfall intensity =     1.678(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       67.000 to Point/Station       68.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   776.000(Ft.)
Top (of initial area) elevation =  1574.100(Ft.)
Bottom (of initial area) elevation =  1564.500(Ft.)
```

```
Difference in elevation =     9.600(Ft.)
Slope =    0.01237  s(percent)=       1.24
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.444 min.
Rainfall intensity =      1.732(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.730
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      3.998(CFS)
Total initial stream area =        3.160(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       68.000 to Point/Station       66.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1564.500(Ft.)
Downstream point/station elevation =  1561.500(Ft.)
Pipe length  =    16.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.998(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     3.998(CFS)
Normal flow depth in pipe =    4.80(In.)
Flow top width inside pipe =    8.98(In.)
Critical depth could not be calculated.
Pipe flow velocity =     16.66(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =    13.46 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       66.000 to Point/Station       66.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      3.160(Ac.)
Runoff from this stream =      3.998(CFS)
Time of concentration =   13.46 min.
Rainfall intensity =     1.731(In/Hr)
Summary of stream data:

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


1        1.332     14.33                 1.678
2        3.998     13.46                 1.731
Largest stream flow has longer or shorter time of concentration
Qp =      3.998 + sum of
          Qa          Tb/Ta
           1.332 *    0.939 =      1.251
Qp =      5.249

Total of 2 streams to confluence:
Flow rates before confluence point:
       1.332       3.998
Area of streams before confluence:
        1.090        3.160
Results of confluence:
Total flow rate =      5.249(CFS)
Time of concentration =    13.460 min.
Effective stream area after confluence =      4.250(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       66.000 to Point/Station       63.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1561.500(Ft.)
Downstream point/station elevation =  1561.000(Ft.)
Pipe length  =    25.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.249(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     5.249(CFS)
Normal flow depth in pipe =    8.16(In.)
Flow top width inside pipe =   14.94(In.)
Critical Depth =   11.14(In.)
Pipe flow velocity =      7.70(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =    13.51 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       63.000 to Point/Station       63.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      4.250(Ac.)
Runoff from this stream =      5.249(CFS)
Time of concentration =   13.51 min.
Rainfall intensity =     1.728(In/Hr)
Summary of stream data:

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


1        4.499     14.62               1.661
2        5.249     13.51               1.728
Largest stream flow has longer or shorter time of concentration
Qp =      5.249 + sum of
          Qa          Tb/Ta
           4.499 *    0.925 =      4.159
Qp =      9.408

Total of 2 main streams to confluence:
Flow rates before confluence point:
       4.499       5.249
Area of streams before confluence:
        3.690        4.250


Results of confluence:
Total flow rate =      9.408(CFS)
Time of concentration =    13.514 min.
Effective stream area after confluence  =      7.940(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       63.000 to Point/Station       69.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1561.000(Ft.)
Downstream point/station elevation =  1560.500(Ft.)
Pipe length  =    91.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.408(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     9.408(CFS)
Normal flow depth in pipe =   14.23(In.)
Flow top width inside pipe =   19.63(In.)
Critical Depth =   13.70(In.)
Pipe flow velocity =      5.43(Ft/s)
Travel time through pipe =    0.28 min.
Time of concentration (TC) =    13.79 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       69.000 to Point/Station       57.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
Top of natural channel elevation =   1560.500(Ft.)
End of natural channel elevation =   1560.000(Ft.)
Length of natural channel  =   113.000(Ft.)
Estimated mean flow rate at midpoint of channel =      9.722(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.65(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0044
Corrected/adjusted channel slope =  0.0044
Travel time =    1.14 min.     TC =   14.93  min.


 Adding area flow to channel
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.593
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =     1.644(In/Hr) for a    10.0 year storm
```

```
Subarea runoff =      0.516(CFS) for      0.530(Ac.)
Total runoff =      9.925(CFS)       Total area =       8.470(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       57.000 to Point/Station       57.000
**** CONFLUENCE OF MAIN STREAMS ****
----------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      8.470(Ac.)
Runoff from this stream =      9.925(CFS)
Time of concentration =   14.93 min.
Rainfall intensity =     1.644(In/Hr)
Program is now starting with Main Stream No. 2

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        6.000 to Point/Station       54.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------------
Initial area flow distance =   873.000(Ft.)
Top (of initial area) elevation =  1581.300(Ft.)
Bottom (of initial area) elevation =  1573.000(Ft.)
Difference in elevation =     8.300(Ft.)
Slope =    0.00951  s(percent)=       0.95
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.427 min.
Rainfall intensity =      1.879(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.868
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.071(CFS)
Total initial stream area =        1.270(Ac.)
Pervious area fraction = 0.100

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       54.000 to Point/Station       55.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------------
Top of street segment elevation =  1573.000(Ft.)
End of street segment elevation =  1561.600(Ft.)
Length of street segment  =   542.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  32.000(Ft.)
Distance from crown to crossfall grade break  =  30.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  18.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      3.060(CFS)
Depth of flow =   0.311(Ft.), Average velocity =   3.142(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   9.204(Ft.)
Flow velocity =   3.14(Ft/s)
Travel time =    2.88 min.     TC =   14.30  min.
 Adding area flow to street
COMMERCIAL subarea type
Runoff Coefficient = 0.865
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      1.680(In/Hr) for a    10.0 year storm
Subarea runoff =      1.919(CFS) for      1.320(Ac.)
Total runoff =      3.990(CFS)       Total area =       2.590(Ac.)
Street flow at end of street =      3.990(CFS)
Half street flow at end of street =      3.990(CFS)
Depth of flow =   0.333(Ft.), Average velocity =   3.337(Ft/s)
Flow width (from curb towards crown)=  10.339(Ft.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

```
Process from Point/Station       55.000 to Point/Station       56.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1561.600(Ft.)
Downstream point/station elevation =  1560.500(Ft.)
Pipe length  =   159.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.990(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.990(CFS)
Normal flow depth in pipe =    9.62(In.)
Flow top width inside pipe =   14.39(In.)
Critical Depth =    9.69(In.)
Pipe flow velocity =      4.79(Ft/s)
Travel time through pipe =    0.55 min.
Time of concentration (TC) =    14.85 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       56.000 to Point/Station       57.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
Top of natural channel elevation =   1560.500(Ft.)
End of natural channel elevation =   1560.000(Ft.)
Length of natural channel  =    90.000(Ft.)
Estimated mean flow rate at midpoint of channel =      3.990(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.49(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0056
Corrected/adjusted channel slope =  0.0056
Travel time =    1.01 min.     TC =   15.86  min.


 Adding area flow to channel
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.587
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.595(In/Hr) for a    10.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =      3.990(CFS)       Total area =       2.590(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       57.000 to Point/Station       53.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1560.000(Ft.)
Downstream point/station elevation =  1554.000(Ft.)
Pipe length  =   104.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.990(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     3.990(CFS)
Normal flow depth in pipe =    5.76(In.)
Flow top width inside pipe =   11.99(In.)
Critical Depth =   10.15(In.)
Pipe flow velocity =     10.71(Ft/s)
Travel time through pipe =    0.16 min.
Time of concentration (TC) =    16.02 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       57.000 to Point/Station       57.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      2.590(Ac.)
Runoff from this stream =      3.990(CFS)
Time of concentration =   16.02 min.
Rainfall intensity =     1.587(In/Hr)
Summary of stream data:

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


1        9.925     14.93              1.644
```

```
2        3.990     16.02               1.587
Largest stream flow has longer or shorter time of concentration
Qp =      9.925 + sum of
          Qa           Tb/Ta
           3.990 *     0.932 =      3.719
Qp =     13.643

Total of 2 main streams to confluence:
Flow rates before confluence point:
       9.925       3.990
Area of streams before confluence:
       8.470       2.590


Results of confluence:
Total flow rate =     13.643(CFS)
Time of concentration =    14.934 min.
Effective stream area after confluence  =     11.060(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       57.000 to Point/Station       53.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1560.000(Ft.)
Downstream point/station elevation =  1554.000(Ft.)
Pipe length  =   104.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    13.643(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =    13.643(CFS)
Normal flow depth in pipe =   10.92(In.)
Flow top width inside pipe =   13.35(In.)
Critical depth could not be calculated.
Pipe flow velocity =     14.27(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =    15.06 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       53.000 to Point/Station       53.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     11.060(Ac.)
Runoff from this stream =     13.643(CFS)
Time of concentration =   15.06 min.
Rainfall intensity =     1.637(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       51.000 to Point/Station       52.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   664.000(Ft.)
Top (of initial area) elevation = 14574.500(Ft.)
Bottom (of initial area) elevation =  1560.000(Ft.)
Difference in elevation = 13014.500(Ft.)
Slope =   19.60015  s(percent)=    1960.02
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Warning: TC computed to be less than 5 min.; program is assuming the
time of concentration is 5 minutes.
Initial area time of concentration =    5.000 min.
Rainfall intensity =      2.841(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.876
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      5.921(CFS)
Total initial stream area =        2.380(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       52.000 to Point/Station       53.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1560.000(Ft.)
Downstream point/station elevation =  1554.000(Ft.)
Pipe length  =   250.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     5.921(CFS)
Nearest computed pipe diameter  =     15.00(In.)
```

```
Calculated individual pipe flow  =     5.921(CFS)
Normal flow depth in pipe =    9.09(In.)
Flow top width inside pipe =   14.66(In.)
Critical Depth =   11.81(In.)
Pipe flow velocity =      7.61(Ft/s)
Travel time through pipe =    0.55 min.
Time of concentration (TC) =     5.55 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       53.000 to Point/Station       53.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      2.380(Ac.)
Runoff from this stream =      5.921(CFS)
Time of concentration =    5.55 min.
Rainfall intensity =     2.697(In/Hr)
Summary of stream data:

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


1       13.643     15.06               1.637
2        5.921      5.55               2.697
Largest stream flow has longer time of concentration
Qp =     13.643 + sum of
          Qb         Ia/Ib
           5.921 *    0.607 =      3.594
Qp =     17.237

Total of 2 main streams to confluence:
Flow rates before confluence point:
      13.643       5.921
Area of streams before confluence:
       11.060        2.380


Results of confluence:
Total flow rate =     17.237(CFS)
Time of concentration =    15.056 min.
Effective stream area after confluence  =     13.440(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       53.000 to Point/Station       70.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1554.000(Ft.)
Downstream point/station elevation =  1546.000(Ft.)
Pipe length  =   416.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    17.237(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    17.237(CFS)
Normal flow depth in pipe =   14.02(In.)
Flow top width inside pipe =   19.79(In.)
Critical Depth =   18.23(In.)
Pipe flow velocity =     10.11(Ft/s)
Travel time through pipe =    0.69 min.
Time of concentration (TC) =    15.74 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       70.000 to Point/Station       70.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     13.440(Ac.)
Runoff from this stream =     17.237(CFS)
Time of concentration =   15.74 min.
Rainfall intensity =     1.601(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       71.000 to Point/Station       72.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   424.000(Ft.)
Top (of initial area) elevation =  1562.000(Ft.)
Bottom (of initial area) elevation =  1553.800(Ft.)
Difference in elevation =     8.200(Ft.)
Slope =    0.01934  s(percent)=       1.93
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
```

```
Initial area time of concentration =    9.654 min.
Rainfall intensity =      2.044(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.748
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      1.620(CFS)
Total initial stream area =        1.060(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       72.000 to Point/Station       73.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1553.800(Ft.)
Downstream point/station elevation =  1550.000(Ft.)
Pipe length  =    20.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.620(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     1.620(CFS)
Normal flow depth in pipe =    3.57(In.)
Flow top width inside pipe =    5.89(In.)
Critical depth could not be calculated.
Pipe flow velocity =     13.32(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =     9.68 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       73.000 to Point/Station       73.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      1.060(Ac.)
Runoff from this stream =      1.620(CFS)
Time of concentration =    9.68 min.
Rainfall intensity =     2.042(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       74.000 to Point/Station       75.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   318.000(Ft.)
Top (of initial area) elevation =  1562.000(Ft.)
Bottom (of initial area) elevation =  1553.800(Ft.)
Difference in elevation =     8.200(Ft.)
Slope =    0.02579  s(percent)=       2.58
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.124 min.
Rainfall intensity =      2.228(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.756
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      2.696(CFS)
Total initial stream area =        1.600(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       75.000 to Point/Station       73.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1553.800(Ft.)
Downstream point/station elevation =  1550.000(Ft.)
Pipe length  =    29.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.696(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     2.696(CFS)
Normal flow depth in pipe =    4.23(In.)
Flow top width inside pipe =    8.98(In.)
Critical Depth =    8.46(In.)
Pipe flow velocity =     13.20(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =     8.16 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       73.000 to Point/Station       73.000
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.600(Ac.)
Runoff from this stream =      2.696(CFS)
Time of concentration =    8.16 min.
Rainfall intensity =     2.223(In/Hr)
Summary of stream data:

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


1        1.620      9.68                 2.042
2        2.696      8.16                 2.223
Largest stream flow has longer or shorter time of concentration
Qp =      2.696 + sum of
          Qa           Tb/Ta
           1.620 *    0.843 =      1.366
Qp =      4.062

Total of 2 streams to confluence:
Flow rates before confluence point:
       1.620       2.696
Area of streams before confluence:
        1.060        1.600
Results of confluence:
Total flow rate =      4.062(CFS)
Time of concentration =     8.160 min.
Effective stream area after confluence =      2.660(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       73.000 to Point/Station       76.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
____________________________________________________________________________
Upstream point/station elevation =  1550.000(Ft.)
Downstream point/station elevation =  1549.000(Ft.)
Pipe length  =   152.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.062(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.062(CFS)
Normal flow depth in pipe =    9.91(In.)
Flow top width inside pipe =   14.20(In.)
Critical Depth =    9.79(In.)
Pipe flow velocity =      4.72(Ft/s)
Travel time through pipe =    0.54 min.
Time of concentration (TC) =     8.70 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       76.000 to Point/Station       76.000
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      2.660(Ac.)
Runoff from this stream =      4.062(CFS)
Time of concentration =    8.70 min.
Rainfall intensity =     2.154(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       52.000 to Point/Station       76.500
**** INITIAL AREA EVALUATION ****
____________________________________________________________________________
Initial area flow distance =   347.000(Ft.)
Top (of initial area) elevation =  1560.000(Ft.)
Bottom (of initial area) elevation =  1555.500(Ft.)
Difference in elevation =     4.500(Ft.)
Slope =    0.01297  s(percent)=       1.30
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.652 min.
Rainfall intensity =      2.044(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.748
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      0.611(CFS)
Total initial stream area =        0.400(Ac.)
Pervious area fraction = 0.500
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       76.500 to Point/Station       76.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1555.500(Ft.)
Downstream point/station elevation =  1549.000(Ft.)
Pipe length  =    70.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.611(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.611(CFS)
Normal flow depth in pipe =    2.48(In.)
Flow top width inside pipe =    5.91(In.)
Critical Depth =    4.77(In.)
Pipe flow velocity =      7.98(Ft/s)
Travel time through pipe =    0.15 min.
Time of concentration (TC) =     9.80 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       76.000 to Point/Station       76.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.400(Ac.)
Runoff from this stream =      0.611(CFS)
Time of concentration =    9.80 min.
Rainfall intensity =     2.029(In/Hr)
Summary of stream data:

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


1        4.062      8.70                 2.154
2        0.611      9.80                 2.029
Largest stream flow has longer or shorter time of concentration
Qp =      4.062 + sum of
          Qa           Tb/Ta
           0.611 *    0.888 =      0.543
Qp =      4.604

Total of 2 streams to confluence:
Flow rates before confluence point:
       4.062       0.611
Area of streams before confluence:
        2.660        0.400
Results of confluence:
Total flow rate =      4.604(CFS)
Time of concentration =     8.698 min.
Effective stream area after confluence =      3.060(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       76.000 to Point/Station       77.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1549.000(Ft.)
Downstream point/station elevation =  1548.000(Ft.)
Pipe length  =   146.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.604(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.604(CFS)
Normal flow depth in pipe =   10.73(In.)
Flow top width inside pipe =   13.53(In.)
Critical Depth =   10.44(In.)
Pipe flow velocity =      4.90(Ft/s)
Travel time through pipe =    0.50 min.
Time of concentration (TC) =     9.19 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       77.000 to Point/Station       78.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
Top of natural channel elevation =   1548.000(Ft.)
End of natural channel elevation =   1547.500(Ft.)
Length of natural channel  =    77.000(Ft.)
Estimated mean flow rate at midpoint of channel =      4.860(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.69(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
```

```
       Normal channel slope =  0.0065
Corrected/adjusted channel slope =  0.0065
Travel time =    0.76 min.     TC =    9.95  min.


 Adding area flow to channel
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.632
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.013(In/Hr) for a    10.0 year storm
Subarea runoff =      0.433(CFS) for      0.340(Ac.)
Total runoff =      5.037(CFS)       Total area =       3.400(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       78.000 to Point/Station       78.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      3.400(Ac.)
Runoff from this stream =      5.037(CFS)
Time of concentration =    9.95 min.
Rainfall intensity =     2.013(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       79.000 to Point/Station       80.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   227.000(Ft.)
Top (of initial area) elevation =  1555.200(Ft.)
Bottom (of initial area) elevation =  1552.500(Ft.)
Difference in elevation =     2.700(Ft.)
Slope =    0.01189  s(percent)=       1.19
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.287 min.
Rainfall intensity =      2.206(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.755
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      1.333(CFS)
Total initial stream area =        0.800(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       80.000 to Point/Station       81.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1552.500(Ft.)
Downstream point/station elevation =  1550.000(Ft.)
Pipe length  =    22.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.333(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     1.333(CFS)
Normal flow depth in pipe =    3.71(In.)
Flow top width inside pipe =    5.83(In.)
Critical depth could not be calculated.
Pipe flow velocity =     10.44(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =     8.32 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       82.000 to Point/Station       81.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.755
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =     8.32 min.
Rainfall intensity =      2.202(In/Hr) for a    10.0 year storm
```

```
Subarea runoff =      1.263(CFS) for      0.760(Ac.)
Total runoff =      2.596(CFS)       Total area =       1.560(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       81.000 to Point/Station       84.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1550.000(Ft.)
Downstream point/station elevation =  1548.000(Ft.)
Pipe length  =   230.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.596(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.596(CFS)
Normal flow depth in pipe =    7.98(In.)
Flow top width inside pipe =   11.33(In.)
Critical Depth =    8.28(In.)
Pipe flow velocity =      4.68(Ft/s)
Travel time through pipe =    0.82 min.
Time of concentration (TC) =     9.14 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       84.000 to Point/Station       78.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1548.000(Ft.)
End of natural channel elevation =   1547.500(Ft.)
Length of natural channel  =    74.000(Ft.)
Estimated mean flow rate at midpoint of channel =      2.596(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.50(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0068
Corrected/adjusted channel slope =  0.0068
Travel time =    0.82 min.     TC =    9.97  min.


 Adding area flow to channel
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.632
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.012(In/Hr) for a    10.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =      2.596(CFS)       Total area =       1.560(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       78.000 to Point/Station       78.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.560(Ac.)
Runoff from this stream =      2.596(CFS)
Time of concentration =    9.97 min.
Rainfall intensity =     2.012(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       85.000 to Point/Station       86.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   189.000(Ft.)
Top (of initial area) elevation =  1553.500(Ft.)
Bottom (of initial area) elevation =  1553.000(Ft.)
Difference in elevation =     0.500(Ft.)
Slope =    0.00265  s(percent)=       0.26
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.002 min.
Rainfall intensity =      2.245(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.871
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
```

```
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      0.333(CFS)
Total initial stream area =        0.170(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       86.000 to Point/Station       87.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1553.000(Ft.)
Downstream point/station elevation =  1548.000(Ft.)
Pipe length  =    34.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.333(CFS)
Nearest computed pipe diameter  =      3.00(In.)
Calculated individual pipe flow  =     0.333(CFS)
Normal flow depth in pipe =    2.41(In.)
Flow top width inside pipe =    2.39(In.)
Critical depth could not be calculated.
Pipe flow velocity =      7.87(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =     8.07 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       87.000 to Point/Station       78.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1548.000(Ft.)
End of natural channel elevation =   1547.500(Ft.)
Length of natural channel  =    23.000(Ft.)
Estimated mean flow rate at midpoint of channel =      0.333(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.83(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0217
Corrected/adjusted channel slope =  0.0217
Travel time =    0.21 min.     TC =    8.28  min.


 Adding area flow to channel
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.649
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.207(In/Hr) for a    10.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =      0.333(CFS)       Total area =       0.170(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       78.000 to Point/Station       78.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 3
Stream flow area =      0.170(Ac.)
Runoff from this stream =      0.333(CFS)
Time of concentration =    8.28 min.
Rainfall intensity =     2.207(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       76.500 to Point/Station       88.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   248.000(Ft.)
Top (of initial area) elevation =  1555.500(Ft.)
Bottom (of initial area) elevation =  1553.500(Ft.)
Difference in elevation =     2.000(Ft.)
Slope =    0.00806  s(percent)=       0.81
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.138 min.
Rainfall intensity =      2.377(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.872
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
```

```
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      0.664(CFS)
Total initial stream area =        0.320(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       88.000 to Point/Station       89.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1553.500(Ft.)
Downstream point/station elevation =  1548.000(Ft.)
Pipe length  =    37.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.664(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.664(CFS)
Normal flow depth in pipe =    2.28(In.)
Flow top width inside pipe =    5.83(In.)
Critical Depth =    4.95(In.)
Pipe flow velocity =      9.69(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =     7.20 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       89.000 to Point/Station       78.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1548.000(Ft.)
End of natural channel elevation =   1547.500(Ft.)
Length of natural channel  =     5.000(Ft.)
Estimated mean flow rate at midpoint of channel =      0.664(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.40(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.1000
Corrected/adjusted channel slope =  0.1000
Travel time =    0.02 min.     TC =    7.22  min.


 Adding area flow to channel
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.661
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.364(In/Hr) for a    10.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =      0.664(CFS)       Total area =       0.320(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       78.000 to Point/Station       78.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 4
Stream flow area =      0.320(Ac.)
Runoff from this stream =      0.664(CFS)
Time of concentration =    7.22 min.
Rainfall intensity =     2.364(In/Hr)
Summary of stream data:

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


1        5.037      9.95                2.013
2        2.596      9.97                2.012
3        0.333      8.28                2.207
4        0.664      7.22                2.364
Largest stream flow has longer or shorter time of concentration
Qp =      5.037 + sum of
          Qa          Tb/Ta
           2.596 *    0.999 =      2.593
          Qb          Ia/Ib
           0.333 *    0.912 =      0.303
          Qb          Ia/Ib
```

```
          0.664 *    0.852 =      0.565
Qp =      8.499

Total of 4 streams to confluence:
Flow rates before confluence point:
       5.037       2.596       0.333       0.664
Area of streams before confluence:
        3.400        1.560        0.170        0.320
Results of confluence:
Total flow rate =      8.499(CFS)
Time of concentration =     9.954 min.
Effective stream area after confluence =      5.450(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       78.000 to Point/Station       70.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1547.500(Ft.)
Downstream point/station elevation =  1546.000(Ft.)
Pipe length  =    79.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.499(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     8.499(CFS)
Normal flow depth in pipe =   11.72(In.)
Flow top width inside pipe =   12.40(In.)
Critical Depth =   13.64(In.)
Pipe flow velocity =      8.26(Ft/s)
Travel time through pipe =    0.16 min.
Time of concentration (TC) =    10.11 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       70.000 to Point/Station       70.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      5.450(Ac.)
Runoff from this stream =      8.499(CFS)
Time of concentration =   10.11 min.
Rainfall intensity =     1.997(In/Hr)
Summary of stream data:

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


1       17.237     15.74               1.601
2        8.499     10.11               1.997
Largest stream flow has longer time of concentration
Qp =     17.237 + sum of
          Qb         Ia/Ib
           8.499 *    0.802 =      6.812
Qp =     24.049

Total of 2 main streams to confluence:
Flow rates before confluence point:
      17.237       8.499
Area of streams before confluence:
       13.440        5.450


Results of confluence:
Total flow rate =     24.049(CFS)
Time of concentration =    15.741 min.
Effective stream area after confluence  =     18.890(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       70.000 to Point/Station       50.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1546.000(Ft.)
Downstream point/station elevation =  1545.000(Ft.)
Pipe length  =    25.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    24.049(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    24.049(CFS)
Normal flow depth in pipe =   13.69(In.)
Flow top width inside pipe =   20.01(In.)
Critical depth could not be calculated.
Pipe flow velocity =     14.49(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =    15.77 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       50.000 to Point/Station       50.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     18.890(Ac.)
Runoff from this stream =     24.049(CFS)
Time of concentration =   15.77 min.
Rainfall intensity =     1.599(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       33.000 to Point/Station       50.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________________
Rainfall intensity =      1.365(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.705
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
User specified values are as follows:
TC =  21.65 min.  Rain intensity =       1.37(In/Hr)
Total area =        19.85(Ac.)  Total runoff =    375.11(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       50.000 to Point/Station       50.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     19.850(Ac.)
Runoff from this stream =    375.110(CFS)
Time of concentration =   21.65 min.
Rainfall intensity =     1.365(In/Hr)
Summary of stream data:

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


1       24.049     15.77               1.599
2      375.110     21.65               1.365
Largest stream flow has longer time of concentration
Qp =    375.110 + sum of
          Qb          Ia/Ib
          24.049 *    0.853 =     20.526
Qp =    395.636

Total of 2 main streams to confluence:
Flow rates before confluence point:
      24.049     375.110
Area of streams before confluence:
       18.890       19.850


Results of confluence:
Total flow rate =    395.636(CFS)
Time of concentration =    21.650 min.
Effective stream area after confluence  =     38.740(Ac.)
End of computations, total study area =           38.74 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.455
Area averaged RI index number =  56.1
```

```
                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
        Rational Hydrology Study        Date: 08/16/21  File:pro210.out
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

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

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


Program License Serial Number 5006

------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District 1978 hydrology manual
Storm event (year) =   10.00 Antecedent Moisture Condition = 2
Standard intensity-duration curves data (Plate D-4.1)
For the [ Sunnymead-Moreno ] area used.
10 year storm 10 minute intensity =  2.010(In/Hr)
10 year storm 60 minute intensity =  0.820(In/Hr)
100 year storm 10 minute intensity =  2.940(In/Hr)
100 year storm 60 minute intensity =  1.200(In/Hr)
Storm event year =  10.0
Calculated rainfall intensity data:
1 hour intensity =  0.820(In/Hr)
Slope of intensity duration curve = 0.5000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       51.000 to Point/Station      100.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   462.000(Ft.)
Top (of initial area) elevation =  1574.500(Ft.)
Bottom (of initial area) elevation =  1570.800(Ft.)
Difference in elevation =     3.700(Ft.)
Slope =    0.00801  s(percent)=       0.80
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.168 min.
Rainfall intensity =      2.098(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.870
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.281(CFS)
Total initial stream area =        1.250(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      100.000 to Point/Station      101.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1570.800(Ft.)
End of natural channel elevation =   1559.000(Ft.)
Length of natural channel  =   604.000(Ft.)
Estimated mean flow rate at midpoint of channel =      8.259(CFS)
Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.33(Ft/s)
Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0195
Corrected/adjusted channel slope =  0.0195
Travel time =    3.02 min.     TC =   12.19  min.
 Adding area flow to channel
COMMERCIAL subarea type
Runoff Coefficient = 0.867
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      1.819(In/Hr) for a    10.0 year storm
Subarea runoff =     10.332(CFS) for      6.550(Ac.)
Total runoff =     12.613(CFS)       Total area =       7.800(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      101.000
**** SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------------
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.613
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Time of concentration =    12.19 min.
Rainfall intensity =      1.819(In/Hr) for a    10.0 year storm
Subarea runoff =      0.502(CFS) for      0.450(Ac.)
Total runoff =     13.115(CFS)       Total area =       8.250(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------------
Upstream point/station elevation =  1559.000(Ft.)
Downstream point/station elevation =  1549.500(Ft.)
Pipe length  =   695.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    13.115(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    13.115(CFS)
Normal flow depth in pipe =   13.04(In.)
Flow top width inside pipe =   20.37(In.)
Critical Depth =   16.18(In.)
Pipe flow velocity =      8.35(Ft/s)
Travel time through pipe =    1.39 min.
Time of concentration (TC) =    13.58 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      102.000
**** CONFLUENCE OF MAIN STREAMS ****
----------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      8.250(Ac.)
Runoff from this stream =     13.115(CFS)
Time of concentration =   13.58 min.
Rainfall intensity =     1.724(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------------
Initial area flow distance =   551.000(Ft.)
Top (of initial area) elevation =  1558.000(Ft.)
Bottom (of initial area) elevation =  1552.000(Ft.)
Difference in elevation =     6.000(Ft.)
Slope =    0.01089  s(percent)=       1.09
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.026 min.
Rainfall intensity =      1.832(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.736
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      3.169(CFS)
Total initial stream area =        2.350(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------------
Upstream point/station elevation =  1552.000(Ft.)
Downstream point/station elevation =  1550.500(Ft.)
Pipe length  =    34.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.169(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     3.169(CFS)
Normal flow depth in pipe =    6.75(In.)
Flow top width inside pipe =    7.79(In.)
Critical depth could not be calculated.
```

```
Pipe flow velocity =      8.92(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =    12.09 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      105.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      2.350(Ac.)
Runoff from this stream =      3.169(CFS)
Time of concentration =   12.09 min.
Rainfall intensity =     1.827(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.000 to Point/Station      107.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------------
Initial area flow distance =   506.000(Ft.)
Top (of initial area) elevation =  1557.000(Ft.)
Bottom (of initial area) elevation =  1552.000(Ft.)
Difference in elevation =     5.000(Ft.)
Slope =    0.00988  s(percent)=       0.99
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.851 min.
Rainfall intensity =      1.845(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.737
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      2.121(CFS)
Total initial stream area =        1.560(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.000 to Point/Station      105.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------------
Upstream point/station elevation =  1552.000(Ft.)
Downstream point/station elevation =  1550.500(Ft.)
Pipe length  =     9.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.121(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     2.121(CFS)
Normal flow depth in pipe =    4.56(In.)
Flow top width inside pipe =    5.13(In.)
Critical depth could not be calculated.
Pipe flow velocity =     13.25(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    11.86 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      105.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.560(Ac.)
Runoff from this stream =      2.121(CFS)
Time of concentration =   11.86 min.
Rainfall intensity =     1.844(In/Hr)
Summary of stream data:
Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)               (In/Hr)
1        3.169     12.09                  1.827
2        2.121     11.86                  1.844
Largest stream flow has longer time of concentration
Qp =      3.169 + sum of
          Qb         Ia/Ib
           2.121 *    0.991 =      2.101
Qp =      5.270
Total of 2 streams to confluence:
Flow rates before confluence point:
       3.169       2.121
Area of streams before confluence:
        2.350       1.560
Results of confluence:
Total flow rate =      5.270(CFS)
Time of concentration =    12.090 min.
Effective stream area after confluence =      3.910(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      108.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1550.500(Ft.)
Downstream point/station elevation =  1550.000(Ft.)
Pipe length  =    20.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.270(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     5.270(CFS)
Normal flow depth in pipe =    9.21(In.)
Flow top width inside pipe =   10.14(In.)
Critical Depth =   11.16(In.)
Pipe flow velocity =      8.15(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =    12.13 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      102.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1550.000(Ft.)
End of natural channel elevation =   1549.500(Ft.)
Length of natural channel  =    80.000(Ft.)
Estimated mean flow rate at midpoint of channel =      5.345(CFS)
Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.69(Ft/s)
Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0063
Corrected/adjusted channel slope =  0.0063
Travel time =    0.79 min.     TC =   12.92  min.
 Adding area flow to channel
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.607
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.767(In/Hr) for a    10.0 year storm
Subarea runoff =      0.118(CFS) for      0.110(Ac.)
Total runoff =      5.388(CFS)       Total area =       4.020(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      102.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      4.020(Ac.)
Runoff from this stream =      5.388(CFS)
Time of concentration =   12.92 min.
Rainfall intensity =     1.767(In/Hr)
Summary of stream data:
Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)               (In/Hr)
1       13.115     13.58               1.724
2        5.388     12.92               1.767
Largest stream flow has longer time of concentration
Qp =     13.115 + sum of
          Qb         Ia/Ib
           5.388 *    0.975 =      5.256
Qp =     18.371
Total of 2 main streams to confluence:
Flow rates before confluence point:
      13.115       5.388
Area of streams before confluence:
        8.250        4.020
Results of confluence:
Total flow rate =     18.371(CFS)
Time of concentration =    13.578 min.
Effective stream area after confluence  =     12.270(Ac.)
End of computations, total study area =          12.27 (Ac.)
The following figures maybe used for a unit hydrograph study of the same area.
Area averaged pervious area fraction(Ap) = 0.269
Area averaged RI index number =  56.2
```

