

PRELIMINARY HYDROLOGY REPORT

for

FIRESTONE/TRACT 39105

Located in the City of Jurupa Valley
County of Riverside, California

Prepared For:

RC Hobbs Company
1428 E. Chapman Avenue
Orange, CA 92866
Tel: (714) 633-8100

Prepared by:

adkan
ENGINEERS

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

Job No. 10766

Date Prepared: May 29, 2025



05/30/2025

Table of Contents

Purpose.....	1
Project Description	1
Vicinity Map.....	1
Existing Hydrology	1
Proposed Hydrology	2
Hydraulics.....	2
Method of Analysis.....	3
Conclusion	3
Pre-Developed 10 and 100-year Rational Hydrology & Map	Section 1
Post-Developed 10 and 100-year Rational Hydrology & Map	Section 2
Riverside County Plates / Soils Report	Section 3

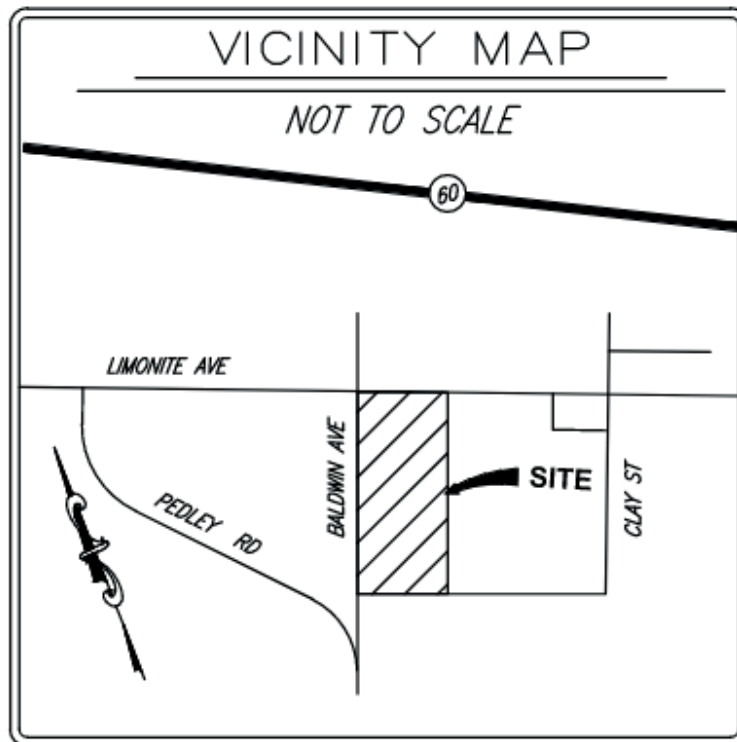
1. Purpose

This Hydrology Report has been prepared to ensure that adequate size and proper operation of drainage facilities is incorporated into the proposed project site.

2. Project Description

The approximately 5.56-acre irregular-shaped project site is located southeast of the intersection of Limonite Avenue and Baldwin Avenue, in the City of Jurupa Valley, Riverside County, California. The site is comprised of a total of two (2) parcels identified as Riverside County Assessor's Parcel Numbers (APNs) 163-400-042 and -045. Access to the site is available by Baldwin Avenue, a paved, improved street located adjacent to the western site boundary. The site is bound by Baldwin Avenue and Jurupa Community Services district property to the west. The De Anza Marketplace is located adjacent to the northern (Firestone Auto addressed as 8360 Limonite Avenue) and eastern (former Albertson's building addressed as 8310 Limonite Avenue) site boundaries, respectively.

Vicinity Map



3. Existing Hydrology

The site is relatively flat to gently sloping terrain, with site drainage generally directed down to the south-southwest. The site is elevated approximately 782 feet above mean sea level (amsl) with an approximately 18 foot relief down to the south-southwest. The site partially consists of an asphalt concrete parking lot for the adjacent De Anza Marketplace, and partially of vacant land in the northern and southern portions, respectively. The site was rough graded for the De Anza Marketplace in or about the year 2002. The site's condition has remained relatively unchanged since initial development. The site is bound by Baldwin Avenue and Jurupa Community Services district property to the west. The De

Anza Marketplace is located adjacent to the northern (Firestone Auto addressed as 8360 Limonite Avenue) and eastern (former Albertson's building addressed as 8310 Limonite Avenue) site boundaries, respectively. A natural watercourse is located adjacent to the southern site boundary, followed by the Appaloosa Springs residential development.

4. Proposed Hydrology

The site property is to be developed with twenty-two (22), three-story multi-family structures. A pocket park/community green, utility construction, access and drive lanes, pavement, hardscape and landscape improvements are also proposed as part of the site development. Stormwater management facilities by means of on-site basins are anticipated within the southwestern portion of the project site.

5. Method of Analysis

The site hydrology was based upon Riverside County Flood Control and Water Conservation 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.

7. Conclusion

The hydrologic calculations provided herein substantiate the design of the proposed project and indicate the following:

- The proposed drainage facility will convey the 10 & 100 year storm events.

Therefore, it is our conclusion that this proposed project does not negatively impact the surrounding storm facilities or community.