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 08/16/21 File:pro100.out

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

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

Program License Serial Number 5006

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

Storm event (year) = 100.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)
For the [Sunnymead-Moreno] area used.
10 year storm 10 minute intensity = 2.010(In/Hr)
10 year storm 60 minute intensity = 0.820(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.200(In/Hr)
Slope of intensity duration curve = 0.5000

++

Process from Point/Station 1.000 to Point/Station 1.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****

Rainfall intensity = 2.078(In/Hr) for a 100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.749
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 56.00
Pervious area fraction = 0.500; Impervious fraction = 0.500
User specified values are as follows:
TC = 20.00 min. Rain intensity = 2.08(In/Hr)
Total area = 0.00(Ac.) Total runoff = 710.00(CFS)

++

Process from Point/Station 1.000 to Point/Station 2.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1580.500(Ft.)
Downstream point/station elevation = 1564.000(Ft.)
Pipe length = 931.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 710.000(CFS)
Nearest computed pipe diameter = 78.00(In.)
Calculated individual pipe flow = 710.000(CFS)
Normal flow depth in pipe = 65.25(In.)
Flow top width inside pipe = 57.69(In.)
Critical depth could not be calculated.
Pipe flow velocity = 23.96(Ft/s)
Travel time through pipe = 0.65 min.
Time of concentration (TC) = 20.65 min.

++

Process from Point/Station 2.000 to Point/Station 2.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area = 0.000(Ac.)
Runoff from this stream = 710.000(CFS)
Time of concentration = 20.65 min.
Rainfall intensity = 2.046(In/Hr)
Program is now starting with Main Stream No. 2

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.000 to Point/Station        4.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   709.000(Ft.)
Top (of initial area) elevation =  1584.000(Ft.)
Bottom (of initial area) elevation =  1573.500(Ft.)
Difference in elevation =    10.500(Ft.)
Slope =    0.01481  s(percent)=       1.48
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.622 min.
Rainfall intensity =      2.997(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.877
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.259(CFS)
Total initial stream area =        0.860(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.000 to Point/Station        5.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1573.500(Ft.)
Downstream point/station elevation =  1569.000(Ft.)
Pipe length  =    65.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.259(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     2.259(CFS)
Normal flow depth in pipe =    4.60(In.)
Flow top width inside pipe =    9.00(In.)
Critical Depth =    8.06(In.)
Pipe flow velocity =      9.94(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =     9.73 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.000 to Point/Station        5.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      0.860(Ac.)
Runoff from this stream =      2.259(CFS)
Time of concentration =    9.73 min.
Rainfall intensity =     2.980(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        6.000 to Point/Station        7.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   370.000(Ft.)
Top (of initial area) elevation =  1581.300(Ft.)
Bottom (of initial area) elevation =  1573.500(Ft.)
Difference in elevation =     7.800(Ft.)
Slope =    0.02108  s(percent)=       2.11
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.912 min.
Rainfall intensity =      3.535(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.879
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      0.808(CFS)
Total initial stream area =        0.260(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        7.000 to Point/Station        5.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1573.500(Ft.)
Downstream point/station elevation =  1469.000(Ft.)
Pipe length  =    44.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.808(CFS)
```

```
Nearest computed pipe diameter  =      3.00(In.)
Calculated individual pipe flow  =     0.808(CFS)
Normal flow depth in pipe =    1.66(In.)
Flow top width inside pipe =    2.98(In.)
Critical depth could not be calculated.
Pipe flow velocity =     28.92(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =     6.94 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.000 to Point/Station        5.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.260(Ac.)
Runoff from this stream =      0.808(CFS)
Time of concentration =    6.94 min.
Rainfall intensity =     3.529(In/Hr)
Summary of stream data:

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


1        2.259      9.73                  2.980
2        0.808      6.94                  3.529
Largest stream flow has longer time of concentration
Qp =      2.259 + sum of
          Qb         Ia/Ib
           0.808 *    0.844 =      0.683
Qp =      2.942

Total of 2 streams to confluence:
Flow rates before confluence point:
       2.259       0.808
Area of streams before confluence:
        0.860        0.260
Results of confluence:
Total flow rate =      2.942(CFS)
Time of concentration =     9.731 min.
Effective stream area after confluence =      1.120(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.000 to Point/Station        8.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1569.000(Ft.)
Downstream point/station elevation =  1568.300(Ft.)
Pipe length  =   139.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.942(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     2.942(CFS)
Normal flow depth in pipe =    8.74(In.)
Flow top width inside pipe =   14.79(In.)
Critical Depth =    8.27(In.)
Pipe flow velocity =      3.97(Ft/s)
Travel time through pipe =    0.58 min.
Time of concentration (TC) =    10.32 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        8.000 to Point/Station        9.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
Top of natural channel elevation =   1568.300(Ft.)
End of natural channel elevation =   1568.000(Ft.)
Length of natural channel  =   166.000(Ft.)
Estimated mean flow rate at midpoint of channel =      3.270(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   0.81(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0018
Corrected/adjusted channel slope =  0.0018
Travel time =    3.40 min.     TC =   13.72  min.


 Adding area flow to channel
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.672
Decimal fraction soil group A = 0.000
```

```
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.510(In/Hr) for a   100.0 year storm
Subarea runoff =      0.422(CFS) for      0.250(Ac.)
Total runoff =      3.363(CFS)       Total area =       1.370(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        9.000 to Point/Station        9.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      1.370(Ac.)
Runoff from this stream =      3.363(CFS)
Time of concentration =   13.72 min.
Rainfall intensity =     2.510(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station       11.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   616.000(Ft.)
Top (of initial area) elevation =  1579.600(Ft.)
Bottom (of initial area) elevation =  1570.300(Ft.)
Difference in elevation =     9.300(Ft.)
Slope =    0.01510  s(percent)=       1.51
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.779 min.
Rainfall intensity =      2.708(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.774
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      4.845(CFS)
Total initial stream area =        2.310(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station       12.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1570.300(Ft.)
Downstream point/station elevation =  1568.300(Ft.)
Pipe length  =    60.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.845(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     4.845(CFS)
Normal flow depth in pipe =    7.72(In.)
Flow top width inside pipe =   11.50(In.)
Critical Depth =   10.90(In.)
Pipe flow velocity =      9.08(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =    11.89 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station        9.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1568.300(Ft.)
End of natural channel elevation =   1568.000(Ft.)
Length of natural channel  =   161.000(Ft.)
Estimated mean flow rate at midpoint of channel =      4.845(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   0.90(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0019
Corrected/adjusted channel slope =  0.0019
Travel time =    2.97 min.     TC =   14.86  min.


 Adding area flow to channel
UNDEVELOPED (good cover) subarea
```

```
Runoff Coefficient = 0.665
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.411(In/Hr) for a   100.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =      4.845(CFS)       Total area =       2.310(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        9.000 to Point/Station        9.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      2.310(Ac.)
Runoff from this stream =      4.845(CFS)
Time of concentration =   14.86 min.
Rainfall intensity =     2.411(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        7.000 to Point/Station       13.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   207.000(Ft.)
Top (of initial area) elevation =  1573.500(Ft.)
Bottom (of initial area) elevation =  1570.300(Ft.)
Difference in elevation =     3.200(Ft.)
Slope =    0.01546  s(percent)=       1.55
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    5.830 min.
Rainfall intensity =      3.850(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.881
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      0.712(CFS)
Total initial stream area =        0.210(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station        9.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1570.300(Ft.)
End of natural channel elevation =   1568.000(Ft.)
Length of natural channel  =   161.000(Ft.)
Estimated mean flow rate at midpoint of channel =      0.712(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.69(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0143
Corrected/adjusted channel slope =  0.0143
Travel time =    1.59 min.     TC =    7.42  min.


 Adding area flow to channel
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.720
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      3.412(In/Hr) for a   100.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =      0.712(CFS)       Total area =       0.210(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        9.000 to Point/Station        9.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
```

```
Along Main Stream number: 2 in normal stream number 3
Stream flow area =      0.210(Ac.)
Runoff from this stream =      0.712(CFS)
Time of concentration =    7.42 min.
Rainfall intensity =     3.412(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       15.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   806.000(Ft.)
Top (of initial area) elevation =  1581.700(Ft.)
Bottom (of initial area) elevation =  1569.800(Ft.)
Difference in elevation =    11.900(Ft.)
Slope =    0.01476  s(percent)=       1.48
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.175 min.
Rainfall intensity =      2.561(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.769
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      5.753(CFS)
Total initial stream area =        2.920(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.000 to Point/Station       16.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1569.800(Ft.)
Downstream point/station elevation =  1568.300(Ft.)
Pipe length  =   106.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.753(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     5.753(CFS)
Normal flow depth in pipe =    9.68(In.)
Flow top width inside pipe =   14.35(In.)
Critical Depth =   11.66(In.)
Pipe flow velocity =      6.87(Ft/s)
Travel time through pipe =    0.26 min.
Time of concentration (TC) =    13.43 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       16.000 to Point/Station        9.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
Top of natural channel elevation =   1568.300(Ft.)
End of natural channel elevation =   1568.000(Ft.)
Length of natural channel  =   148.000(Ft.)
Estimated mean flow rate at midpoint of channel =      5.753(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   0.98(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0020
Corrected/adjusted channel slope =  0.0020
Travel time =    2.51 min.     TC =   15.94  min.


 Adding area flow to channel
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.659
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.328(In/Hr) for a   100.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =      5.753(CFS)       Total area =       2.920(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        9.000 to Point/Station        9.000
```

```
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________________
Along Main Stream number: 2 in normal stream number 4
Stream flow area =      2.920(Ac.)
Runoff from this stream =      5.753(CFS)
Time of concentration =   15.94 min.
Rainfall intensity =     2.328(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       17.000 to Point/Station       18.000
**** INITIAL AREA EVALUATION ****
____________________________________________________________________________
Initial area flow distance =   483.000(Ft.)
Top (of initial area) elevation =  1575.300(Ft.)
Bottom (of initial area) elevation =  1570.500(Ft.)
Difference in elevation =     4.800(Ft.)
Slope =    0.00994  s(percent)=       0.99
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.619 min.
Rainfall intensity =      2.727(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.775
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      4.904(CFS)
Total initial stream area =        2.320(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       18.000 to Point/Station        9.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
____________________________________________________________________________
Top of natural channel elevation =   1570.500(Ft.)
End of natural channel elevation =   1568.000(Ft.)
Length of natural channel  =    76.000(Ft.)
Estimated mean flow rate at midpoint of channel =      4.904(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.81(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0329
Corrected/adjusted channel slope =  0.0329
Travel time =    0.33 min.     TC =   11.95  min.


 Adding area flow to channel
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.683
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.689(In/Hr) for a   100.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =      4.904(CFS)       Total area =       2.320(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        9.000 to Point/Station        9.000
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________________
Along Main Stream number: 2 in normal stream number 5
Stream flow area =      2.320(Ac.)
Runoff from this stream =      4.904(CFS)
Time of concentration =   11.95 min.
Rainfall intensity =     2.689(In/Hr)
Summary of stream data:

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


1        3.363     13.72                2.510
2        4.845     14.86                2.411
3        0.712      7.42                3.412
```

```
4        5.753     15.94                 2.328
5        4.904     11.95                 2.689
Largest stream flow has longer time of concentration
Qp =      5.753 + sum of
          Qb         Ia/Ib
           3.363 *    0.927 =      3.119
          Qb         Ia/Ib
           4.845 *    0.965 =      4.677
          Qb         Ia/Ib
           0.712 *    0.682 =      0.486
          Qb         Ia/Ib
           4.904 *    0.866 =      4.245
Qp =     18.281

Total of 5 streams to confluence:
Flow rates before confluence point:
       3.363       4.845       0.712       5.753       4.904
Area of streams before confluence:
        1.370       2.310       0.210       2.920       2.320
Results of confluence:
Total flow rate =     18.281(CFS)
Time of concentration =    15.944 min.
Effective stream area after confluence =      9.130(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        9.000 to Point/Station        2.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1568.000(Ft.)
Downstream point/station elevation =  1564.000(Ft.)
Pipe length  =    53.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    18.281(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    18.281(CFS)
Normal flow depth in pipe =   10.39(In.)
Flow top width inside pipe =   17.78(In.)
Critical depth could not be calculated.
Pipe flow velocity =     17.28(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =    16.00 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.000 to Point/Station        2.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      9.130(Ac.)
Runoff from this stream =     18.281(CFS)
Time of concentration =   16.00 min.
Rainfall intensity =     2.324(In/Hr)
Summary of stream data:

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


1      710.000     20.65                2.046
2       18.281     16.00                2.324
Largest stream flow has longer time of concentration
Qp =    710.000 + sum of
          Qb         Ia/Ib
           18.281 *    0.880 =     16.090
Qp =    726.090

Total of 2 main streams to confluence:
Flow rates before confluence point:
     710.000      18.281
Area of streams before confluence:
        0.000       9.130


Results of confluence:
Total flow rate =    726.090(CFS)
Time of concentration =    20.648 min.
Effective stream area after confluence  =      9.130(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.000 to Point/Station       19.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1564.000(Ft.)
Downstream point/station elevation =  1553.000(Ft.)
Pipe length  =   861.00(Ft.)   Manning's N = 0.013
```

```
No. of pipes = 1  Required pipe flow  =   726.090(CFS)
Nearest computed pipe diameter  =     84.00(In.)
Calculated individual pipe flow  =   726.090(CFS)
Normal flow depth in pipe =   69.28(In.)
Flow top width inside pipe =   63.87(In.)
Critical Depth =   79.21(In.)
Pipe flow velocity =     21.39(Ft/s)
Travel time through pipe =    0.67 min.
Time of concentration (TC) =    21.32 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       19.000 to Point/Station       19.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      9.130(Ac.)
Runoff from this stream =    726.090(CFS)
Time of concentration =   21.32 min.
Rainfall intensity =     2.013(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       18.000 to Point/Station       19.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   662.000(Ft.)
Top (of initial area) elevation =  1573.900(Ft.)
Bottom (of initial area) elevation =  1567.800(Ft.)
Difference in elevation =     6.100(Ft.)
Slope =    0.00921  s(percent)=       0.92
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.294 min.
Rainfall intensity =      2.897(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.876
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.041(CFS)
Total initial stream area =        0.410(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       19.000 to Point/Station       20.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of street segment elevation =  1567.800(Ft.)
End of street segment elevation =  1557.500(Ft.)
Length of street segment  =   589.000(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  =  16.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [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 =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      1.522(CFS)
Depth of flow =   0.265(Ft.), Average velocity =   2.516(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   6.915(Ft.)
Flow velocity =   2.52(Ft/s)
Travel time =    3.90 min.     TC =   14.20  min.
 Adding area flow to street
COMMERCIAL subarea type
Runoff Coefficient = 0.873
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      2.467(In/Hr) for a   100.0 year storm
Subarea runoff =      0.883(CFS) for      0.410(Ac.)
Total runoff =      1.924(CFS)       Total area =       0.820(Ac.)
```

```
Street flow at end of street =      1.924(CFS)
Half street flow at end of street =      1.924(CFS)
Depth of flow =   0.282(Ft.), Average velocity =   2.641(Ft/s)
Flow width (from curb towards crown)=   7.757(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       20.000 to Point/Station       21.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1557.500(Ft.)
Downstream point/station elevation =  1556.500(Ft.)
Pipe length  =    71.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.924(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.924(CFS)
Normal flow depth in pipe =    7.22(In.)
Flow top width inside pipe =    7.17(In.)
Critical Depth =    7.59(In.)
Pipe flow velocity =      5.07(Ft/s)
Travel time through pipe =    0.23 min.
Time of concentration (TC) =    14.43 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       21.000 to Point/Station       23.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1556.500(Ft.)
End of natural channel elevation =   1556.000(Ft.)
Length of natural channel  =    38.000(Ft.)
Estimated mean flow rate at midpoint of channel =      2.194(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   2.01(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0132
Corrected/adjusted channel slope =  0.0132
Travel time =    0.31 min.     TC =   14.74  min.


 Adding area flow to channel
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.666
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.421(In/Hr) for a   100.0 year storm
Subarea runoff =      0.371(CFS) for      0.230(Ac.)
Total runoff =      2.294(CFS)       Total area =       1.050(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       23.000 to Point/Station       23.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      1.050(Ac.)
Runoff from this stream =      2.294(CFS)
Time of concentration =   14.74 min.
Rainfall intensity =     2.421(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       22.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   922.000(Ft.)
Top (of initial area) elevation =  1570.300(Ft.)
Bottom (of initial area) elevation =  1557.500(Ft.)
Difference in elevation =    12.800(Ft.)
Slope =    0.01388  s(percent)=       1.39
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.827 min.
Rainfall intensity =      2.825(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.876
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
```

```
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.880(CFS)
Total initial stream area =        0.760(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       22.000 to Point/Station       21.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1557.500(Ft.)
Downstream point/station elevation =  1556.500(Ft.)
Pipe length  =    31.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.880(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.880(CFS)
Normal flow depth in pipe =    5.20(In.)
Flow top width inside pipe =    8.89(In.)
Critical Depth =    7.52(In.)
Pipe flow velocity =      7.12(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =    10.90 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       21.000 to Point/Station       23.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1556.500(Ft.)
End of natural channel elevation =   1556.000(Ft.)
Length of natural channel  =    38.000(Ft.)
Estimated mean flow rate at midpoint of channel =      1.880(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.95(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0132
Corrected/adjusted channel slope =  0.0132
Travel time =    0.32 min.     TC =   11.22  min.


 Adding area flow to channel
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.688
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.774(In/Hr) for a   100.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =      1.880(CFS)       Total area =       0.760(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       23.000 to Point/Station       23.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.760(Ac.)
Runoff from this stream =      1.880(CFS)
Time of concentration =   11.22 min.
Rainfall intensity =     2.774(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       24.000 to Point/Station       25.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   328.000(Ft.)
Top (of initial area) elevation =  1570.500(Ft.)
Bottom (of initial area) elevation =  1566.500(Ft.)
Difference in elevation =     4.000(Ft.)
Slope =    0.01220  s(percent)=       1.22
TC = k(0.940)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   23.027 min.
Rainfall intensity =      1.937(In/Hr) for a   100.0 year storm
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.625
Decimal fraction soil group A = 0.000
```

```
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      0.847(CFS)
Total initial stream area =        0.700(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       25.000 to Point/Station       26.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1566.500(Ft.)
Downstream point/station elevation =  1557.500(Ft.)
Pipe length  =   293.00(Ft.)   Manning's N = 0.013
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 =    4.29(In.)
Flow top width inside pipe =    5.41(In.)
Critical Depth =    5.43(In.)
Pipe flow velocity =      5.63(Ft/s)
Travel time through pipe =    0.87 min.
Time of concentration (TC) =    23.89 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       27.000 to Point/Station       26.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.740
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    23.89 min.
Rainfall intensity =      1.902(In/Hr) for a   100.0 year storm
Subarea runoff =      0.676(CFS) for      0.480(Ac.)
Total runoff =      1.523(CFS)       Total area =       1.180(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       26.000 to Point/Station       29.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1557.500(Ft.)
Downstream point/station elevation =  1557.000(Ft.)
Pipe length  =    39.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.523(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.523(CFS)
Normal flow depth in pipe =    6.16(In.)
Flow top width inside pipe =    8.36(In.)
Critical Depth =    6.81(In.)
Pipe flow velocity =      4.72(Ft/s)
Travel time through pipe =    0.14 min.
Time of concentration (TC) =    24.03 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       30.000 to Point/Station       29.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.740
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    24.03 min.
Rainfall intensity =      1.896(In/Hr) for a   100.0 year storm
Subarea runoff =      0.954(CFS) for      0.680(Ac.)
Total runoff =      2.477(CFS)       Total area =       1.860(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       29.000 to Point/Station       32.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1557.000(Ft.)
```

```
Downstream point/station elevation =  1556.500(Ft.)
Pipe length  =    35.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.477(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.477(CFS)
Normal flow depth in pipe =    6.57(In.)
Flow top width inside pipe =   11.94(In.)
Critical Depth =    8.09(In.)
Pipe flow velocity =      5.63(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =    24.14 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       32.000 to Point/Station       23.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
Top of natural channel elevation =   1556.500(Ft.)
End of natural channel elevation =   1556.000(Ft.)
Length of natural channel  =    65.000(Ft.)
Estimated mean flow rate at midpoint of channel =      2.630(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.60(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0077
Corrected/adjusted channel slope =  0.0077
Travel time =    0.68 min.     TC =   24.81  min.


 Adding area flow to channel
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.618
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.866(In/Hr) for a   100.0 year storm
Subarea runoff =      0.265(CFS) for      0.230(Ac.)
Total runoff =      2.742(CFS)       Total area =       2.090(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       23.000 to Point/Station       23.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 3
Stream flow area =      2.090(Ac.)
Runoff from this stream =      2.742(CFS)
Time of concentration =   24.81 min.
Rainfall intensity =     1.866(In/Hr)
Summary of stream data:

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


1        2.294     14.74                2.421
2        1.880     11.22                2.774
3        2.742     24.81                1.866
Largest stream flow has longer time of concentration
Qp =      2.742 + sum of
          Qb         Ia/Ib
           2.294 *    0.771 =      1.769
          Qb         Ia/Ib
           1.880 *    0.673 =      1.264
Qp =      5.775

Total of 3 streams to confluence:
Flow rates before confluence point:
       2.294       1.880       2.742
Area of streams before confluence:
       1.050       0.760       2.090
Results of confluence:
Total flow rate =      5.775(CFS)
Time of concentration =    24.812 min.
Effective stream area after confluence =      3.900(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       23.000 to Point/Station       19.000
```

```
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1556.000(Ft.)
Downstream point/station elevation =  1553.000(Ft.)
Pipe length  =    65.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.775(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     5.775(CFS)
Normal flow depth in pipe =    7.78(In.)
Flow top width inside pipe =   11.46(In.)
Critical Depth =   11.39(In.)
Pipe flow velocity =     10.71(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =    24.91 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       19.000 to Point/Station       19.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      3.900(Ac.)
Runoff from this stream =      5.775(CFS)
Time of concentration =   24.91 min.
Rainfall intensity =     1.862(In/Hr)
Summary of stream data:

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


1      726.090     21.32               2.013
2        5.775     24.91               1.862
Largest stream flow has longer or shorter time of concentration
Qp =    726.090 + sum of
          Qa          Tb/Ta
           5.775 *    0.856 =      4.942
Qp =    731.032

Total of 2 main streams to confluence:
Flow rates before confluence point:
     726.090       5.775
Area of streams before confluence:
        9.130        3.900


Results of confluence:
Total flow rate =    731.032(CFS)
Time of concentration =    21.319 min.
Effective stream area after confluence  =     13.030(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       19.000 to Point/Station       33.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1553.000(Ft.)
Downstream point/station elevation =  1547.000(Ft.)
Pipe length  =   428.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   731.032(CFS)
Nearest computed pipe diameter  =     81.00(In.)
Calculated individual pipe flow  =   731.032(CFS)
Normal flow depth in pipe =   72.90(In.)
Flow top width inside pipe =   48.60(In.)
Critical depth could not be calculated.
Pipe flow velocity =     21.57(Ft/s)
Travel time through pipe =    0.33 min.
Time of concentration (TC) =    21.65 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       33.000 to Point/Station       33.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     13.030(Ac.)
Runoff from this stream =    731.032(CFS)
Time of concentration =   21.65 min.
Rainfall intensity =     1.998(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       34.000 to Point/Station       35.000
**** INITIAL AREA EVALUATION ****
```

```
Initial area flow distance =   365.000(Ft.)
Top (of initial area) elevation =  1566.000(Ft.)
Bottom (of initial area) elevation =  1562.000(Ft.)
Difference in elevation =     4.000(Ft.)
Slope =    0.01096  s(percent)=       1.10
TC = k(0.940)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   24.552 min.
Rainfall intensity =      1.876(In/Hr) for a   100.0 year storm
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.619
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      1.393(CFS)
Total initial stream area =        1.200(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       35.000 to Point/Station       36.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1562.000(Ft.)
Downstream point/station elevation =  1553.000(Ft.)
Pipe length  =   329.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.393(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.393(CFS)
Normal flow depth in pipe =    4.55(In.)
Flow top width inside pipe =    9.00(In.)
Critical Depth =    6.52(In.)
Pipe flow velocity =      6.22(Ft/s)
Travel time through pipe =    0.88 min.
Time of concentration (TC) =    25.43 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       36.000 to Point/Station       36.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      1.200(Ac.)
Runoff from this stream =      1.393(CFS)
Time of concentration =   25.43 min.
Rainfall intensity =     1.843(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       59.000 to Point/Station       37.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   543.000(Ft.)
Top (of initial area) elevation =  1564.500(Ft.)
Bottom (of initial area) elevation =  1562.000(Ft.)
Difference in elevation =     2.500(Ft.)
Slope =    0.00460  s(percent)=       0.46
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.202 min.
Rainfall intensity =      2.466(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.766
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      3.872(CFS)
Total initial stream area =        2.050(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       37.000 to Point/Station       38.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1562.000(Ft.)
Downstream point/station elevation =  1552.000(Ft.)
Pipe length  =    28.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.872(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     3.872(CFS)
Normal flow depth in pipe =    3.91(In.)
```

```
Flow top width inside pipe =    8.92(In.)
Critical depth could not be calculated.
Pipe flow velocity =     21.02(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =    14.22 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       62.000 to Point/Station       38.000
**** SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------------
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.766
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    14.22 min.
Rainfall intensity =      2.465(In/Hr) for a   100.0 year storm
Subarea runoff =      3.491(CFS) for      1.850(Ac.)
Total runoff =      7.364(CFS)       Total area =       3.900(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       38.000 to Point/Station       36.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------------
Upstream point/station elevation =  1554.000(Ft.)
Downstream point/station elevation =  1553.000(Ft.)
Pipe length  =    26.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.364(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     7.364(CFS)
Normal flow depth in pipe =    8.21(In.)
Flow top width inside pipe =   14.93(In.)
Critical Depth =   12.97(In.)
Pipe flow velocity =     10.71(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =    14.26 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       36.000 to Point/Station       36.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      3.900(Ac.)
Runoff from this stream =      7.364(CFS)
Time of concentration =   14.26 min.
Rainfall intensity =     2.461(In/Hr)
Summary of stream data:

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


1        1.393     25.43                 1.843
2        7.364     14.26                 2.461
Largest stream flow has longer or shorter time of concentration
Qp =      7.364 + sum of
          Qa          Tb/Ta
           1.393 *    0.561 =      0.781
Qp =      8.145

Total of 2 streams to confluence:
Flow rates before confluence point:
       1.393       7.364
Area of streams before confluence:
       1.200       3.900
Results of confluence:
Total flow rate =      8.145(CFS)
Time of concentration =    14.265 min.
Effective stream area after confluence =      5.100(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       36.000 to Point/Station       40.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------------
Upstream point/station elevation =  1553.000(Ft.)
Downstream point/station elevation =  1552.500(Ft.)
Pipe length  =    21.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.145(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     8.145(CFS)
```

```
Normal flow depth in pipe =   10.31(In.)
Flow top width inside pipe =   13.91(In.)
Critical Depth =   13.46(In.)
Pipe flow velocity =      9.06(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =    14.30 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       40.000 to Point/Station       41.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1552.500(Ft.)
End of natural channel elevation =   1552.000(Ft.)
Length of natural channel  =    80.000(Ft.)
Estimated mean flow rate at midpoint of channel =      8.377(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.89(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0063
Corrected/adjusted channel slope =  0.0063
Travel time =    0.71 min.     TC =   15.01  min.