Section 1

Pre-developed 10 and 100-year Rational Hydrology & Map

Riverside County Rational Hydrology Program
CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 05/29/25 File:ex10.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 [Mira Loma] area used.

10 year storm 10 minute intensity = 1.960(In/Hr)

10 year storm 60 minute intensity = 0.760(In/Hr)

100 year storm 10 minute intensity = 3.100(In/Hr)

100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 10.0

Calculated rainfall intensity data:

1 hour intensity = 0.760(In/Hr)

Slope of intensity duration curve = 0.5300

Process from Point/Station 1.000 to Point/Station 2.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 664.000(Ft.)

Top (of initial area) elevation = 804.000(Ft.)

Bottom (of initial area) elevation = 779.000(Ft.)

Difference in elevation = 25.000(Ft.)

Slope = 0.03765 s(percent)= 3.77

TC = $k(0.300)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$

Initial area time of concentration = 7.777 min.

Rainfall intensity = 2.244(In/Hr) for a 10.0 year storm

COMMERCIAL subarea type

Runoff Coefficient = 0.885

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 1.000

RI index for soil(AMC 2) = 75.00

Pervious area fraction = 0.100; Impervious fraction = 0.900

Initial subarea runoff = 6.158(CFS)

Total initial stream area = 3.100(Ac.)

Pervious area fraction = 0.100

End of computations, total study area = 3.10 (Ac.)

The following figures may

be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100

Area averaged RI index number = 75.0

Riverside County Rational Hydrology Program
CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 05/29/25 File:ex110.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 [Mira Loma] area used.

10 year storm 10 minute intensity = 1.960(In/Hr)

10 year storm 60 minute intensity = 0.760(In/Hr)

100 year storm 10 minute intensity = 3.100(In/Hr)

100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 10.0

Calculated rainfall intensity data:

1 hour intensity = 0.760(In/Hr)

Slope of intensity duration curve = 0.5300

+++++
Process from Point/Station 3.000 to Point/Station 4.000
*** INITIAL AREA EVALUATION ***

Initial area flow distance = 528.000(Ft.)

Top (of initial area) elevation = 802.000(Ft.)

Bottom (of initial area) elevation = 780.000(Ft.)

Difference in elevation = 22.000(Ft.)

Slope = 0.04167 s(percent)= 4.17

TC = $k(0.300)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$

Initial area time of concentration = 6.954 min.

Rainfall intensity = 2.382(In/Hr) for a 10.0 year storm

COMMERCIAL subarea type

Runoff Coefficient = 0.886

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 1.000

RI index for soil(AMC 2) = 75.00

Pervious area fraction = 0.100; Impervious fraction = 0.900

Initial subarea runoff = 9.093(CFS)

Total initial stream area = 4.310(Ac.)

Pervious area fraction = 0.100

End of computations, total study area = 4.31 (Ac.)

The following figures may

be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100

Area averaged RI index number = 75.0

Riverside County Rational Hydrology Program
CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 05/29/25 File:ex210.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 [Mira Loma] area used.

10 year storm 10 minute intensity = 1.960(In/Hr)

10 year storm 60 minute intensity = 0.760(In/Hr)

100 year storm 10 minute intensity = 3.100(In/Hr)

100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 10.0

Calculated rainfall intensity data:

1 hour intensity = 0.760(In/Hr)

Slope of intensity duration curve = 0.5300

+++++
Process from Point/Station 5.000 to Point/Station 6.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 666.000(Ft.)

Top (of initial area) elevation = 782.800(Ft.)

Bottom (of initial area) elevation = 769.000(Ft.)

Difference in elevation = 13.800(Ft.)

Slope = 0.02072 s(percent)= 2.07

TC = $k(0.370)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$

Initial area time of concentration = 10.822 min.

Rainfall intensity = 1.884(In/Hr) for a 10.0 year storm

CONDOMINIUM subarea type

Runoff Coefficient = 0.840

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 1.000

RI index for soil(AMC 2) = 75.00

Pervious area fraction = 0.350; Impervious fraction = 0.650

Initial subarea runoff = 8.433(CFS)

Total initial stream area = 5.330(Ac.)

Pervious area fraction = 0.350

End of computations, total study area = 5.33 (Ac.)

The following figures may

be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.350

Area averaged RI index number = 75.0

Riverside County Rational Hydrology Program
CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 05/29/25 File:ex100.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 [Mira Loma] area used.

10 year storm 10 minute intensity = 1.960(In/Hr)

10 year storm 60 minute intensity = 0.760(In/Hr)

100 year storm 10 minute intensity = 3.100(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 = 0.5300

Process from Point/Station 1.000 to Point/Station 2.000
*** INITIAL AREA EVALUATION ***

Initial area flow distance = 664.000(Ft.)

Top (of initial area) elevation = 804.000(Ft.)

Bottom (of initial area) elevation = 779.000(Ft.)

Difference in elevation = 25.000(Ft.)

Slope = 0.03765 s(percent)= 3.77

TC = $k(0.300)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$

Initial area time of concentration = 7.777 min.

Rainfall intensity = 3.544(In/Hr) for a 100.0 year storm

COMMERCIAL subarea type

Runoff Coefficient = 0.890

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 1.000

RI index for soil(AMC 2) = 75.00

Pervious area fraction = 0.100; Impervious fraction = 0.900

Initial subarea runoff = 9.777(CFS)

Total initial stream area = 3.100(Ac.)

Pervious area fraction = 0.100

End of computations, total study area = 3.10 (Ac.)

The following figures may

be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100

Area averaged RI index number = 75.0

Riverside County Rational Hydrology Program
CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 05/29/25 File:ex1100.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 [Mira Loma] area used.

10 year storm 10 minute intensity = 1.960(In/Hr)

10 year storm 60 minute intensity = 0.760(In/Hr)

100 year storm 10 minute intensity = 3.100(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 = 0.5300

Process from Point/Station 3.000 to Point/Station 4.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 528.000(Ft.)

Top (of initial area) elevation = 802.000(Ft.)

Bottom (of initial area) elevation = 780.000(Ft.)

Difference in elevation = 22.000(Ft.)

Slope = 0.04167 s(percent)= 4.17

TC = $k(0.300)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$

Initial area time of concentration = 6.954 min.

Rainfall intensity = 3.760(In/Hr) for a 100.0 year storm

COMMERCIAL subarea type

Runoff Coefficient = 0.890

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 1.000

RI index for soil(AMC 2) = 75.00

Pervious area fraction = 0.100; Impervious fraction = 0.900

Initial subarea runoff = 14.432(CFS)

Total initial stream area = 4.310(Ac.)

Pervious area fraction = 0.100

End of computations, total study area = 4.31 (Ac.)

The following figures may

be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100

Area averaged RI index number = 75.0

Riverside County Rational Hydrology Program
CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 05/29/25 File:ex2100.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 [Mira Loma] area used.

10 year storm 10 minute intensity = 1.960(In/Hr)

10 year storm 60 minute intensity = 0.760(In/Hr)

100 year storm 10 minute intensity = 3.100(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 = 0.5300

Process from Point/Station 5.000 to Point/Station 6.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 666.000(Ft.)

Top (of initial area) elevation = 782.800(Ft.)

Bottom (of initial area) elevation = 769.000(Ft.)

Difference in elevation = 13.800(Ft.)

Slope = 0.02072 s(percent)= 2.07

TC = $k(0.370)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$

Initial area time of concentration = 10.822 min.

Rainfall intensity = 2.975(In/Hr) for a 100.0 year storm

CONDOMINIUM subarea type

Runoff Coefficient = 0.859

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 1.000

RI index for soil(AMC 2) = 75.00

Pervious area fraction = 0.350; Impervious fraction = 0.650

Initial subarea runoff = 13.620(CFS)

Total initial stream area = 5.330(Ac.)

Pervious area fraction = 0.350

End of computations, total study area = 5.33 (Ac.)

The following figures may

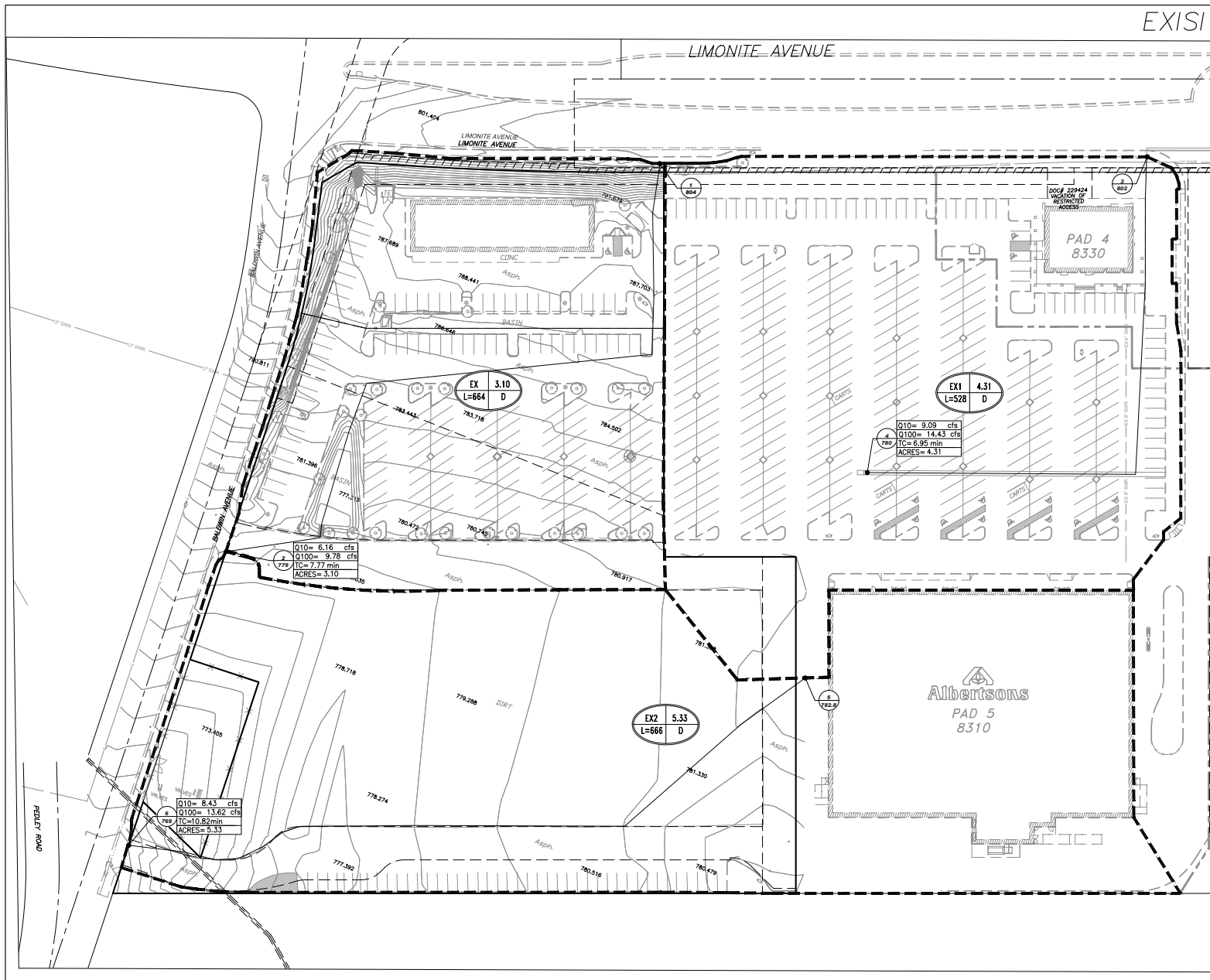
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.350