 Adding area flow to channel
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.664
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.399(In/Hr) for a   100.0 year storm
Subarea runoff =      0.462(CFS) for      0.290(Ac.)
Total runoff =      8.607(CFS)       Total area =       5.390(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       41.000 to Point/Station       41.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      5.390(Ac.)
Runoff from this stream =      8.607(CFS)
Time of concentration =   15.01 min.
Rainfall intensity =     2.399(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       55.000 to Point/Station       42.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   657.000(Ft.)
Top (of initial area) elevation =  1561.600(Ft.)
Bottom (of initial area) elevation =  1553.000(Ft.)
Difference in elevation =     8.600(Ft.)
Slope =    0.01309  s(percent)=       1.31
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.567 min.
Rainfall intensity =      3.005(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.877
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.371(CFS)
Total initial stream area =       0.900(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       42.000 to Point/Station       43.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1553.000(Ft.)
Downstream point/station elevation =  1552.500(Ft.)
Pipe length  =    23.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.371(CFS)
```

```
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     2.371(CFS)
Normal flow depth in pipe =    7.16(In.)
Flow top width inside pipe =    7.26(In.)
Critical Depth =    8.19(In.)
Pipe flow velocity =      6.29(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =     9.63 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       43.000 to Point/Station       41.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
Top of natural channel elevation =   1552.500(Ft.)
End of natural channel elevation =   1552.000(Ft.)
Length of natural channel  =    39.000(Ft.)
Estimated mean flow rate at midpoint of channel =      2.371(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   2.02(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0128
Corrected/adjusted channel slope =  0.0128
Travel time =    0.32 min.     TC =    9.95  min.


 Adding area flow to channel
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.698
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.947(In/Hr) for a   100.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =      2.371(CFS)       Total area =       0.900(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       41.000 to Point/Station       41.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.900(Ac.)
Runoff from this stream =      2.371(CFS)
Time of concentration =    9.95 min.
Rainfall intensity =     2.947(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       22.000 to Point/Station       44.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   556.000(Ft.)
Top (of initial area) elevation =  1557.500(Ft.)
Bottom (of initial area) elevation =  1553.000(Ft.)
Difference in elevation =     4.500(Ft.)
Slope =    0.00809  s(percent)=       0.81
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.852 min.
Rainfall intensity =      2.961(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.876
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.350(CFS)
Total initial stream area =        0.520(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       44.000 to Point/Station       45.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1553.000(Ft.)
Downstream point/station elevation =  1552.500(Ft.)
```

```
Pipe length  =    31.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.350(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.350(CFS)
Normal flow depth in pipe =    5.24(In.)
Flow top width inside pipe =    8.88(In.)
Critical Depth =    6.42(In.)
Pipe flow velocity =      5.05(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =     9.95 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       45.000 to Point/Station       41.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
Top of natural channel elevation =   1552.500(Ft.)
End of natural channel elevation =   1552.000(Ft.)
Length of natural channel  =    31.000(Ft.)
Estimated mean flow rate at midpoint of channel =      1.350(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   2.02(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0161
Corrected/adjusted channel slope =  0.0161
Travel time =    0.26 min.     TC =   10.21  min.


 Adding area flow to channel
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.696
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.909(In/Hr) for a   100.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =      1.350(CFS)       Total area =       0.520(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       41.000 to Point/Station       41.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 3
Stream flow area =      0.520(Ac.)
Runoff from this stream =      1.350(CFS)
Time of concentration =   10.21 min.
Rainfall intensity =     2.909(In/Hr)
Summary of stream data:

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


1        8.607     15.01                2.399
2        2.371      9.95                2.947
3        1.350     10.21                2.909
Largest stream flow has longer time of concentration
Qp =      8.607 + sum of
          Qb         Ia/Ib
           2.371 *    0.814 =      1.931
          Qb         Ia/Ib
           1.350 *    0.825 =      1.113
Qp =     11.651

Total of 3 streams to confluence:
Flow rates before confluence point:
       8.607       2.371       1.350
Area of streams before confluence:
        5.390        0.900        0.520
Results of confluence:
Total flow rate =     11.651(CFS)
Time of concentration =    15.009 min.
Effective stream area after confluence =      6.810(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       41.000 to Point/Station       33.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
```

```
Upstream point/station elevation =  1552.000(Ft.)
Downstream point/station elevation =  1547.000(Ft.)
Pipe length  =    71.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.651(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =    11.651(CFS)
Normal flow depth in pipe =    9.07(In.)
Flow top width inside pipe =   14.67(In.)
Critical depth could not be calculated.
Pipe flow velocity =     15.02(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    15.09 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       33.000 to Point/Station       33.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      6.810(Ac.)
Runoff from this stream =     11.651(CFS)
Time of concentration =   15.09 min.
Rainfall intensity =     2.393(In/Hr)
Summary of stream data:

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


1      731.032     21.65               1.998
2       11.651     15.09               2.393
Largest stream flow has longer time of concentration
Qp =    731.032 + sum of
          Qb         Ia/Ib
          11.651 *    0.835 =      9.726
Qp =    740.759

Total of 2 main streams to confluence:
Flow rates before confluence point:
     731.032      11.651
Area of streams before confluence:
       13.030        6.810


Results of confluence:
Total flow rate =    740.759(CFS)
Time of concentration =    21.649 min.
Effective stream area after confluence  =     19.840(Ac.)
End of computations, total study area =           19.84 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.486
Area averaged RI index number =  56.7
```

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 08/16/21 File:pro1100.out

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

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

Program License Serial Number 5006

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

Storm event (year) = 100.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)
For the [Sunnymead-Moreno] area used.
10 year storm 10 minute intensity = 2.010(In/Hr)
10 year storm 60 minute intensity = 0.820(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.200(In/Hr)
Slope of intensity duration curve = 0.5000

++
Process from Point/Station 58.000 to Point/Station 59.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 933.000(Ft.)
Top (of initial area) elevation = 1575.900(Ft.)
Bottom (of initial area) elevation = 1564.500(Ft.)
Difference in elevation = 11.400(Ft.)
Slope = 0.01222 s(percent)= 1.22
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 14.508 min.
Rainfall intensity = 2.440(In/Hr) for a 100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.765
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 56.00
Pervious area fraction = 0.500; Impervious fraction = 0.500
Initial subarea runoff = 4.424(CFS)
Total initial stream area = 2.370(Ac.)
Pervious area fraction = 0.500

++
Process from Point/Station 59.000 to Point/Station 60.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1564.500(Ft.)
Downstream point/station elevation = 1561.500(Ft.)
Pipe length = 22.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 4.424(CFS)
Nearest computed pipe diameter = 9.00(In.)
Calculated individual pipe flow = 4.424(CFS)
Normal flow depth in pipe = 5.68(In.)
Flow top width inside pipe = 8.69(In.)
Critical depth could not be calculated.
Pipe flow velocity = 15.07(Ft/s)
Travel time through pipe = 0.02 min.
Time of concentration (TC) = 14.53 min.

++
Process from Point/Station 60.000 to Point/Station 60.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 2.370(Ac.)

```
Runoff from this stream =      4.424(CFS)
Time of concentration =   14.53 min.
Rainfall intensity =     2.438(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       61.000 to Point/Station       62.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   542.000(Ft.)
Top (of initial area) elevation =  1572.100(Ft.)
Bottom (of initial area) elevation =  1564.500(Ft.)
Difference in elevation =     7.600(Ft.)
Slope =    0.01402  s(percent)=       1.40
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.358 min.
Rainfall intensity =      2.758(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.776
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      2.826(CFS)
Total initial stream area =        1.320(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       62.000 to Point/Station       60.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1564.500(Ft.)
Downstream point/station elevation =  1561.500(Ft.)
Pipe length  =    22.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.826(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     2.826(CFS)
Normal flow depth in pipe =    4.30(In.)
Flow top width inside pipe =    8.99(In.)
Critical Depth =    8.54(In.)
Pipe flow velocity =     13.56(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =    11.39 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       60.000 to Point/Station       60.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.320(Ac.)
Runoff from this stream =      2.826(CFS)
Time of concentration =   11.39 min.
Rainfall intensity =     2.755(In/Hr)
Summary of stream data:

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


1        4.424     14.53                 2.438
2        2.826     11.39                 2.755
Largest stream flow has longer time of concentration
Qp =      4.424 + sum of
         Qb         Ia/Ib
          2.826 *    0.885 =      2.501
Qp =      6.925

Total of 2 streams to confluence:
Flow rates before confluence point:
       4.424       2.826
Area of streams before confluence:
        2.370        1.320
Results of confluence:
Total flow rate =      6.925(CFS)
Time of concentration =    14.533 min.
Effective stream area after confluence =      3.690(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       60.000 to Point/Station       63.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1561.500(Ft.)
```

```
Downstream point/station elevation =  1561.000(Ft.)
Pipe length  =    33.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.925(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     6.925(CFS)
Normal flow depth in pipe =   10.83(In.)
Flow top width inside pipe =   13.44(In.)
Critical Depth =   12.67(In.)
Pipe flow velocity =      7.30(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    14.61 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       63.000 to Point/Station       63.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      3.690(Ac.)
Runoff from this stream =      6.925(CFS)
Time of concentration =   14.61 min.
Rainfall intensity =     2.432(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       64.000 to Point/Station       65.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   888.000(Ft.)
Top (of initial area) elevation =  1575.100(Ft.)
Bottom (of initial area) elevation =  1564.500(Ft.)
Difference in elevation =    10.600(Ft.)
Slope =    0.01194  s(percent)=       1.19
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.291 min.
Rainfall intensity =      2.459(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.766
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      2.052(CFS)
Total initial stream area =        1.090(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       65.000 to Point/Station       66.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1564.500(Ft.)
Downstream point/station elevation =  1561.500(Ft.)
Pipe length  =    25.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.052(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     2.052(CFS)
Normal flow depth in pipe =    3.72(In.)
Flow top width inside pipe =    8.86(In.)
Critical Depth =    7.78(In.)
Pipe flow velocity =     11.89(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =    14.33 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       66.000 to Point/Station       66.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      1.090(Ac.)
Runoff from this stream =      2.052(CFS)
Time of concentration =   14.33 min.
Rainfall intensity =     2.456(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       67.000 to Point/Station       68.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   776.000(Ft.)
Top (of initial area) elevation =  1574.100(Ft.)
Bottom (of initial area) elevation =  1564.500(Ft.)
```

```
Difference in elevation =     9.600(Ft.)
Slope =    0.01237  s(percent)=       1.24
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.444 min.
Rainfall intensity =      2.535(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.768
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      6.156(CFS)
Total initial stream area =        3.160(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       68.000 to Point/Station       66.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1564.500(Ft.)
Downstream point/station elevation =  1561.500(Ft.)
Pipe length  =    16.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.156(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     6.156(CFS)
Normal flow depth in pipe =    6.43(In.)
Flow top width inside pipe =    8.13(In.)
Critical depth could not be calculated.
Pipe flow velocity =     18.23(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    13.46 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       66.000 to Point/Station       66.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      3.160(Ac.)
Runoff from this stream =      6.156(CFS)
Time of concentration =   13.46 min.
Rainfall intensity =     2.534(In/Hr)
Summary of stream data:

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


1        2.052     14.33                 2.456
2        6.156     13.46                 2.534
Largest stream flow has longer or shorter time of concentration
Qp =      6.156 + sum of
          Qa          Tb/Ta
           2.052 *    0.939 =      1.928
Qp =      8.083

Total of 2 streams to confluence:
Flow rates before confluence point:
       2.052       6.156
Area of streams before confluence:
        1.090        3.160
Results of confluence:
Total flow rate =      8.083(CFS)
Time of concentration =    13.459 min.
Effective stream area after confluence =      4.250(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       66.000 to Point/Station       63.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1561.500(Ft.)
Downstream point/station elevation =  1561.000(Ft.)
Pipe length  =    25.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.083(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     8.083(CFS)
Normal flow depth in pipe =   10.97(In.)
Flow top width inside pipe =   13.30(In.)
Critical Depth =   13.42(In.)
Pipe flow velocity =      8.41(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =    13.51 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       63.000 to Point/Station       63.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      4.250(Ac.)
Runoff from this stream =      8.083(CFS)
Time of concentration =   13.51 min.
Rainfall intensity =     2.529(In/Hr)
Summary of stream data:

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


1        6.925     14.61               2.432
2        8.083     13.51               2.529
Largest stream flow has longer or shorter time of concentration
Qp =      8.083 + sum of
          Qa          Tb/Ta
           6.925 *    0.925 =      6.403
Qp =     14.487

Total of 2 main streams to confluence:
Flow rates before confluence point:
       6.925       8.083
Area of streams before confluence:
        3.690        4.250


Results of confluence:
Total flow rate =     14.487(CFS)
Time of concentration =    13.508 min.
Effective stream area after confluence  =      7.940(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       63.000 to Point/Station       69.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1561.000(Ft.)
Downstream point/station elevation =  1560.500(Ft.)
Pipe length  =    91.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    14.487(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    14.487(CFS)
Normal flow depth in pipe =   17.20(In.)
Flow top width inside pipe =   21.63(In.)
Critical Depth =   16.44(In.)
Pipe flow velocity =      6.01(Ft/s)
Travel time through pipe =    0.25 min.
Time of concentration (TC) =    13.76 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       69.000 to Point/Station       57.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
Top of natural channel elevation =   1560.500(Ft.)
End of natural channel elevation =   1560.000(Ft.)
Length of natural channel  =   113.000(Ft.)
Estimated mean flow rate at midpoint of channel =     14.970(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.85(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0044
Corrected/adjusted channel slope =  0.0044
Travel time =    1.02 min.     TC =   14.78  min.


 Adding area flow to channel
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.665
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =     2.418(In/Hr) for a   100.0 year storm
```

```
Subarea runoff =      0.853(CFS) for      0.530(Ac.)
Total runoff =     15.339(CFS)       Total area =       8.470(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       57.000 to Point/Station       57.000
**** CONFLUENCE OF MAIN STREAMS ****
----------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      8.470(Ac.)
Runoff from this stream =     15.339(CFS)
Time of concentration =   14.78 min.
Rainfall intensity =     2.418(In/Hr)
Program is now starting with Main Stream No. 2

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        6.000 to Point/Station       54.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------------
Initial area flow distance =   873.000(Ft.)
Top (of initial area) elevation =  1581.300(Ft.)
Bottom (of initial area) elevation =  1573.000(Ft.)
Difference in elevation =     8.300(Ft.)
Slope =    0.00951  s(percent)=       0.95
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.427 min.
Rainfall intensity =      2.750(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.875
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      3.056(CFS)
Total initial stream area =        1.270(Ac.)
Pervious area fraction = 0.100

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       54.000 to Point/Station       55.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------------
Top of street segment elevation =  1573.000(Ft.)
End of street segment elevation =  1561.600(Ft.)
Length of street segment  =   542.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  32.000(Ft.)
Distance from crown to crossfall grade break  =  30.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  18.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      4.525(CFS)
Depth of flow =   0.345(Ft.), Average velocity =   3.436(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  10.911(Ft.)
Flow velocity =   3.44(Ft/s)
Travel time =    2.63 min.     TC =   14.06  min.
 Adding area flow to street
COMMERCIAL subarea type
Runoff Coefficient = 0.873
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      2.479(In/Hr) for a   100.0 year storm
Subarea runoff =      2.858(CFS) for      1.320(Ac.)
Total runoff =      5.914(CFS)       Total area =       2.590(Ac.)
Street flow at end of street =      5.914(CFS)
Half street flow at end of street =      5.914(CFS)
Depth of flow =   0.371(Ft.), Average velocity =   3.658(Ft/s)
Flow width (from curb towards crown)=  12.208(Ft.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

```
Process from Point/Station       55.000 to Point/Station       56.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1561.600(Ft.)
Downstream point/station elevation =  1560.500(Ft.)
Pipe length  =   159.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.914(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     5.914(CFS)
Normal flow depth in pipe =   10.85(In.)
Flow top width inside pipe =   17.61(In.)
Critical Depth =   11.26(In.)
Pipe flow velocity =      5.31(Ft/s)
Travel time through pipe =    0.50 min.
Time of concentration (TC) =    14.55 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       56.000 to Point/Station       57.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
Top of natural channel elevation =   1560.500(Ft.)
End of natural channel elevation =   1560.000(Ft.)
Length of natural channel  =    90.000(Ft.)
Estimated mean flow rate at midpoint of channel =      5.914(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.64(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0056
Corrected/adjusted channel slope =  0.0056
Travel time =    0.92 min.     TC =   15.47  min.


 Adding area flow to channel
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.661
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.363(In/Hr) for a   100.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =      5.914(CFS)       Total area =       2.590(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       57.000 to Point/Station       53.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1560.000(Ft.)
Downstream point/station elevation =  1554.000(Ft.)
Pipe length  =   104.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.914(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     5.914(CFS)
Normal flow depth in pipe =    7.34(In.)
Flow top width inside pipe =   11.70(In.)
Critical depth could not be calculated.
Pipe flow velocity =     11.76(Ft/s)
Travel time through pipe =    0.15 min.
Time of concentration (TC) =    15.62 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       57.000 to Point/Station       57.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      2.590(Ac.)
Runoff from this stream =      5.914(CFS)
Time of concentration =   15.62 min.
Rainfall intensity =     2.352(In/Hr)
Summary of stream data:

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


1       15.339     14.78              2.418
```

```
2        5.914     15.62               2.352
Largest stream flow has longer or shorter time of concentration
Qp =     15.339 + sum of
          Qa           Tb/Ta
           5.914 *     0.946 =      5.597
Qp =     20.936

Total of 2 main streams to confluence:
Flow rates before confluence point:
      15.339       5.914
Area of streams before confluence:
        8.470        2.590


Results of confluence:
Total flow rate =     20.936(CFS)
Time of concentration =    14.781 min.
Effective stream area after confluence  =     11.060(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       57.000 to Point/Station       53.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1560.000(Ft.)
Downstream point/station elevation =  1554.000(Ft.)
Pipe length  =   104.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    20.936(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    20.936(CFS)
Normal flow depth in pipe =   12.52(In.)
Flow top width inside pipe =   16.57(In.)
Critical depth could not be calculated.
Pipe flow velocity =     15.96(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =    14.89 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       53.000 to Point/Station       53.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     11.060(Ac.)
Runoff from this stream =     20.936(CFS)
Time of concentration =   14.89 min.
Rainfall intensity =     2.409(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       51.000 to Point/Station       52.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   664.000(Ft.)
Top (of initial area) elevation = 14574.500(Ft.)
Bottom (of initial area) elevation =  1560.000(Ft.)
Difference in elevation = 13014.500(Ft.)
Slope =   19.60015  s(percent)=    1960.02
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Warning: TC computed to be less than 5 min.; program is assuming the
time of concentration is 5 minutes.
Initial area time of concentration =    5.000 min.
Rainfall intensity =      4.157(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.882
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      8.725(CFS)
Total initial stream area =        2.380(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       52.000 to Point/Station       53.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1560.000(Ft.)
Downstream point/station elevation =  1554.000(Ft.)
Pipe length  =   250.00(Ft.)   Manning's N = 0.015
No. of pipes = 1  Required pipe flow  =     8.725(CFS)
Nearest computed pipe diameter  =     18.00(In.)
```

```
Calculated individual pipe flow  =     8.725(CFS)
Normal flow depth in pipe =   10.24(In.)
Flow top width inside pipe =   17.83(In.)
Critical Depth =   13.71(In.)
Pipe flow velocity =      8.40(Ft/s)
Travel time through pipe =    0.50 min.
Time of concentration (TC) =     5.50 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       53.000 to Point/Station       53.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      2.380(Ac.)
Runoff from this stream =      8.725(CFS)
Time of concentration =    5.50 min.
Rainfall intensity =     3.965(In/Hr)
Summary of stream data:

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


1       20.936     14.89               2.409
2        8.725      5.50               3.965
Largest stream flow has longer time of concentration
Qp =     20.936 + sum of
          Qb         Ia/Ib
           8.725 *    0.608 =      5.301
Qp =     26.237

Total of 2 main streams to confluence:
Flow rates before confluence point:
      20.936       8.725
Area of streams before confluence:
       11.060        2.380


Results of confluence:
Total flow rate =     26.237(CFS)
Time of concentration =    14.890 min.
Effective stream area after confluence  =     13.440(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       53.000 to Point/Station       70.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1554.000(Ft.)
Downstream point/station elevation =  1546.000(Ft.)
Pipe length  =   416.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    26.237(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    26.237(CFS)
Normal flow depth in pipe =   16.78(In.)
Flow top width inside pipe =   22.01(In.)
Critical Depth =   21.51(In.)
Pipe flow velocity =     11.18(Ft/s)
Travel time through pipe =    0.62 min.
Time of concentration (TC) =    15.51 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       70.000 to Point/Station       70.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     13.440(Ac.)
Runoff from this stream =     26.237(CFS)
Time of concentration =   15.51 min.
Rainfall intensity =     2.360(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       71.000 to Point/Station       72.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   424.000(Ft.)
Top (of initial area) elevation =  1562.000(Ft.)
Bottom (of initial area) elevation =  1553.800(Ft.)
Difference in elevation =     8.200(Ft.)
Slope =    0.01934  s(percent)=       1.93
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
```

```
Initial area time of concentration =    9.654 min.
Rainfall intensity =      2.992(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.783
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      2.484(CFS)
Total initial stream area =        1.060(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       72.000 to Point/Station       73.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1553.800(Ft.)
Downstream point/station elevation =  1550.000(Ft.)
Pipe length  =    20.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.484(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     2.484(CFS)
Normal flow depth in pipe =    3.64(In.)
Flow top width inside pipe =    8.84(In.)
Critical Depth =    8.30(In.)
Pipe flow velocity =     14.81(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =     9.68 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       73.000 to Point/Station       73.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      1.060(Ac.)
Runoff from this stream =      2.484(CFS)
Time of concentration =    9.68 min.
Rainfall intensity =     2.988(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       74.000 to Point/Station       75.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   318.000(Ft.)
Top (of initial area) elevation =  1562.000(Ft.)
Bottom (of initial area) elevation =  1553.800(Ft.)
Difference in elevation =     8.200(Ft.)
Slope =    0.02579  s(percent)=       2.58
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.124 min.
Rainfall intensity =      3.261(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.791
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      4.125(CFS)
Total initial stream area =        1.600(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       75.000 to Point/Station       73.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1553.800(Ft.)
Downstream point/station elevation =  1550.000(Ft.)
Pipe length  =    29.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.125(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     4.125(CFS)
Normal flow depth in pipe =    5.49(In.)
Flow top width inside pipe =    8.78(In.)
Critical depth could not be calculated.
Pipe flow velocity =     14.62(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =     8.16 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       73.000 to Point/Station       73.000
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.600(Ac.)
Runoff from this stream =      4.125(CFS)
Time of concentration =    8.16 min.
Rainfall intensity =     3.255(In/Hr)
Summary of stream data:

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


1        2.484      9.68                 2.988
2        4.125      8.16                 3.255
Largest stream flow has longer or shorter time of concentration
Qp =      4.125 + sum of
          Qa          Tb/Ta
           2.484 *    0.843 =      2.094
Qp =      6.219

Total of 2 streams to confluence:
Flow rates before confluence point:
       2.484       4.125
Area of streams before confluence:
        1.060        1.600
Results of confluence:
Total flow rate =      6.219(CFS)
Time of concentration =     8.157 min.
Effective stream area after confluence =      2.660(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       73.000 to Point/Station       76.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
____________________________________________________________________________
Upstream point/station elevation =  1550.000(Ft.)
Downstream point/station elevation =  1549.000(Ft.)
Pipe length  =   152.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.219(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     6.219(CFS)
Normal flow depth in pipe =   11.41(In.)
Flow top width inside pipe =   17.34(In.)
Critical Depth =   11.57(In.)
Pipe flow velocity =      5.26(Ft/s)
Travel time through pipe =    0.48 min.
Time of concentration (TC) =     8.64 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       76.000 to Point/Station       76.000
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      2.660(Ac.)
Runoff from this stream =      6.219(CFS)
Time of concentration =    8.64 min.
Rainfall intensity =     3.163(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       52.000 to Point/Station       76.500
**** INITIAL AREA EVALUATION ****
____________________________________________________________________________
Initial area flow distance =   347.000(Ft.)
Top (of initial area) elevation =  1560.000(Ft.)
Bottom (of initial area) elevation =  1555.500(Ft.)
Difference in elevation =     4.500(Ft.)
Slope =    0.01297  s(percent)=       1.30
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.652 min.
Rainfall intensity =      2.992(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.783
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      0.937(CFS)
Total initial stream area =        0.400(Ac.)
Pervious area fraction = 0.500
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       76.500 to Point/Station       76.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1555.500(Ft.)
Downstream point/station elevation =  1549.000(Ft.)
Pipe length  =    70.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.937(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.937(CFS)
Normal flow depth in pipe =    3.17(In.)
Flow top width inside pipe =    5.99(In.)
Critical Depth =    5.59(In.)
Pipe flow velocity =      8.91(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =     9.78 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       76.000 to Point/Station       76.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.400(Ac.)
Runoff from this stream =      0.937(CFS)
Time of concentration =    9.78 min.
Rainfall intensity =     2.972(In/Hr)
Summary of stream data:

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


1        6.219      8.64                  3.163
2        0.937      9.78                  2.972
Largest stream flow has longer or shorter time of concentration
Qp =      6.219 + sum of
          Qa           Tb/Ta
           0.937 *    0.883 =      0.828
Qp =      7.047

Total of 2 streams to confluence:
Flow rates before confluence point:
       6.219       0.937
Area of streams before confluence:
        2.660        0.400
Results of confluence:
Total flow rate =      7.047(CFS)
Time of concentration =     8.638 min.
Effective stream area after confluence =      3.060(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       76.000 to Point/Station       77.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1549.000(Ft.)
Downstream point/station elevation =  1548.000(Ft.)
Pipe length  =   146.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.047(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     7.047(CFS)
Normal flow depth in pipe =   12.30(In.)
Flow top width inside pipe =   16.74(In.)
Critical Depth =   12.33(In.)
Pipe flow velocity =      5.48(Ft/s)
Travel time through pipe =    0.44 min.
Time of concentration (TC) =     9.08 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       77.000 to Point/Station       78.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
Top of natural channel elevation =   1548.000(Ft.)
End of natural channel elevation =   1547.500(Ft.)
Length of natural channel  =    77.000(Ft.)
Estimated mean flow rate at midpoint of channel =      7.438(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.87(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
```

```
       Normal channel slope =  0.0065
Corrected/adjusted channel slope =  0.0065
Travel time =    0.69 min.     TC =    9.77  min.


 Adding area flow to channel
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.699
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.974(In/Hr) for a   100.0 year storm
Subarea runoff =      0.707(CFS) for      0.340(Ac.)
Total runoff =      7.754(CFS)       Total area =       3.400(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       78.000 to Point/Station       78.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      3.400(Ac.)
Runoff from this stream =      7.754(CFS)
Time of concentration =    9.77 min.
Rainfall intensity =     2.974(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       79.000 to Point/Station       80.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   227.000(Ft.)
Top (of initial area) elevation =  1555.200(Ft.)
Bottom (of initial area) elevation =  1552.500(Ft.)
Difference in elevation =     2.700(Ft.)
Slope =    0.01189  s(percent)=       1.19
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.287 min.
Rainfall intensity =      3.229(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.790
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      2.040(CFS)
Total initial stream area =        0.800(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       80.000 to Point/Station       81.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1552.500(Ft.)
Downstream point/station elevation =  1550.000(Ft.)
Pipe length  =    22.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.040(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     2.040(CFS)
Normal flow depth in pipe =    3.77(In.)
Flow top width inside pipe =    8.88(In.)
Critical Depth =    7.77(In.)
Pipe flow velocity =     11.64(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =     8.32 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       82.000 to Point/Station       81.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.790
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =     8.32 min.
Rainfall intensity =      3.223(In/Hr) for a   100.0 year storm
```

```
Subarea runoff =      1.934(CFS) for      0.760(Ac.)
Total runoff =      3.974(CFS)       Total area =       1.560(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       81.000 to Point/Station       84.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1550.000(Ft.)
Downstream point/station elevation =  1548.000(Ft.)
Pipe length  =   230.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.974(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.974(CFS)
Normal flow depth in pipe =    8.89(In.)
Flow top width inside pipe =   14.74(In.)
Critical Depth =    9.67(In.)
Pipe flow velocity =      5.24(Ft/s)
Travel time through pipe =    0.73 min.
Time of concentration (TC) =     9.05 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       84.000 to Point/Station       78.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1548.000(Ft.)
End of natural channel elevation =   1547.500(Ft.)
Length of natural channel  =    74.000(Ft.)
Estimated mean flow rate at midpoint of channel =      3.974(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.64(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0068
Corrected/adjusted channel slope =  0.0068
Travel time =    0.75 min.     TC =    9.80  min.


 Adding area flow to channel
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.699
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.969(In/Hr) for a   100.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =      3.974(CFS)       Total area =       1.560(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       78.000 to Point/Station       78.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.560(Ac.)
Runoff from this stream =      3.974(CFS)
Time of concentration =    9.80 min.
Rainfall intensity =     2.969(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       85.000 to Point/Station       86.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   189.000(Ft.)
Top (of initial area) elevation =  1553.500(Ft.)
Bottom (of initial area) elevation =  1553.000(Ft.)
Difference in elevation =     0.500(Ft.)
Slope =    0.00265  s(percent)=       0.26
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.002 min.
Rainfall intensity =      3.286(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.878
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
```

```
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      0.491(CFS)
Total initial stream area =        0.170(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       86.000 to Point/Station       87.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1553.000(Ft.)
Downstream point/station elevation =  1548.000(Ft.)
Pipe length  =    34.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.491(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.491(CFS)
Normal flow depth in pipe =    1.95(In.)
Flow top width inside pipe =    5.62(In.)
Critical Depth =    4.28(In.)
Pipe flow velocity =      8.88(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =     8.07 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       87.000 to Point/Station       78.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1548.000(Ft.)
End of natural channel elevation =   1547.500(Ft.)
Length of natural channel  =    23.000(Ft.)
Estimated mean flow rate at midpoint of channel =      0.491(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.95(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0217
Corrected/adjusted channel slope =  0.0217
Travel time =    0.20 min.     TC =    8.26  min.


 Adding area flow to channel
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.712
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      3.234(In/Hr) for a   100.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =      0.491(CFS)       Total area =       0.170(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       78.000 to Point/Station       78.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 3
Stream flow area =      0.170(Ac.)
Runoff from this stream =      0.491(CFS)
Time of concentration =    8.26 min.
Rainfall intensity =     3.234(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       76.500 to Point/Station       88.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   248.000(Ft.)
Top (of initial area) elevation =  1555.500(Ft.)
Bottom (of initial area) elevation =  1553.500(Ft.)
Difference in elevation =     2.000(Ft.)
Slope =    0.00806  s(percent)=       0.81
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.138 min.
Rainfall intensity =      3.479(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.879
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
```

```
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      0.979(CFS)
Total initial stream area =        0.320(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       88.000 to Point/Station       89.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1553.500(Ft.)
Downstream point/station elevation =  1548.000(Ft.)
Pipe length  =    37.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.979(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.979(CFS)
Normal flow depth in pipe =    2.83(In.)
Flow top width inside pipe =    5.99(In.)
Critical Depth =    5.64(In.)
Pipe flow velocity =     10.74(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =     7.20 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       89.000 to Point/Station       78.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1548.000(Ft.)
End of natural channel elevation =   1547.500(Ft.)
Length of natural channel  =     5.000(Ft.)
Estimated mean flow rate at midpoint of channel =      0.979(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   4.72(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.1000
Corrected/adjusted channel slope =  0.1000
Travel time =    0.02 min.     TC =    7.21  min.


 Adding area flow to channel
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.722
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      3.461(In/Hr) for a   100.0 year storm
Subarea runoff =      0.000(CFS) for      0.000(Ac.)
Total runoff =      0.979(CFS)       Total area =       0.320(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       78.000 to Point/Station       78.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 2 in normal stream number 4
Stream flow area =      0.320(Ac.)
Runoff from this stream =      0.979(CFS)
Time of concentration =    7.21 min.
Rainfall intensity =     3.461(In/Hr)
Summary of stream data:

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


1        7.754      9.77                2.974
2        3.974      9.80                2.969
3        0.491      8.26                3.234
4        0.979      7.21                3.461
Largest stream flow has longer or shorter time of concentration
Qp =      7.754 + sum of
          Qa          Tb/Ta
           3.974 *    0.997 =      3.961
          Qb          Ia/Ib
           0.491 *    0.920 =      0.451
          Qb          Ia/Ib
```

```
          0.979 *    0.859 =      0.841
Qp =     13.008

Total of 4 streams to confluence:
Flow rates before confluence point:
       7.754       3.974       0.491       0.979
Area of streams before confluence:
       3.400       1.560       0.170       0.320
Results of confluence:
Total flow rate =     13.008(CFS)
Time of concentration =     9.768 min.
Effective stream area after confluence =      5.450(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       78.000 to Point/Station       70.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1547.500(Ft.)
Downstream point/station elevation =  1546.000(Ft.)
Pipe length  =    79.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    13.008(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    13.008(CFS)
Normal flow depth in pipe =   13.34(In.)
Flow top width inside pipe =   15.77(In.)
Critical Depth =   16.21(In.)
Pipe flow velocity =      9.27(Ft/s)
Travel time through pipe =    0.14 min.
Time of concentration (TC) =     9.91 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       70.000 to Point/Station       70.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      5.450(Ac.)
Runoff from this stream =     13.008(CFS)
Time of concentration =    9.91 min.
Rainfall intensity =     2.953(In/Hr)
Summary of stream data:

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


1       26.237     15.51               2.360
2       13.008      9.91               2.953
Largest stream flow has longer time of concentration
Qp =     26.237 + sum of
          Qb         Ia/Ib
          13.008 *    0.799 =     10.398
Qp =     36.635

Total of 2 main streams to confluence:
Flow rates before confluence point:
      26.237      13.008
Area of streams before confluence:
       13.440        5.450


Results of confluence:
Total flow rate =     36.635(CFS)
Time of concentration =    15.510 min.
Effective stream area after confluence  =     18.890(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       70.000 to Point/Station       50.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1546.000(Ft.)
Downstream point/station elevation =  1545.000(Ft.)
Pipe length  =    25.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    36.635(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    36.635(CFS)
Normal flow depth in pipe =   16.38(In.)
Flow top width inside pipe =   22.34(In.)
Critical depth could not be calculated.
Pipe flow velocity =     16.04(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =    15.54 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       50.000 to Point/Station       50.000
**** CONFLUENCE OF MAIN STREAMS ****
____________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     18.890(Ac.)
Runoff from this stream =     36.635(CFS)
Time of concentration =   15.54 min.
Rainfall intensity =     2.358(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       33.000 to Point/Station       50.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
____________________________________________________________________________
Rainfall intensity =      1.998(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.745
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
User specified values are as follows:
TC =  21.65 min.  Rain intensity =       2.00(In/Hr)
Total area =        19.85(Ac.)  Total runoff =    740.76(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       50.000 to Point/Station       50.000
**** CONFLUENCE OF MAIN STREAMS ****
____________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     19.850(Ac.)
Runoff from this stream =    740.760(CFS)
Time of concentration =   21.65 min.
Rainfall intensity =     1.998(In/Hr)
Summary of stream data:

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


1       36.635     15.54               2.358
2      740.760     21.65               1.998
Largest stream flow has longer time of concentration
Qp =    740.760 + sum of
          Qb          Ia/Ib
          36.635 *    0.847 =     31.034
Qp =    771.794

Total of 2 main streams to confluence:
Flow rates before confluence point:
      36.635     740.760
Area of streams before confluence:
       18.890       19.850


Results of confluence:
Total flow rate =    771.794(CFS)
Time of concentration =    21.650 min.
Effective stream area after confluence  =     38.740(Ac.)
End of computations, total study area =           38.74 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.455
Area averaged RI index number =  56.1
```

```
                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
        Rational Hydrology Study        Date: 08/16/21  File:pro2100.out
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

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

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


Program License Serial Number 5006

------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District 1978 hydrology manual
Storm event (year) =  100.00 Antecedent Moisture Condition = 2
Standard intensity-duration curves data (Plate D-4.1)
For the [ Sunnymead-Moreno ] area used.
10 year storm 10 minute intensity =  2.010(In/Hr)
10 year storm 60 minute intensity =  0.820(In/Hr)
100 year storm 10 minute intensity =  2.940(In/Hr)
100 year storm 60 minute intensity =  1.200(In/Hr)
Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity =  1.200(In/Hr)
Slope of intensity duration curve = 0.5000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       51.000 to Point/Station      100.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   462.000(Ft.)
Top (of initial area) elevation =  1574.500(Ft.)
Bottom (of initial area) elevation =  1570.800(Ft.)
Difference in elevation =     3.700(Ft.)
Slope =    0.00801  s(percent)=       0.80
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.168 min.
Rainfall intensity =      3.070(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.877
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      3.366(CFS)
Total initial stream area =        1.250(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      100.000 to Point/Station      101.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1570.800(Ft.)
End of natural channel elevation =   1559.000(Ft.)
Length of natural channel  =   604.000(Ft.)
Estimated mean flow rate at midpoint of channel =     12.184(CFS)
Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   3.67(Ft/s)
Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0195
Corrected/adjusted channel slope =  0.0195
Travel time =    2.74 min.     TC =   11.91  min.
 Adding area flow to channel
COMMERCIAL subarea type
Runoff Coefficient = 0.875
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      2.694(In/Hr) for a   100.0 year storm
Subarea runoff =     15.435(CFS) for      6.550(Ac.)
Total runoff =     18.800(CFS)       Total area =       7.800(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      101.000
**** SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------------
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.684
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Time of concentration =    11.91 min.
Rainfall intensity =      2.694(In/Hr) for a   100.0 year storm
Subarea runoff =      0.829(CFS) for      0.450(Ac.)
Total runoff =     19.629(CFS)       Total area =       8.250(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------------
Upstream point/station elevation =  1559.000(Ft.)
Downstream point/station elevation =  1549.500(Ft.)
Pipe length  =   695.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    19.629(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    19.629(CFS)
Normal flow depth in pipe =   15.40(In.)
Flow top width inside pipe =   23.02(In.)
Critical Depth =   19.11(In.)
Pipe flow velocity =      9.22(Ft/s)
Travel time through pipe =    1.26 min.
Time of concentration (TC) =    13.16 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      102.000
**** CONFLUENCE OF MAIN STREAMS ****
----------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      8.250(Ac.)
Runoff from this stream =     19.629(CFS)
Time of concentration =   13.16 min.
Rainfall intensity =     2.562(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------------
Initial area flow distance =   551.000(Ft.)
Top (of initial area) elevation =  1558.000(Ft.)
Bottom (of initial area) elevation =  1552.000(Ft.)
Difference in elevation =     6.000(Ft.)
Slope =    0.01089  s(percent)=       1.09
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.026 min.
Rainfall intensity =      2.680(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.774
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      4.872(CFS)
Total initial stream area =        2.350(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------------
Upstream point/station elevation =  1552.000(Ft.)
Downstream point/station elevation =  1550.500(Ft.)
Pipe length  =    34.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.872(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     4.872(CFS)
Normal flow depth in pipe =    7.05(In.)
Flow top width inside pipe =   11.81(In.)
Critical Depth =   10.92(In.)
```

```
Pipe flow velocity =     10.15(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =    12.08 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      105.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      2.350(Ac.)
Runoff from this stream =      4.872(CFS)
Time of concentration =   12.08 min.
Rainfall intensity =     2.674(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.000 to Point/Station      107.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------------
Initial area flow distance =   506.000(Ft.)
Top (of initial area) elevation =  1557.000(Ft.)
Bottom (of initial area) elevation =  1552.000(Ft.)
Difference in elevation =     5.000(Ft.)
Slope =    0.00988  s(percent)=       0.99
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.851 min.
Rainfall intensity =      2.700(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.774
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      3.261(CFS)
Total initial stream area =        1.560(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.000 to Point/Station      105.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------------
Upstream point/station elevation =  1552.000(Ft.)
Downstream point/station elevation =  1550.500(Ft.)
Pipe length  =     9.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.261(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     3.261(CFS)
Normal flow depth in pipe =    4.41(In.)
Flow top width inside pipe =    9.00(In.)
Critical depth could not be calculated.
Pipe flow velocity =     15.15(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    11.86 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      105.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.560(Ac.)
Runoff from this stream =      3.261(CFS)
Time of concentration =   11.86 min.
Rainfall intensity =     2.699(In/Hr)
Summary of stream data:
Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)               (In/Hr)
1        4.872     12.08                  2.674
2        3.261     11.86                  2.699
Largest stream flow has longer time of concentration
Qp =      4.872 + sum of
          Qb         Ia/Ib
           3.261 *    0.991 =      3.231
Qp =      8.104
Total of 2 streams to confluence:
Flow rates before confluence point:
       4.872       3.261
Area of streams before confluence:
        2.350        1.560
Results of confluence:
Total flow rate =      8.104(CFS)
Time of concentration =    12.082 min.
Effective stream area after confluence =      3.910(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      108.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1550.500(Ft.)
Downstream point/station elevation =  1550.000(Ft.)
Pipe length  =    20.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.104(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     8.104(CFS)
Normal flow depth in pipe =   10.09(In.)
Flow top width inside pipe =   14.08(In.)
Critical Depth =   13.44(In.)
Pipe flow velocity =      9.23(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =    12.12 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      102.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________________
Top of natural channel elevation =   1550.000(Ft.)
End of natural channel elevation =   1549.500(Ft.)
Length of natural channel  =    80.000(Ft.)
Estimated mean flow rate at midpoint of channel =      8.218(CFS)
Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.88(Ft/s)
Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0063
Corrected/adjusted channel slope =  0.0063
Travel time =    0.71 min.     TC =   12.83  min.
 Adding area flow to channel
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.677
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  61.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.595(In/Hr) for a   100.0 year storm
Subarea runoff =      0.193(CFS) for      0.110(Ac.)
Total runoff =      8.297(CFS)       Total area =       4.020(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      102.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      4.020(Ac.)
Runoff from this stream =      8.297(CFS)
Time of concentration =   12.83 min.
Rainfall intensity =     2.595(In/Hr)
Summary of stream data:
Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)              (In/Hr)
1       19.629     13.16               2.562
2        8.297     12.83               2.595
Largest stream flow has longer time of concentration
Qp =     19.629 + sum of
          Qb         Ia/Ib
           8.297 *    0.987 =      8.190
Qp =     27.819
Total of 2 main streams to confluence:
Flow rates before confluence point:
      19.629       8.297
Area of streams before confluence:
        8.250        4.020
Results of confluence:
Total flow rate =     27.819(CFS)
Time of concentration =    13.164 min.
Effective stream area after confluence  =     12.270(Ac.)
End of computations, total study area =          12.27 (Ac.)
The following figures maybe used for a unit hydrograph study of the same area.
Area averaged pervious area fraction(Ap) = 0.269
Area averaged RI index number =  56.2
```