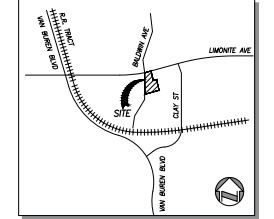
Area averaged RI index number = 75.0

EXISTING HYDROLOGY MAP

TRACT 39105- FIRESTONE

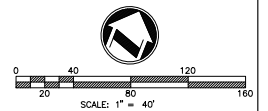
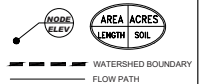


THOMAS BRO. GUIDE PG. 684 F-5.



VICINITY MAP
(CLCS)
T2SR6W SEC25 SE

LEGEND



EXISTING HYDROLOGY MAP
PREPARATION DATE: MAY 2025
PREP BY: [Name]
adkan ENGINEERS
Civil Engineering • Surveying • Planning
6979 Airport Drive, Riverside, CA 92504
Tel: (951) 688-0241 • Fax: (951) 688-0299

Section 2

Post-Developed 10 and 100-year Rational Hydrology & Map

***** 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 [Mira Loma] area used.

10 year storm 10 minute intensity = 1.960(In/Hr)

10 year storm 60 minute intensity = 0.760(In/Hr)

100 year storm 10 minute intensity = 3.100(In/Hr)

100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 10.0

Calculated rainfall intensity data:

1 hour intensity = 0.760(In/Hr)

Slope of intensity duration curve = 0.5300

Process from Point/Station 1.000 to Point/Station 2.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 342.000(Ft.)
Top (of initial area) elevation = 804.000(Ft.)
Bottom (of initial area) elevation = 786.500(Ft.)
Difference in elevation = 17.500(Ft.)
Slope = 0.05117 s(percent)= 5.12
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 5.610 min.
Rainfall intensity = 2.669(In/Hr) for a 10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.887
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 75.00
Pervious area fraction = 0.100; Impervious fraction = 0.900
Initial subarea runoff = 2.675(CFS)
Total initial stream area = 1.130(Ac.)
Pervious area fraction = 0.100

Process from Point/Station 2.000 to Point/Station 3.000
**** SUBAREA FLOW ADDITION ****

COMMERCIAL subarea type
Runoff Coefficient = 0.887
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 75.00
Pervious area fraction = 0.100; Impervious fraction = 0.900
Time of concentration = 5.61 min.
Rainfall intensity = 2.669(In/Hr) for a 10.0 year storm
Subarea runoff = 0.000(CFS) for 0.000(Ac.)
Total runoff = 2.675(CFS) Total area = 1.130(Ac.)

Process from Point/Station 3.000 to Point/Station 3.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1

Stream flow area = 1.130(Ac.)
 Runoff from this stream = 2.675(CFS)
 Time of concentration = 5.61 min.
 Rainfall intensity = 2.669(In/Hr)

 Process from Point/Station 4.000 to Point/Station 3.000
 **** INITIAL AREA EVALUATION ****

Initial area flow distance = 480.000(Ft.)
 Top (of initial area) elevation = 786.500(Ft.)
 Bottom (of initial area) elevation = 778.000(Ft.)
 Difference in elevation = 8.500(Ft.)
 Slope = 0.01771 s(percent)= 1.77
 $TC = k(0.323)*[(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 8.552 min.
 Rainfall intensity = 2.134(In/Hr) for a 10.0 year storm
 APARTMENT subarea type
 Runoff Coefficient = 0.869
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 75.00
 Pervious area fraction = 0.200; Impervious fraction = 0.800
 Initial subarea runoff = 3.264(CFS)
 Total initial stream area = 1.760(Ac.)
 Pervious area fraction = 0.200

 Process from Point/Station 3.000 to Point/Station 3.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 1.760(Ac.)
 Runoff from this stream = 3.264(CFS)
 Time of concentration = 8.55 min.
 Rainfall intensity = 2.134(In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	2.675	5.61	2.669
2	3.264	8.55	2.134

Largest stream flow has longer time of concentration
 $Q_p = 3.264 + \text{sum of}$
 $Q_b \quad I_a/I_b$
 $2.675 * 0.800 = 2.140$
 $Q_p = 5.404$

Total of 2 streams to confluence:
 Flow rates before confluence point:
 2.675 3.264
 Area of streams before confluence:
 1.130 1.760
 Results of confluence:
 Total flow rate = 5.404(CFS)
 Time of concentration = 8.552 min.
 Effective stream area after confluence = 2.890(Ac.)

 Process from Point/Station 3.000 to Point/Station 5.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 778.000(Ft.)
 Downstream point/station elevation = 773.000(Ft.)
 Pipe length = 36.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 5.404(CFS)
 Nearest computed pipe diameter = 9.00(In.)
 Calculated individual pipe flow = 5.404(CFS)
 Normal flow depth in pipe = 6.53(In.)
 Flow top width inside pipe = 8.03(In.)
 Critical depth could not be calculated.
 Pipe flow velocity = 15.74(Ft/s)
 Travel time through pipe = 0.04 min.
 Time of concentration (TC) = 8.59 min.

 Process from Point/Station 5.000 to Point/Station 5.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
 Stream flow area = 2.890(Ac.)
 Runoff from this stream = 5.404(CFS)
 Time of concentration = 8.59 min.
 Rainfall intensity = 2.129(In/Hr)

 Process from Point/Station 6.000 to Point/Station 7.000
 **** INITIAL AREA EVALUATION ****

Initial area flow distance = 483.000(Ft.)
 Top (of initial area) elevation = 782.800(Ft.)
 Bottom (of initial area) elevation = 778.000(Ft.)
 Difference in elevation = 4.800(Ft.)
 Slope = 0.00994 s(percent)= 0.99
 $TC = k(0.323)*[(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 9.623 min.
 Rainfall intensity = 2.005(In/Hr) for a 10.0 year storm
 APARTMENT subarea type
 Runoff Coefficient = 0.867
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 75.00
 Pervious area fraction = 0.200; Impervious fraction = 0.800
 Initial subarea runoff = 2.365(CFS)
 Total initial stream area = 1.360(Ac.)
 Pervious area fraction = 0.200

 Process from Point/Station 7.000 to Point/Station 5.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 778.000(Ft.)
 Downstream point/station elevation = 773.000(Ft.)
 Pipe length = 32.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 2.365(CFS)
 Nearest computed pipe diameter = 6.00(In.)
 Calculated individual pipe flow = 2.365(CFS)
 Normal flow depth in pipe = 5.40(In.)
 Flow top width inside pipe = 3.60(In.)
 Critical depth could not be calculated.
 Pipe flow velocity = 12.70(Ft/s)
 Travel time through pipe = 0.04 min.
 Time of concentration (TC) = 9.67 min.

 Process from Point/Station 5.000 to Point/Station 5.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 1.360(Ac.)
 Runoff from this stream = 2.365(CFS)
 Time of concentration = 9.67 min.
 Rainfall intensity = 2.000(In/Hr)
 Summary of stream data:

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

1	5.404	8.59	2.129
2	2.365	9.67	2.000

Largest stream flow has longer or shorter time of concentration

Qp = 5.404 + sum of
 $Qa \quad Tb/Ta$
 $2.365 * 0.889 = 2.102$
 Qp = 7.505

Total of 2 streams to confluence:
 Flow rates before confluence point:
 5.404 2.365

Area of streams before confluence:
 2.890 1.360

Results of confluence:
 Total flow rate = 7.505(CFS)
 Time of concentration = 8.590 min.
 Effective stream area after confluence = 4.250(Ac.)

Process from Point/Station 5.000 to Point/Station 8.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 773.000(Ft.)
Downstream point/station elevation = 772.500(Ft.)
Pipe length = 23.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 7.505(CFS)
Nearest computed pipe diameter = 15.00(In.)
Calculated individual pipe flow = 7.505(CFS)
Normal flow depth in pipe = 10.03(In.)
Flow top width inside pipe = 14.12(In.)
Critical Depth = 13.07(In.)
Pipe flow velocity = 8.60(Ft/s)
Travel time through pipe = 0.04 min.
Time of concentration (TC) = 8.63 min.

Process from Point/Station 8.000 to Point/Station 9.000
**** SUBAREA FLOW ADDITION ****

UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.778
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 80.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Time of concentration = 8.63 min.
Rainfall intensity = 2.123(In/Hr) for a 10.0 year storm
Subarea runoff = 0.198(CFS) for 0.120(Ac.)
Total runoff = 7.704(CFS) Total area = 4.370(Ac.)

Process from Point/Station 9.000 to Point/Station 10.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 772.000(Ft.)
Downstream point/station elevation = 771.500(Ft.)
Pipe length = 37.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 7.704(CFS)
Nearest computed pipe diameter = 18.00(In.)
Calculated individual pipe flow = 7.704(CFS)
Normal flow depth in pipe = 10.37(In.)
Flow top width inside pipe = 17.79(In.)
Critical Depth = 12.90(In.)
Pipe flow velocity = 7.31(Ft/s)
Travel time through pipe = 0.08 min.
Time of concentration (TC) = 8.72 min.