POST-DEVELOPMENT RATIONAL HYDROLOGY MAP

TRACT 38236 & 38237

Q100=710 CFS PROPOSED 87" LINE H
RCFC&WCD MORENO MASTER DRAINAGE PLAN
ADOPTED 1980
REVISION NO. 2 APRIL 2015

ALESSANDRO AVE

OLIVER ST

BRODIAEA AVE

LARKIN RD

OPEN SPACE/PARK 4.56 ACRE +/-

N.A.P.
76 FUTURE 3200 S.F. LOTS

PRO 0.86 L=709' B
PRO 2.92 L=806' B
PRO 2.31 L=616' B
PRO 0.41 L=662 B
PRO 0.26 L=370' B
PRO 2.32 L=483' B
PRO 0.21 L=207 B
PRO 0.25 L=166 B
PRO 0.76 L=922 B
PRO 0.41 L=589 B
PRO 1.20 L=365 B
PRO 0.70 L=328 B
PRO 2.05 L=543 B
PRO1 1.27 L=873' B
PRO1 2.37 L=933' B
PRO1 3.16 L=776' B
PRO1 1.09 L=888' B
PRO1 1.32 L=542' B
PRO1 2.38 L=664' B
PRO1 1.60 L=318 B
PRO1 1.06 L=424 B
PRO1 0.76 L=192 B
PRO2 1.25 L=462 B
PRO2 6.55 L=604 B
PRO2 0.45 - B
PRO2 2.35 L=551' B
PRO2 1.56 L=506 B

Q10= 1.53 cfs
Q100= 2.26 cfs
TC= 9.62 min
ACRES=0.86

Q10= 0.55 cfs
Q100= 0.81 cfs
TC= 6.91 min
ACRES=0.26

Q10= 3.15 cfs
Q100= 4.84 cfs
TC=11.78min
ACRES=2.31

Q10= 3.74 cfs
Q100= 5.75 cfs
TC=13.17min
ACRES=2.92

Q10= 0.48 cfs
Q100= 0.71 cfs
TC= 5.83 min
ACRES=0.21

Q10= 1.99 cfs
Q100= 2.94 cfs
TC=10.32min
ACRES=1.12

Q10= 3.19 cfs
Q100= 4.90 cfs
TC=11.62min
ACRES=2.32

Q10= 1.84 cfs
Q100= 2.82 cfs
TC=11.36min
ACRES=1.32

Q10= 2.87 cfs
Q100= 4.42 cfs
TC=14.51min
ACRES=2.37

Q10= 4.00 cfs
Q100= 6.15 cfs
TC=13.44min
ACRES=3.16

Q10= 1.33 cfs
Q100= 2.05 cfs
TC=14.29min
ACRES=1.09

Q10= 0.83 cfs
Q100= 1.39 cfs
TC=24.55min
ACRES=1.20

Q10= 11.95 cfs
Q100= 18.28 cfs
TC=15.94min
ACRES=9.13

Q10=365.58 cfs
Q100= 726.09 cfs
TC=20.65min
ACRES=9.13

Q10= 0.51 cfs
Q100= 0.85 cfs
TC=23.03min
ACRES=0.70

Q10= 0.44 cfs
Q100= 0.67 cfs
TC=23.89min
ACRES=0.48

Q10= 1.55 cfs
Q100= 2.48 cfs
TC=24.14min
ACRES=1.86

Q10= 1.30 cfs
Q100= 1.92 cfs
TC=14.20min
ACRES=0.81

Q10= 1.27 cfs
Q100= 1.88 cfs
TC=10.83min
ACRES=0.76

Q10= 3.75 cfs
Q100= 5.77 cfs
TC=24.81min
ACRES=3.90

Q10=368.80 cfs
Q100= 731.03 cfs
TC=21.32min
ACRES=13.03

Q10= 7.58 cfs
Q100= 11.65 cfs
TC=15.09min
ACRES=6.81

Q10=375.11 cfs
Q100= 740.76 cfs
TC=21.65min
ACRES=19.85

Q10= 0.91 cfs
Q100= 1.35 cfs
TC= 9.85 min
ACRES=0.52

Q10= 1.61 cfs
Q100= 2.37 cfs
TC= 9.57 min
ACRES=0.90

Q10= 13.64 cfs
Q100= 20.93 cfs
TC=14.78min
ACRES=11.06

Q10= 0.611 cfs
Q100= 0.94 cfs
TC= 9.65 min
ACRES=0.40

Q10= 5.24 cfs
Q100= 8.14 cfs
TC=14.26min
ACRES=5.10

Q10= 2.51 cfs
Q100= 3.87 cfs
TC=14.20min
ACRES=2.05

Q10= 0.61 cfs
Q100= 0.95 cfs
TC=24.03min
ACRES=0.68

Q10= 2.26 cfs
Q100= 3.49 cfs
TC=14.22min
ACRES=1.85

Q10= 1.62 cfs
Q100= 2.48 cfs
TC= 9.65 min
ACRES=1.06

Q10= 0.66 cfs
Q100= 0.98 cfs
TC= 7.14 min
ACRES=0.32

Q10= 4.60 cfs
Q100= 7.05 cfs
TC= 9.08 min
ACRES=3.06

Q10= 2.59 cfs
Q100= 3.97 cfs
TC= 9.05 min
ACRES=1.56

Q10= 0.33 cfs
Q100= 0.49 cfs
TC= 8.00 min
ACRES=0.17

Q10= 8.50 cfs
Q100= 13.01 cfs
TC= 9.77 min
ACRES=5.45

Q10=395.63 cfs
Q100= 771.79 cfs
TC=21.65min
ACRES= 38.74

Q10= 24.05 cfs
Q100= 36.63 cfs
TC=15.51min
ACRES=18.89

Q10= 3.99 cfs
Q100= 5.91 cfs
TC=14.06min
ACRES=2.59

Q10= 5.92 cfs
Q100= 8.72 cfs
TC= 5.00 min
ACRES=2.38

Q10= 9.41 cfs
Q100= 14.49 cfs
TC=13.51min
ACRES=7.94

Q10= 2.69 cfs
Q100= 4.12 cfs
TC= 8.12 min
ACRES=1.60

Q10= 1.26 cfs
Q100= 1.93 cfs
TC= 8.32 min
ACRES=0.76

Q10= 1.33 cfs
Q100= 2.04 cfs
TC= 8.29 min
ACRES=0.80

Q10= 3.17 cfs
Q100= 4.87 cfs
TC=12.02min
ACRES=2.35

Q10= 13.11 cfs
Q100= 19.63 cfs
TC=11.91min
ACRES= 8.25

Q10= 2.12 cfs
Q100= 3.26 cfs
TC=11.85min
ACRES=1.56

Q10= 5.27 cfs
Q100= 8.10 cfs
TC=12.12min
ACRES=3.91

Q10= 18.37 cfs
Q100= 27.82 cfs
TC=13.16min
ACRES=12.27

14' CB
7' CB
4' CB
9' OPENING
6' OPENING
4' OPENING
SUMP GRATE 4X4
SUMP GRATE 1.5X1.5
2X2 GRATE OR 4' OPENING
4' COMBO 1.5X1.5
EMERGENCY ACCESS

0.48 AC L=285'
0.68 AC L=322'
0.23 AC L=65' L=31'
0.53 AC L=113'
0.40 AC L=347'
0.90 AC L=657'
1.85 AC L=567'
0.29 AC L=80'
0.32 AC L=248'
0.34 AC L=74'
0.17 AC L=189'
0.80 AC L=227'
0.11 AC L=80'
0.52 AC L=556'
0.5 0.15 AC

L=931' L=139' L=65' L=60' L=14' L=161' L=148' L=106' L=44' L=53' L=76' L=71' L=65' L=428' L=93' L=25' L=250' L=90' L=104' L=161' L=293' L=329' L=146' L=416' L=159' L=22' L=33' L=25' L=79' L=70' L=152' L=20' L=29' L=22' L=230' L=695' L=39' L=31' L=35' L=20' L=26' L=28' L=23' L=38' L=37' L=74' L=34' L=9' L=24' L=80'

LEGEND

AREA ACRES
LENGTH SOIL
NODE ELEV
Q10= cfs
Q100= cfs
TC= min
ACRES=

DRAINAGE AREA BOUNDARY
FLOW PATH

VICINITY MAP

(N.T.S.)

ALESSANDRO BLVD
SITE
BRODIAEA AVENUE
CACTUS AVENUE
KINDWILL LANE
ANTHONY PLACE
OLIVER STREET
NASON STREET
MORENO BEACH DRIVE
LARKIN RD

SCALE: 1" = 60'

POST DEVELOPMENT
RATIONAL HYDROLOGY MAP
TRACT 38236 & 38237
PREPARATION DATE : AUGUST 2021

PLAN PREPARED BY:
adkan ENGINEERS
Civil Engineering · Surveying · Planning
6879 Airport Drive, Riverside, CA 92504
Tel:(951) 688-0241 · Fax:(951) 688-0599

Section 2

Catch Basin and Street Capacity

Node 4
Worksheet for Curb Inlet on Grade

Project Description	
Worksheet	NODE 4
Type	Curb Inlet On Grade
Solve For	Efficiency

Input Data		
Discharge	2.26	cfs
Slope	0.018000	ft/ft
Gutter Width	2.00	ft
Gutter Cross Slope	0.080000	ft/ft
Road Cross Slope	0.020000	ft/ft
Mannings Coefficient	0.013	
Curb Opening Length	7.00	ft
Local Depression	8.0	in
Local Depression Width	2.00	ft

Results		
Efficiency	1.00	
Intercepted Flow	2.26	cfs
Bypass Flow	0.00	cfs
Spread	6.71	ft
Depth	0.25	ft
Flow Area	0.6	ft²
Gutter Depression	1.4	in
Total Depression	9.4	in
Velocity	3.96	ft/s
Equivalent Cross Slope	0.321394	ft/ft
Length Factor	1.03	
Total Interception Length	6.77	ft

Node 13
Worksheet for Curb Inlet on Grade

Project Description	
Worksheet	NODE 13
Type	Grate Inlet On Grade
Solve For	Efficiency

Input Data		
Discharge	0.71	cfs
Slope	0.018000	ft/ft
Gutter Width	2.50	ft
Gutter Cross Slope	0.080000	ft/ft
Road Cross Slope	0.020000	ft/ft
Mannings Coefficient	0.013	
Grate Width	2.00	ft
Grate Length	2.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.0	%

Options	
Grate Flow Option	Exclude None

Results		
Efficiency	1.00	
Intercepted Flow	0.71	cfs
Bypass Flow	0.00	cfs
Spread	2.21	ft
Depth	0.18	ft
Flow Area	0.2	ft²
Gutter Depression	1.8	in
Total Depression	1.8	in
Velocity	3.62	ft/s
Splash Over Velocity	5.66	ft/s
Frontal Flow Factor	1.00	
Side Flow Factor	0.01	
Grate Flow Ratio	1.00	
Active Grate Length	1.00	ft

Node 15
Worksheet for Curb Inlet on Grade

Project Description	
Worksheet	NODE 15
Type	Curb Inlet On Grade
Solve For	Efficiency

Input Data		
Discharge	5.75	cfs
Slope	0.010000	ft/ft
Gutter Width	2.00	ft
Gutter Cross Slope	0.080000	ft/ft
Road Cross Slope	0.020000	ft/ft
Mannings Coefficient	0.013	
Curb Opening Length	14.00	ft
Local Depression	6.0	in
Local Depression Width	2.00	ft

Results		
Efficiency	1.00	
Intercepted Flow	5.75	cfs
Bypass Flow	0.00	cfs
Spread	12.03	ft
Depth	0.36	ft
Flow Area	1.6	ft²
Gutter Depression	1.4	in
Total Depression	7.4	in
Velocity	3.67	ft/s
Equivalent Cross Slope	0.170573	ft/ft
Length Factor	1.14	
Total Interception Length	12.29	ft

Node 20
Worksheet for Curb Inlet on Grade

Project Description	
Worksheet	NODE 20
Type	Curb Inlet On Grade
Solve For	Efficiency

Input Data		
Discharge	1.92	cfs
Slope	0.010000	ft/ft
Gutter Width	2.00	ft
Gutter Cross Slope	0.080000	ft/ft
Road Cross Slope	0.020000	ft/ft
Mannings Coefficient	0.013	
Curb Opening Length	7.00	ft
Local Depression	6.0	in
Local Depression Width	2.00	ft

Results		
Efficiency	1.00	
Intercepted Flow	1.92	cfs
Bypass Flow	0.00	cfs
Spread	7.20	ft
Depth	0.26	ft
Flow Area	0.6	ft²
Gutter Depression	1.4	in
Total Depression	7.4	in
Velocity	3.01	ft/s
Equivalent Cross Slope	0.247329	ft/ft
Length Factor	1.13	
Total Interception Length	6.21	ft

Node 28
Worksheet for Curb Inlet on Grade

Project Description	
Worksheet	NODE 28
Type	Curb Inlet On Grade
Solve For	Efficiency

Input Data		
Discharge	0.67	cfs
Slope	0.010000	ft/ft
Gutter Width	2.00	ft
Gutter Cross Slope	0.080000	ft/ft
Road Cross Slope	0.020000	ft/ft
Mannings Coefficient	0.013	
Curb Opening Length	4.00	ft
Local Depression	6.0	in
Local Depression Width	2.00	ft

Results		
Efficiency	1.00	
Intercepted Flow	0.67	cfs
Bypass Flow	0.00	cfs
Spread	3.58	ft
Depth	0.19	ft
Flow Area	0.2	ft²
Gutter Depression	1.4	in
Total Depression	7.4	in
Velocity	2.70	ft/s
Equivalent Cross Slope	0.320054	ft/ft
Length Factor	1.17	
Total Interception Length	3.42	ft

Node 31
Worksheet for Curb Inlet on Grade

Project Description	
Worksheet	NODE 31
Type	Curb Inlet On Grade
Solve For	Efficiency

Input Data		
Discharge	0.95	cfs
Slope	0.010000	ft/ft
Gutter Width	2.00	ft
Gutter Cross Slope	0.080000	ft/ft
Road Cross Slope	0.020000	ft/ft
Mannings Coefficient	0.013	
Curb Opening Length	4.00	ft
Local Depression	6.0	in
Local Depression Width	2.00	ft