Process from Point/Station 10.000 to Point/Station 11.000
**** SUBAREA FLOW ADDITION ****

UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.777
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 80.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Time of concentration = 8.72 min.
Rainfall intensity = 2.112(In/Hr) for a 10.0 year storm
Subarea runoff = 0.230(CFS) for 0.140(Ac.)
Total runoff = 7.933(CFS) Total area = 4.510(Ac.)

Process from Point/Station 11.000 to Point/Station 11.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area = 4.510(Ac.)
Runoff from this stream = 7.933(CFS)
Time of concentration = 8.72 min.
Rainfall intensity = 2.112(In/Hr)
Program is now starting with Main Stream No. 2

Process from Point/Station 6.000 to Point/Station 12.000

**** INITIAL AREA EVALUATION ****

Initial area flow distance = 158.000(Ft.)
 Top (of initial area) elevation = 782.800(Ft.)
 Bottom (of initial area) elevation = 779.400(Ft.)
 Difference in elevation = 3.400(Ft.)
 Slope = 0.02152 s(percent)= 2.15
 $TC = k(0.323)*[(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 5.274 min.
 Rainfall intensity = 2.758(In/Hr) for a 10.0 year storm
 APARTMENT subarea type
 Runoff Coefficient = 0.875
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 75.00
 Pervious area fraction = 0.200; Impervious fraction = 0.800
 Initial subarea runoff = 0.314(CFS)
 Total initial stream area = 0.130(Ac.)
 Pervious area fraction = 0.200

 Process from Point/Station 12.000 to Point/Station 13.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 779.400(Ft.)
 Downstream point/station elevation = 773.000(Ft.)
 Pipe length = 320.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 0.314(CFS)
 Nearest computed pipe diameter = 6.00(In.)
 Calculated individual pipe flow = 0.314(CFS)
 Normal flow depth in pipe = 2.62(In.)
 Flow top width inside pipe = 5.95(In.)
 Critical Depth = 3.40(In.)
 Pipe flow velocity = 3.80(Ft/s)
 Travel time through pipe = 1.40 min.
 Time of concentration (TC) = 6.68 min.

 Process from Point/Station 13.000 to Point/Station 13.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 2 in normal stream number 1
 Stream flow area = 0.130(Ac.)
 Runoff from this stream = 0.314(CFS)
 Time of concentration = 6.68 min.
 Rainfall intensity = 2.433(In/Hr)

 Process from Point/Station 12.000 to Point/Station 14.000
 **** INITIAL AREA EVALUATION ****

Initial area flow distance = 306.000(Ft.)
 Top (of initial area) elevation = 779.400(Ft.)
 Bottom (of initial area) elevation = 778.200(Ft.)
 Difference in elevation = 1.200(Ft.)
 Slope = 0.00392 s(percent)= 0.39
 $TC = k(0.323)*[(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 9.656 min.
 Rainfall intensity = 2.001(In/Hr) for a 10.0 year storm
 APARTMENT subarea type
 Runoff Coefficient = 0.867
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 75.00
 Pervious area fraction = 0.200; Impervious fraction = 0.800
 Initial subarea runoff = 1.458(CFS)
 Total initial stream area = 0.840(Ac.)
 Pervious area fraction = 0.200

 Process from Point/Station 14.000 to Point/Station 13.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 778.200(Ft.)
 Downstream point/station elevation = 773.000(Ft.)
 Pipe length = 14.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 1.458(CFS)
 Nearest computed pipe diameter = 6.00(In.)

Calculated individual pipe flow = 1.458(CFS)
 Normal flow depth in pipe = 2.74(In.)
 Flow top width inside pipe = 5.98(In.)
 Critical depth could not be calculated.
 Pipe flow velocity = 16.72(Ft/s)
 Travel time through pipe = 0.01 min.
 Time of concentration (TC) = 9.67 min.

 Process from Point/Station 13.000 to Point/Station 13.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 2 in normal stream number 2
 Stream flow area = 0.840(Ac.)
 Runoff from this stream = 1.458(CFS)
 Time of concentration = 9.67 min.
 Rainfall intensity = 2.000(In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	0.314	6.68	2.433
2	1.458	9.67	2.000

Largest stream flow has longer time of concentration
 $Q_p = 1.458 + \text{sum of } Q_b \text{ Ia/Ib}$
 $Q_p = 0.314 * 0.822 = 0.258$
 $Q_p = 1.716$

Total of 2 streams to confluence:
 Flow rates before confluence point:
 0.314 1.458
 Area of streams before confluence:
 0.130 0.840
 Results of confluence:
 Total flow rate = 1.716(CFS)
 Time of concentration = 9.670 min.
 Effective stream area after confluence = 0.970(Ac.)