Results		
Efficiency	1.00	
Intercepted Flow	0.95	cfs
Bypass Flow	0.00	cfs
Spread	4.72	ft
Depth	0.21	ft
Flow Area	0.3	ft²
Gutter Depression	1.4	in
Total Depression	7.4	in
Velocity	2.77	ft/s
Equivalent Cross Slope	0.300311	ft/ft
Length Factor	0.97	
Total Interception Length	4.11	ft

Node 37
Worksheet for Combination Inlet in Sag

Project Description	
Worksheet	NODE 37
Type	Combination Inlet In Sag
Solve For	Spread

Input Data		
Discharge	3.87	cfs
Local Depression	6.0	in
Local Depression Width	2.00	ft
Gutter Width	4.00	ft
Gutter Cross Slope	0.080000	ft/ft
Road Cross Slope	0.020000	ft/ft
Curb Opening Length	4.00	ft
Opening Height	0.67	ft
Curb Throat Type	Horizontal	
Grate Width	1.50	ft
Grate Length	1.50	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.0	%

Options	
Calculation Option	Use Both

Results		
Spread	1.73	ft
Throat Incline Angle	90.00	degrees
Depth	0.07	ft
Gutter Depression	2.9	in
Total Depression	8.9	in
Open Grate Area	1.0	ft²
Active Grate Weir Length	3.00	ft

Node 39
Worksheet for Combination Inlet in Sag

Project Description	
Worksheet	NODE 39
Type	Combination Inlet In Sag
Solve For	Spread

Input Data		
Discharge	3.49	cfs
Local Depression	6.0	in
Local Depression Width	2.00	ft
Gutter Width	4.00	ft
Gutter Cross Slope	0.080000	ft/ft
Road Cross Slope	0.020000	ft/ft
Curb Opening Length	4.00	ft
Opening Height	0.67	ft
Curb Throat Type	Horizontal	
Grate Width	1.50	ft
Grate Length	1.50	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.0	%

Options	
Calculation Option	Use Both

Results		
Spread	1.61	ft
Throat Incline Angle	90.00	degrees
Depth	0.03	ft
Gutter Depression	2.9	in
Total Depression	8.9	in
Open Grate Area	1.0	ft²
Active Grate Weir Length	3.00	ft

Node 42
Worksheet for Curb Cutout

Project Description	
Worksheet	NODE 42
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Slope	0.001000	ft/ft
Bottom Width	6.00	ft
Discharge	2.37	cfs

Results		
Depth	0.27	ft
Flow Area	1.6	ft²
Wetted Perimeter	6.55	ft
Top Width	6.00	ft
Critical Depth	0.17	ft
Critical Slope	0.004790	ft/ft
Velocity	1.44	ft/s
Velocity Head	0.03	ft
Specific Energy	0.31	ft
Froude Number	0.48	
Flow Type	Subcritical	

Node 55
Worksheet for Curb Inlet on Grade

Project Description	
Worksheet	NODE 55
Type	Curb Inlet On Grade
Solve For	Efficiency

Input Data		
Discharge	5.91	cfs
Slope	0.016000	ft/ft
Gutter Width	2.00	ft
Gutter Cross Slope	0.080000	ft/ft
Road Cross Slope	0.020000	ft/ft
Mannings Coefficient	0.013	
Curb Opening Length	14.00	ft
Local Depression	6.0	in
Local Depression Width	2.00	ft

Results		
Efficiency	1.00	
Intercepted Flow	5.91	cfs
Bypass Flow	0.00	cfs
Spread	10.99	ft
Depth	0.34	ft
Flow Area	1.3	ft²
Gutter Depression	1.4	in
Total Depression	7.4	in
Velocity	4.45	ft/s
Equivalent Cross Slope	0.183401	ft/ft
Length Factor	1.02	
Total Interception Length	13.71	ft

Node 59
Worksheet for Curb Inlet on Grade

Project Description	
Worksheet	NODE 59
Type	Curb Inlet On Grade
Solve For	Efficiency

Input Data		
Discharge	4.42	cfs
Slope	0.016000	ft/ft
Gutter Width	2.00	ft
Gutter Cross Slope	0.080000	ft/ft
Road Cross Slope	0.020000	ft/ft
Mannings Coefficient	0.013	
Curb Opening Length	14.00	ft
Local Depression	6.0	in
Local Depression Width	2.00	ft

Results		
Efficiency	1.00	
Intercepted Flow	4.42	cfs
Bypass Flow	0.00	cfs
Spread	9.65	ft
Depth	0.31	ft
Flow Area	1.1	ft^2
Gutter Depression	1.4	in
Total Depression	7.4	in
Velocity	4.21	ft/s
Equivalent Cross Slope	0.202811	ft/ft
Length Factor	1.23	
Total Interception Length	11.42	ft

Node 62
Worksheet for Curb Inlet on Grade

Project Description	
Worksheet	NODE 62
Type	Curb Inlet On Grade
Solve For	Efficiency

Input Data		
Discharge	2.82	cfs
Slope	0.016000	ft/ft
Gutter Width	2.00	ft
Gutter Cross Slope	0.080000	ft/ft
Road Cross Slope	0.020000	ft/ft
Mannings Coefficient	0.013	
Curb Opening Length	14.00	ft
Local Depression	6.0	in
Local Depression Width	2.00	ft

Results		
Efficiency	1.00	
Intercepted Flow	2.82	cfs
Bypass Flow	0.00	cfs
Spread	7.77	ft
Depth	0.28	ft
Flow Area	0.7	ft²
Gutter Depression	1.4	in
Total Depression	7.4	in
Velocity	3.89	ft/s
Equivalent Cross Slope	0.235791	ft/ft
Length Factor	1.62	
Total Interception Length	8.64	ft

Node 65
Worksheet for Curb Inlet on Grade

Project Description	
Worksheet	NODE 65
Type	Curb Inlet On Grade
Solve For	Efficiency

Input Data		
Discharge	2.05	cfs
Slope	0.013000	ft/ft
Gutter Width	2.00	ft
Gutter Cross Slope	0.080000	ft/ft
Road Cross Slope	0.020000	ft/ft
Mannings Coefficient	0.013	
Curb Opening Length	7.00	ft
Local Depression	6.0	in
Local Depression Width	2.00	ft

Results		
Efficiency	1.00	
Intercepted Flow	2.05	cfs
Bypass Flow	0.00	cfs
Spread	6.95	ft
Depth	0.26	ft
Flow Area	0.6	ft²
Gutter Depression	1.4	in
Total Depression	7.4	in
Velocity	3.40	ft/s
Equivalent Cross Slope	0.252447	ft/ft
Length Factor	1.03	
Total Interception Length	6.82	ft

Node 75
Worksheet for Curb Inlet in Sag

Project Description	
Worksheet	NODE 75
Type	Curb Inlet In Sag
Solve For	Spread

Input Data		
Discharge	4.12	cfs
Gutter Width	4.00	ft
Gutter Cross Slope	0.080000	ft/ft
Road Cross Slope	0.020000	ft/ft
Curb Opening Length	14.00	ft
Opening Height	0.67	ft
Curb Throat Type	Horizontal	
Local Depression	6.0	in
Local Depression Width	2.00	ft

Results		
Spread	9.63	ft
Throat Incline Angle	90.00	degrees
Depth	0.43	ft
Gutter Depression	2.9	in
Total Depression	8.9	in

Node 76.5
Worksheet for Curb Inlet on Grade

Project Description	
Worksheet	NODE 76.5
Type	Curb Inlet On Grade
Solve For	Efficiency

Input Data		
Discharge	0.94	cfs
Slope	0.016000	ft/ft
Gutter Width	2.00	ft
Gutter Cross Slope	0.080000	ft/ft
Road Cross Slope	0.020000	ft/ft
Mannings Coefficient	0.013	
Curb Opening Length	7.00	ft
Local Depression	6.0	in
Local Depression Width	2.00	ft

Results		
Efficiency	1.00	
Intercepted Flow	0.94	cfs
Bypass Flow	0.00	cfs
Spread	3.92	ft
Depth	0.20	ft
Flow Area	0.3	ft²
Gutter Depression	1.4	in
Total Depression	7.4	in
Velocity	3.44	ft/s
Equivalent Cross Slope	0.315078	ft/ft
Length Factor	1.53	
Total Interception Length	4.58	ft

Node 80
Worksheet for Curb Inlet in Sag

Project Description	
Worksheet	NODE 80
Type	Curb Inlet In Sag
Solve For	Spread

Input Data		
Discharge	2.04	cfs
Gutter Width	4.00	ft
Gutter Cross Slope	0.080000	ft/ft
Road Cross Slope	0.020000	ft/ft
Curb Opening Length	7.00	ft
Opening Height	0.67	ft
Curb Throat Type	Horizontal	
Local Depression	6.0	in
Local Depression Width	2.00	ft

Results		
Spread	7.87	ft
Throat Incline Angle	90.00	degrees
Depth	0.40	ft
Gutter Depression	2.9	in
Total Depression	8.9	in

Node 83
Worksheet for Curb Inlet in Sag

Project Description	
Worksheet	NODE 83
Type	Curb Inlet In Sag
Solve For	Spread

Input Data		
Discharge	1.93	cfs
Gutter Width	4.00	ft
Gutter Cross Slope	0.080000	ft/ft
Road Cross Slope	0.020000	ft/ft
Curb Opening Length	7.00	ft
Opening Height	0.67	ft
Curb Throat Type	Horizontal	
Local Depression	6.0	in
Local Depression Width	2.00	ft

Results		
Spread	7.59	ft
Throat Incline Angle	90.00	degrees
Depth	0.39	ft
Gutter Depression	2.9	in
Total Depression	8.9	in

Node 86
Worksheet for Curb Cutout

Project Description	
Worksheet	NODE 86
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Slope	0.001000	ft/ft
Bottom Width	4.00	ft
Discharge	0.49	cfs

Results		
Depth	0.13	ft
Flow Area	0.5	ft²
Wetted Perimeter	4.27	ft
Top Width	4.00	ft
Critical Depth	0.08	ft
Critical Slope	0.006075	ft/ft
Velocity	0.91	ft/s
Velocity Head	0.01	ft
Specific Energy	0.15	ft
Froude Number	0.44	
Flow Type	Subcritical	

Node 88
Worksheet for Curb Cutout

Project Description	
Worksheet	NODE 88
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Slope	0.001000	ft/ft
Bottom Width	4.00	ft
Discharge	0.98	cfs

Results		
Depth	0.21	ft
Flow Area	0.8	ft²
Wetted Perimeter	4.41	ft
Top Width	4.00	ft
Critical Depth	0.12	ft
Critical Slope	0.005361	ft/ft
Velocity	1.18	ft/s
Velocity Head	0.02	ft
Specific Energy	0.23	ft
Froude Number	0.46	
Flow Type	Subcritical	

Node 101
Worksheet for Grate Inlet In Sag

Project Description	
Worksheet	NODE 101
Type	Grate Inlet In Sag
Solve For	Spread

Input Data		
Discharge	19.63	cfs
Gutter Width	4.00	ft
Gutter Cross Slope	0.080000	ft/ft
Road Cross Slope	0.020000	ft/ft
Grate Width	4.00	ft
Grate Length	4.00	ft
Local Depression	6.0	in
Local Depression Width	2.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.0	%

Results		
Spread	6.73	ft
Depth	0.37	ft
Gutter Depression	2.9	in
Total Depression	8.9	in
Open Grate Area	7.2	ft²
Active Grate Weir Length	8.00	ft

Node 104
Worksheet for Combination Inlet in Sag

Project Description	
Worksheet	NODE 104
Type	Combination Inlet In Sag
Solve For	Spread

Input Data		
Discharge	4.87	cfs
Local Depression	6.0	in
Local Depression Width	2.00	ft
Gutter Width	4.00	ft
Gutter Cross Slope	0.080000	ft/ft
Road Cross Slope	0.020000	ft/ft
Curb Opening Length	4.00	ft
Opening Height	0.67	ft
Curb Throat Type	Horizontal	
Grate Width	1.50	ft
Grate Length	1.50	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.0	%

Options	
Calculation Option	Use Both

Results		
Spread	3.32	ft
Throat Incline Angle	90.00	degrees
Depth	0.27	ft
Gutter Depression	2.9	in
Total Depression	8.9	in
Open Grate Area	1.0	ft²
Active Grate Weir Length	3.00	ft

Node 107
Worksheet for Grate inlet in Sag

Project Description	
Worksheet	NODE 107
Type	Grate Inlet In Sag
Solve For	Spread

Input Data		
Discharge	3.26	cfs
Gutter Width	2.00	ft
Gutter Cross Slope	0.080000	ft/ft
Road Cross Slope	0.020000	ft/ft
Grate Width	1.50	ft
Grate Length	1.50	ft
Local Depression	6.0	in
Local Depression Width	2.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	50.0	%

Results		
Spread	1.54	ft
Depth	0.01	ft
Gutter Depression	1.4	in
Total Depression	7.4	in
Open Grate Area	1.0	ft²
Active Grate Weir Length	3.00	ft

Private Streets
Worksheet for Irregular Channel

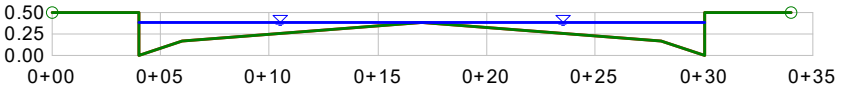
Project Description	
Worksheet	Private Streets
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Slope	0.010000	ft/ft
Water Surface Elevation	0.38	ft

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

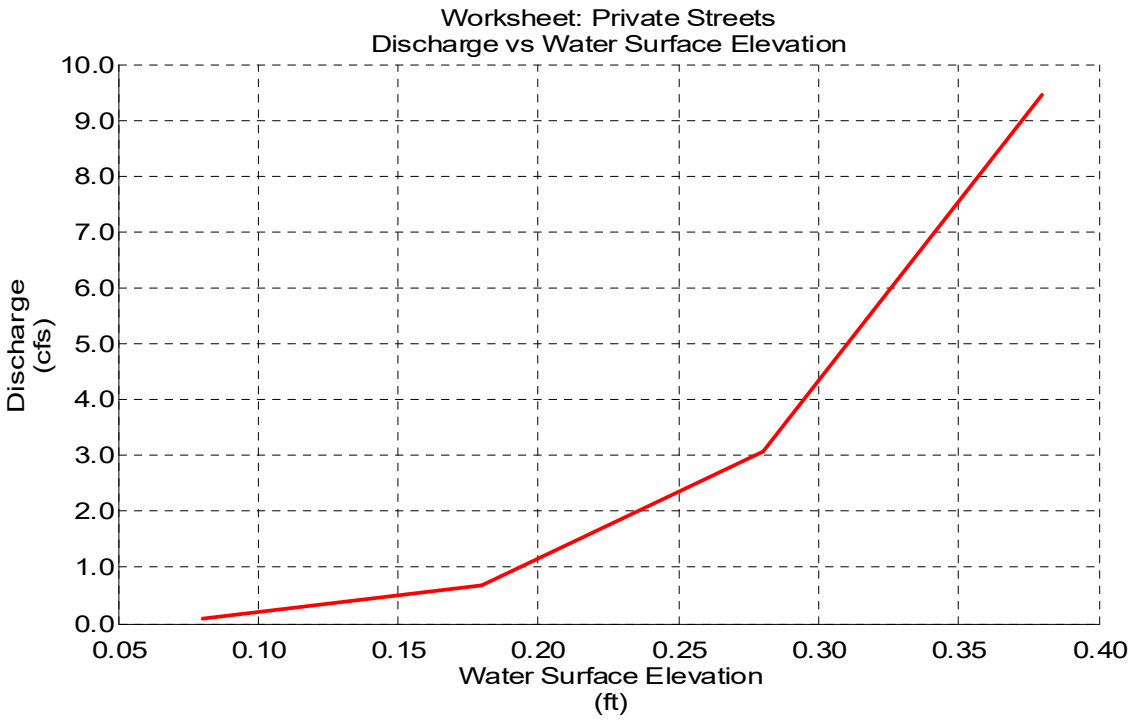
Results		
Mannings Coefficient	0.015	
Elevation Range	0.00 to 0.50	
Discharge	9.45	cfs
Flow Area	3.6	ft²
Wetted Perimeter	26.78	ft
Top Width	26.00	ft
Actual Depth	0.38	ft
Critical Elevation	0.40	ft
Critical Slope	0.006293	ft/ft
Velocity	2.61	ft/s
Velocity Head	0.11	ft
Specific Energy	0.49	ft
Froude Number	1.23	
Flow Type	Supercritical	

Calculation Messages:
Flow is divided.



Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00	0+34	0.015

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00	0.50
0+04	0.50
0+04	0.00
0+06	0.16
0+17	0.38
0+28	0.16
0+30	0.00
0+30	0.50
0+34	0.50



Street B & C
Worksheet for Irregular Channel

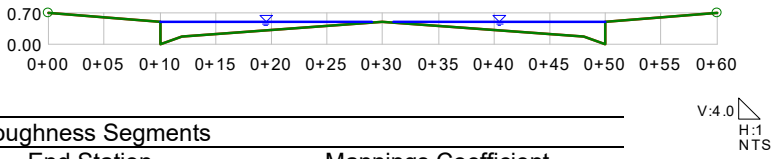
Project Description	
Worksheet	Street B & C
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Slope	0.010000	ft/ft
Water Surface Elevation	0.50	ft

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

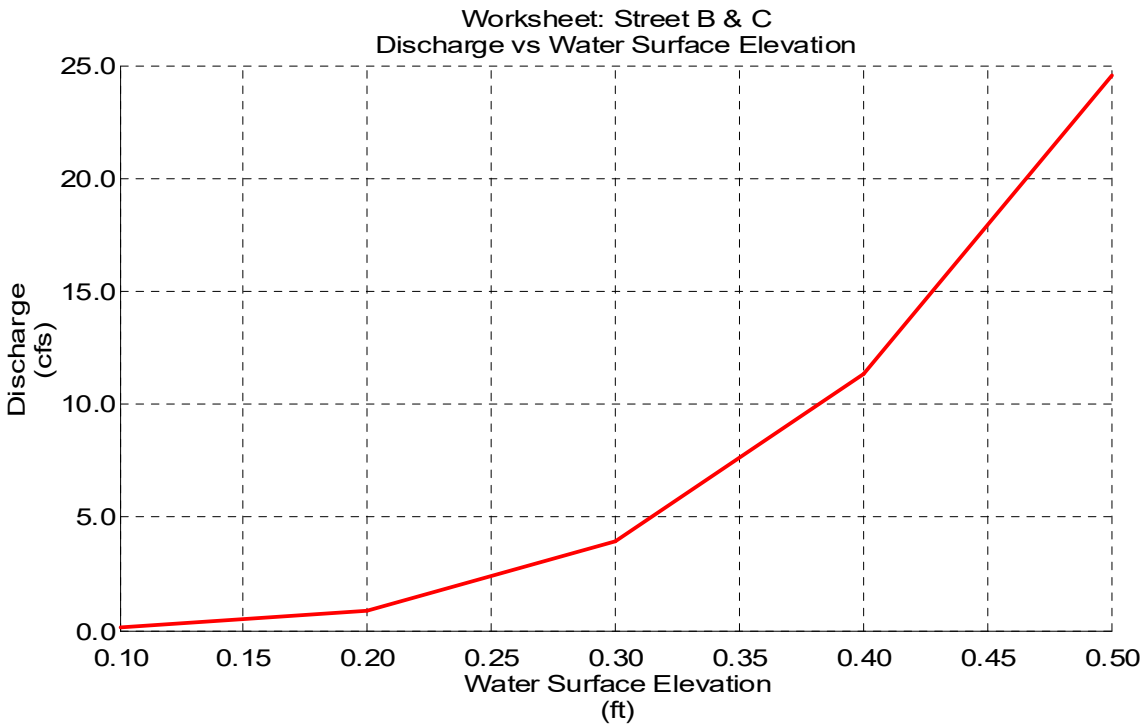
Results		
Mannings Coefficient	0.015	
Elevation Range	0.00 to 0.70	
Discharge	24.53	cfs
Flow Area	7.5	ft²
Wetted Perimeter	39.02	ft
Top Width	38.00	ft
Actual Depth	0.50	ft
Critical Elevation	0.55	ft
Critical Slope	0.005677	ft/ft
Velocity	3.29	ft/s
Velocity Head	0.17	ft
Specific Energy	0.67	ft
Froude Number	1.31	
Flow Type	Supercritical	

Calculation Messages:
Flow is divided.



Roughness Segments		
Start Station	End Station	Mannings Coefficient
0+00	0+60	0.015

Natural Channel Points	
Station (ft)	Elevation (ft)
0+00	0.70
0+10	0.50
0+10	0.00
0+12	0.16
0+30	0.52
0+48	0.16
0+50	0.00
0+50	0.50
0+60	0.70



Section 3

Approved Offsite Hydrology Maps and MDP Storm Drain Plans

MORENO
MASTER DRAINAGE PLAN

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

ADOPTED OCTOBER 1980 — REVISION NO. 2 APRIL 2015

LEGEND

- DRAINAGE BOUNDARY
- PROPOSED STORM DRAIN
- PROPOSED OPEN CHANNEL
- EXISTING FACILITY
- Q=10 — 10 YEAR FLOW IN CFS
- Q=100 — 100 YEAR FLOW IN CFS

SCALE 1"=800'

NOTES

1. ADOPTED IN OCTOBER 1980
2. REVISION #1 IN APRIL 1991
3. REVISION #2 IN PROGRESS

Copyright 2007 AirPhotoUSA™, LLC, All Rights Reserved

RECHE CANYON DEBRIS BASIN
APPROXIMATE R/W = 10.0 ac.
b=10' d=7' ss=1.5:1 Q=1560
RECHE CYN. RD
CITY LIMITS
LOCUST AVE.
14'X7' RCB
K-4
A-1
A-2
D-1
LINE A
QUINCY ST.
A-3
D-2
D-5
LINE D-5
LINE B
KALMIA AVE.
K-1
K-2
K-3
A-6
A-7
LINE K
OLIVER ST.
MORENO BEACH DR.
IRONWOOD AVE.
NASON ST.
HEMLOCK AVE.
PETTIT ST.
G-1
G-2
G-3
G-4
A-8
NASON BASIN
QUINCY BASIN
Qin = 1555 cfs
Qout = 280 cfs
STORAGE = 150 ac. ft.
R/W = 22.5 ac.
F-15
F-2
D-3
D-4
JUNIPER AVE.
B-2
HIGHLAND BLVD.
IRONWOOD DEBRIS BASIN
APPROXIMATE R/W = 3.1 ac.
B-1
B-3
D-7
D-9
REDLANDS BLVD.
D-8
LINE C
SINCLAIR BASIN
Qin = 2525cfs
Qout = 635cfs
STORAGE = 170 ac. ft.
R/W = 25 Acres
D-6
LINE F
SINCLAIR ST.
LINE D
U.S. HWY 60
FIR ST.
EUCALYPTUS AVE.
LASSELLE ST.
MORRISON ST.
COLD CREEK COURT STORM DRAIN LINE A
LINE I
F-16
F-9
F-17
E-1
E-2
THEODORE ST.
J-1
J-2
J-3
J-4
J-5
J-6
J-7
J-8
J-9
J-10
LINE J
DRACAEA AVE.
COTTONWOOD AVE.
BAY AVE.
ALESSANDRO BLVD.
BRODIAEA AVE.
CACTUS AVE.
H-11
LINE H
H-4
H-2
H-3
H-1
H-1a
H-5
H-5a
H-6
H-7
H-8
H-10
H-9
SITE
F-13
F-4
F-12
F-11
LINE G
G-7
G-8
G-9
G-10
G-11
PROPOSED LINE F-2 TO REPLACE EXISTING LINE F-2
F-18
F-19
E-3
E-4
E-5
E-6
E-7
E-8
E-10
CACTUS BASIN
REDLANDS BLVD.
F-3
DAVIS RD.
JOHN F. KENNEDY DR.
F-14
F-6
F-8
IRIS AVE.
F-5
F-7
OLIVER ST.
CITY LIMITS

Section 4

Riverside County Plates

RUNOFF INDEX NUMBERS OF HYDROLOGIC SOIL-COVER COMPLEXES FOR PERVIOUS AREAS-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group A	B	C	D
NATURAL COVERS -					
Barren (Rockland, eroded and graded land)		78	86	91	93
Chaparrel, Broadleaf (Manzonita, ceanothus and scrub oak)	Poor	53	70	80	85
	Fair	40	63	75	81
	Good	31	57	71	78
Chaparrel, Narrowleaf (Chamise and redshank)	Poor	71	82	88	91
	Fair	55	72	81	86
Grass, Annual or Perennial	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Meadows or Cienegas (Areas with seasonally high water table, principal vegetation is sod forming grass)	Poor	63	77	85	88
	Fair	51	70	80	84
	Good	30	58	72	78
Open Brush (Soft wood shrubs - buckwheat, sage, etc.)	Poor	62	76	84	88
	Fair	46	66	77	83
	Good	41	63	75	81
Woodland (Coniferous or broadleaf trees predominate. Canopy density is at least 50 percent)	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	28	55	70	77
Woodland, Grass (Coniferous or broadleaf trees with canopy density from 20 to 50 percent)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
URBAN COVERS -					
Residential or Commercial Landscaping (Lawn, shrubs, etc.)	Good	32	56	69	75
Turf (Irrigated and mowed grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
AGRICULTURAL COVERS -					
Fallow (Land plowed but not tilled or seeded)		76	85	90	92

RCFC & WCD
HYDROLOGY MANUAL

RUNOFF INDEX NUMBERS FOR PERVIOUS AREA

ACTUAL IMPERVIOUS COVER

Land Use (1)	Range-Percent	Recommended Value For Average Conditions-Percent(2)
Natural or Agriculture	0 - 10	0
Single Family Residential: (3)		
40,000 S. F. (1 Acre) Lots	10 - 25	20
20,000 S. F. (½ Acre) Lots	30 - 45	40
7,200 - 10,000 S. F. Lots	45 - 55	50
Multiple Family Residential:		
Condominiums	45 - 70	65
Apartments	65 - 90	80
Mobile Home Park	60 - 85	75
Commercial, Downtown Business or Industrial	80 -100	90

Notes:

1. Land use should be based on ultimate development of the watershed. Long range master plans for the County and incorporated cities should be reviewed to insure reasonable land use assumptions.

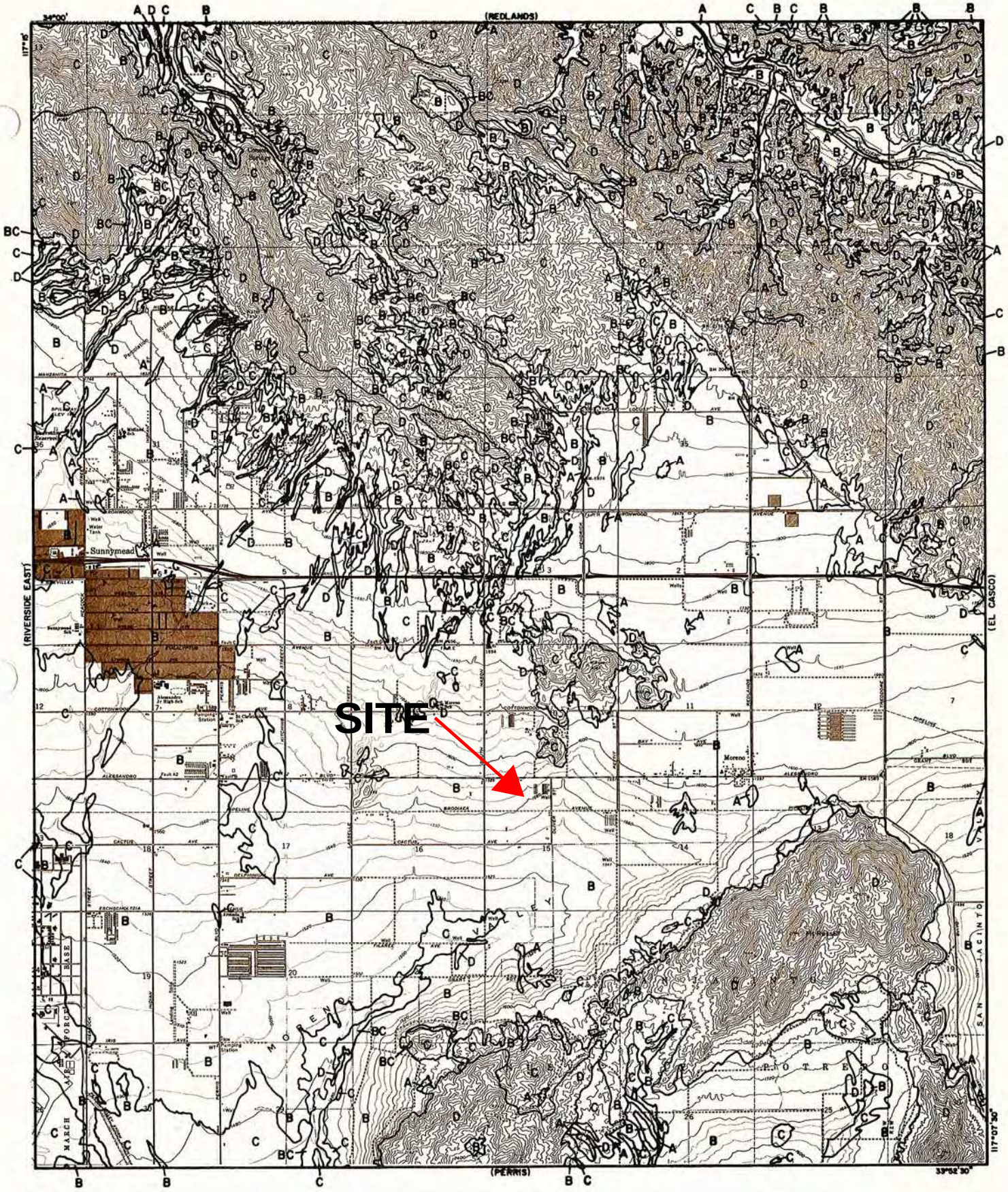
2. Recommended values are based on average conditions which may not apply to a particular study area. The percentage impervious may vary greatly even on comparable sized lots due to differences in dwelling size, improvements, etc. Landscape practices should also be considered as it is common in some areas to use ornamental gravels underlain by impervious plastic materials in place of lawns and shrubs. A field investigation of a study area should always be made, and a review of aerial photos, where available may assist in estimating the percentage of impervious cover in developed areas.

3. For typical horse ranch subdivisions increase impervious area 5 percent over the values recommended in the table above.

RCFC & WCD
HYDROLOGY MANUAL

IMPERVIOUS COVER FOR DEVELOPED AREAS

PLATE D-5.6



LEGEND

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

RCFC&WCD

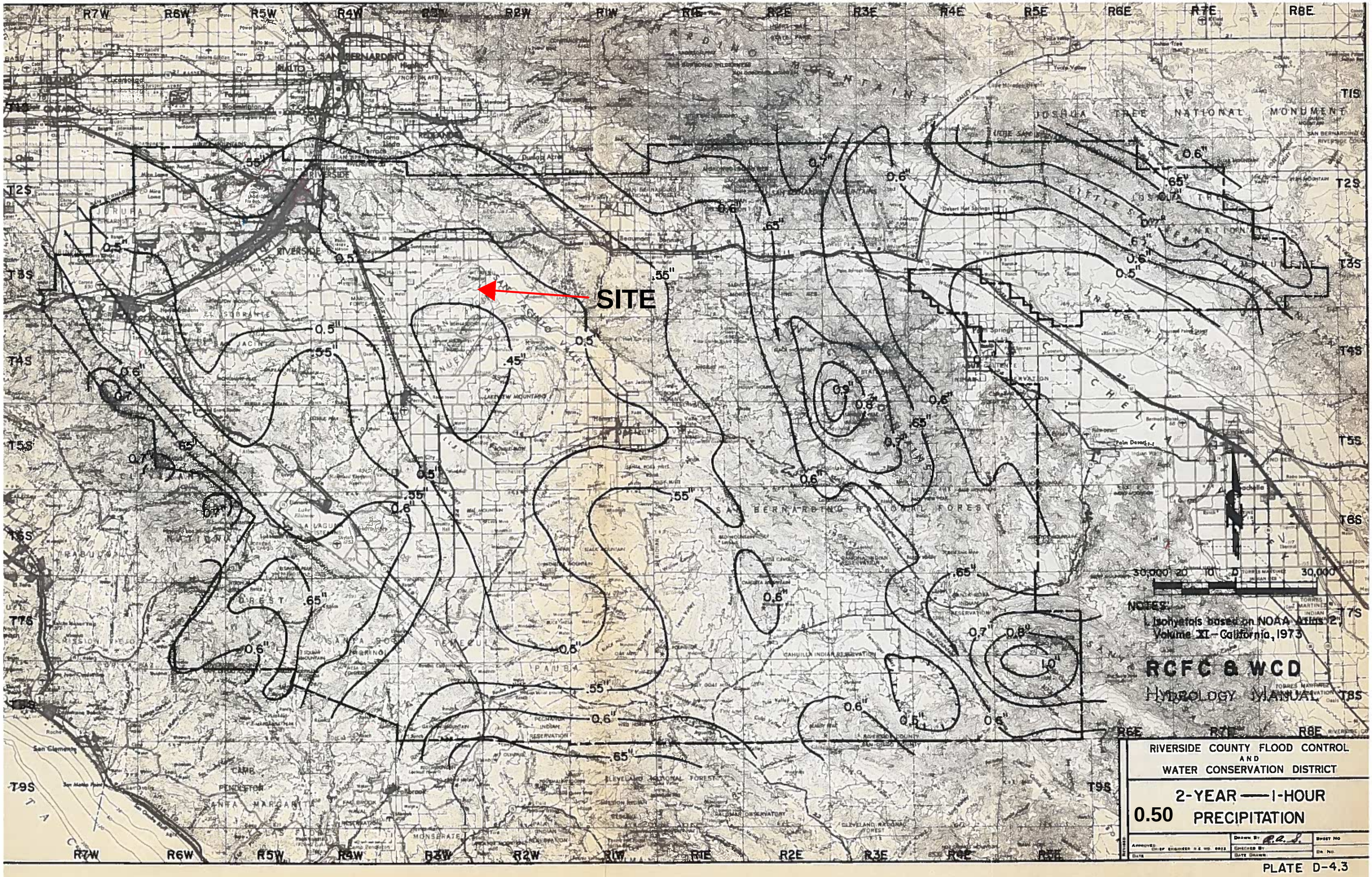
HYDROLOGY MANUAL

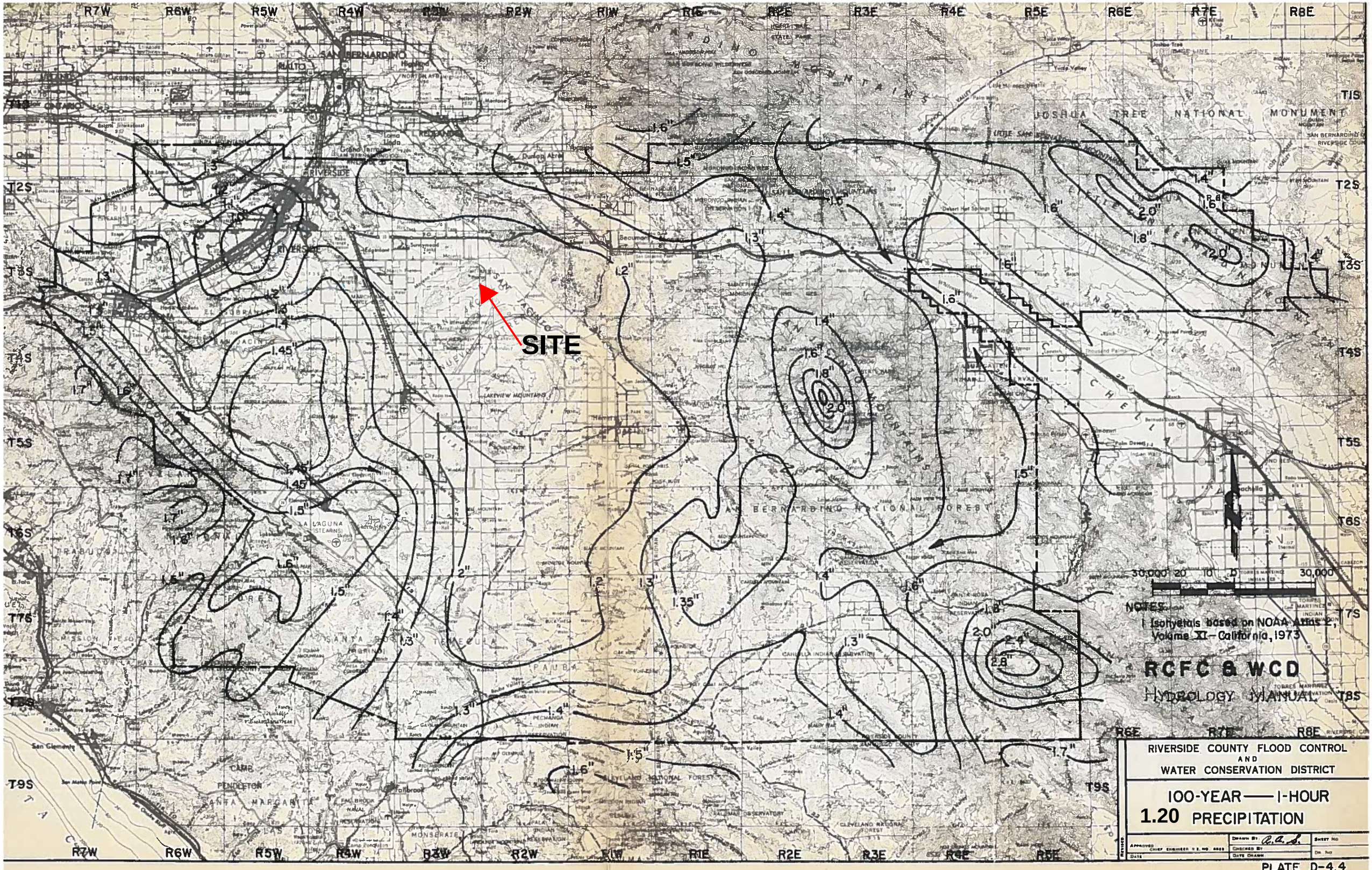
0 FEET 5000

HYDROLOGIC SOILS GROUP MAP FOR SUNNYMEAD

B TYPE

PLATE C-1.17


SITE
NOTES:
1. Isohyetals based on NOAA Atlas 2, Volume XI – California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
2-YEAR — 1-HOUR
0.50 PRECIPITATION
PLATE D-4.3



NOTES:
1. Isohyetals based on NOAA Atlas 2, Volume XI – California, 1973

RCFC & WCD
HYDROLOGY MANUAL

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

100-YEAR — 1-HOUR
1.20 PRECIPITATION

PLATE D-4.4

SITE
.50
.55
.45
.58
.60
.63
NOTES:
1. Slope of Intensity-Duration Curve based on District analysis of automatic recording rain gage records.
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
SLOPE OF INTENSITY DURATION
0.50 CURVE
PLATE D-4.6