 Process from Point/Station 13.000 to Point/Station 15.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 773.000(Ft.)
 Downstream point/station elevation = 771.500(Ft.)
 Pipe length = 104.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 1.716(CFS)
 Nearest computed pipe diameter = 9.00(In.)
 Calculated individual pipe flow = 1.716(CFS)
 Normal flow depth in pipe = 6.46(In.)
 Flow top width inside pipe = 8.10(In.)
 Critical Depth = 7.21(In.)
 Pipe flow velocity = 5.06(Ft/s)
 Travel time through pipe = 0.34 min.
 Time of concentration (TC) = 10.01 min.

 Process from Point/Station 15.000 to Point/Station 11.000
 **** SUBAREA FLOW ADDITION ****

UNDEVELOPED (good cover) subarea
 Runoff Coefficient = 0.769
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 80.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
 Time of concentration = 10.01 min.
 Rainfall intensity = 1.963(In/Hr) for a 10.0 year storm
 Subarea runoff = 0.000(CFS) for 0.000(Ac.)
 Total runoff = 1.716(CFS) Total area = 0.970(Ac.)

 Process from Point/Station 11.000 to Point/Station 11.000
 **** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
 In Main Stream number: 2
 Stream flow area = 0.970(Ac.)

Runoff from this stream = 1.716(CFS)
 Time of concentration = 10.01 min.
 Rainfall intensity = 1.963(In/Hr)
 Program is now starting with Main Stream No. 3

 Process from Point/Station 14.000 to Point/Station 16.000
 **** INITIAL AREA EVALUATION ****

Initial area flow distance = 180.000(Ft.)
 Top (of initial area) elevation = 778.200(Ft.)
 Bottom (of initial area) elevation = 774.000(Ft.)
 Difference in elevation = 4.200(Ft.)
 Slope = 0.02333 s(percent)= 2.33
 $TC = k(0.323)^*[(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 5.467 min.
 Rainfall intensity = 2.705(In/Hr) for a 10.0 year storm
 APARTMENT subarea type
 Runoff Coefficient = 0.875
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 75.00
 Pervious area fraction = 0.200; Impervious fraction = 0.800
 Initial subarea runoff = 0.899(CFS)
 Total initial stream area = 0.380(Ac.)
 Pervious area fraction = 0.200

 Process from Point/Station 16.000 to Point/Station 17.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 774.000(Ft.)
 Downstream point/station elevation = 771.500(Ft.)
 Pipe length = 36.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 0.899(CFS)
 Nearest computed pipe diameter = 6.00(In.)
 Calculated individual pipe flow = 0.899(CFS)
 Normal flow depth in pipe = 3.38(In.)
 Flow top width inside pipe = 5.95(In.)
 Critical Depth = 5.53(In.)
 Pipe flow velocity = 7.90(Ft/s)
 Travel time through pipe = 0.08 min.
 Time of concentration (TC) = 5.54 min.

 Process from Point/Station 17.000 to Point/Station 11.000
 **** SUBAREA FLOW ADDITION ****

UNDEVELOPED (good cover) subarea
 Runoff Coefficient = 0.801
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 80.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
 Time of concentration = 5.54 min.
 Rainfall intensity = 2.686(In/Hr) for a 10.0 year storm
 Subarea runoff = 0.000(CFS) for 0.000(Ac.)
 Total runoff = 0.899(CFS) Total area = 0.380(Ac.)

 Process from Point/Station 11.000 to Point/Station 11.000
 **** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 3
 Stream flow area = 0.380(Ac.)
 Runoff from this stream = 0.899(CFS)
 Time of concentration = 5.54 min.
 Rainfall intensity = 2.686(In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	7.933	8.72	2.112
2	1.716	10.01	1.963
3	0.899	5.54	2.686

Largest stream flow has longer or shorter time of concentration

Qp = 7.933 + sum of
Qa Tb/Ta
1.716 * 0.871 = 1.494
Qb Ia/Ib
0.899 * 0.787 = 0.707
Qp = 10.135

Total of 3 main streams to confluence:

Flow rates before confluence point:
7.933 1.716 0.899

Area of streams before confluence:
4.510 0.970 0.380

Results of confluence:

Total flow rate = 10.135(CFS)
Time of concentration = 8.719 min.
Effective stream area after confluence = 5.860(Ac.)

Process from Point/Station 11.000 to Point/Station 18.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 771.000(Ft.)
Downstream point/station elevation = 770.500(Ft.)
Pipe length = 31.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 10.135(CFS)
Nearest computed pipe diameter = 18.00(In.)
Calculated individual pipe flow = 10.135(CFS)
Normal flow depth in pipe = 11.74(In.)
Flow top width inside pipe = 17.14(In.)
Critical Depth = 14.72(In.)
Pipe flow velocity = 8.31(Ft/s)
Travel time through pipe = 0.06 min.
Time of concentration (TC) = 8.78 min.

Process from Point/Station 18.000 to Point/Station 18.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 1
Stream flow area = 5.860(Ac.)
Runoff from this stream = 10.135(CFS)
Time of concentration = 8.78 min.
Rainfall intensity = 2.105(In/Hr)
Program is now starting with Main Stream No. 2

Process from Point/Station 19.000 to Point/Station 20.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 528.000(Ft.)
Top (of initial area) elevation = 802.000(Ft.)
Bottom (of initial area) elevation = 780.000(Ft.)
Difference in elevation = 22.000(Ft.)
Slope = 0.04167 s(percent) = 4.17
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 6.954 min.
Rainfall intensity = 2.382(In/Hr) for a 10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.886
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 75.00
Pervious area fraction = 0.100; Impervious fraction = 0.900
Initial subarea runoff = 8.671(CFS)
Total initial stream area = 4.110(Ac.)
Pervious area fraction = 0.100

Process from Point/Station 20.000 to Point/Station 21.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 780.000(Ft.)
Downstream point/station elevation = 775.000(Ft.)
Pipe length = 509.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 8.671(CFS)
Nearest computed pipe diameter = 18.00(In.)

Calculated individual pipe flow = 8.671(CFS)
 Normal flow depth in pipe = 12.55(In.)
 Flow top width inside pipe = 16.54(In.)
 Critical Depth = 13.68(In.)
 Pipe flow velocity = 6.59(Ft/s)
 Travel time through pipe = 1.29 min.
 Time of concentration (TC) = 8.24 min.

 Process from Point/Station 21.000 to Point/Station 21.000
 ***** CONFLUENCE OF MINOR STREAMS *****

Along Main Stream number: 2 in normal stream number 1
 Stream flow area = 4.110(Ac.)
 Runoff from this stream = 8.671(CFS)
 Time of concentration = 8.24 min.
 Rainfall intensity = 2.177(In/Hr)

 Process from Point/Station 22.000 to Point/Station 23.000
 ***** INITIAL AREA EVALUATION *****

Initial area flow distance = 196.000(Ft.)
 Top (of initial area) elevation = 782.800(Ft.)
 Bottom (of initial area) elevation = 779.500(Ft.)
 Difference in elevation = 3.300(Ft.)
 Slope = 0.01684 s(percent) = 1.68
 $TC = k(0.300) * [(length^3) / (elevation\ change)]^{0.2}$
 Initial area time of concentration = 5.608 min.
 Rainfall intensity = 2.669(In/Hr) for a 10.0 year storm
 COMMERCIAL subarea type
 Runoff Coefficient = 0.887
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 75.00
 Pervious area fraction = 0.100; Impervious fraction = 0.900
 Initial subarea runoff = 2.510(CFS)
 Total initial stream area = 1.060(Ac.)
 Pervious area fraction = 0.100

 Process from Point/Station 23.000 to Point/Station 21.000
 ***** PIPEFLOW TRAVEL TIME (Program estimated size) *****

Upstream point/station elevation = 779.500(Ft.)
 Downstream point/station elevation = 775.000(Ft.)
 Pipe length = 118.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 2.510(CFS)
 Nearest computed pipe diameter = 9.00(In.)
 Calculated individual pipe flow = 2.510(CFS)
 Normal flow depth in pipe = 5.96(In.)
 Flow top width inside pipe = 8.51(In.)
 Critical Depth = 8.32(In.)
 Pipe flow velocity = 8.08(Ft/s)
 Travel time through pipe = 0.24 min.
 Time of concentration (TC) = 5.85 min.

 Process from Point/Station 21.000 to Point/Station 21.000
 ***** CONFLUENCE OF MINOR STREAMS *****

Along Main Stream number: 2 in normal stream number 2
 Stream flow area = 1.060(Ac.)
 Runoff from this stream = 2.510(CFS)
 Time of concentration = 5.85 min.
 Rainfall intensity = 2.610(In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	8.671	8.24	2.177
2	2.510	5.85	2.610

Largest stream flow has longer time of concentration
 $Q_p = 8.671 + \text{sum of}$
 $Q_b \quad I_a/I_b$
 $Q_p = 2.510 * 0.834 = 2.093$
 $Q_p = 10.764$

Total of 2 streams to confluence:
Flow rates before confluence point:
8.671 2.510
Area of streams before confluence:
4.110 1.060
Results of confluence:
Total flow rate = 10.764(CFS)
Time of concentration = 8.241 min.
Effective stream area after confluence = 5.170(Ac.)

Process from Point/Station 21.000 to Point/Station 18.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 775.000(Ft.)
Downstream point/station elevation = 770.500(Ft.)
Pipe length = 363.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 10.764(CFS)
Nearest computed pipe diameter = 18.00(In.)
Calculated individual pipe flow = 10.764(CFS)
Normal flow depth in pipe = 13.62(In.)
Flow top width inside pipe = 15.45(In.)
Critical Depth = 15.10(In.)
Pipe flow velocity = 7.51(Ft/s)
Travel time through pipe = 0.81 min.
Time of concentration (TC) = 9.05 min.

Process from Point/Station 18.000 to Point/Station 18.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 2
Stream flow area = 5.170(Ac.)
Runoff from this stream = 10.764(CFS)
Time of concentration = 9.05 min.
Rainfall intensity = 2.072(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	10.135	8.78	2.105
2	10.764	9.05	2.072

Largest stream flow has longer time of concentration
 $Q_p = 10.764 + \text{sum of } Q_b \text{ Ia/Ib}$
 $10.135 * 0.984 = 9.976$
 $Q_p = 20.740$

Total of 2 main streams to confluence:
Flow rates before confluence point:
10.135 10.764
Area of streams before confluence:
5.860 5.170
Results of confluence:
Total flow rate = 20.740(CFS)
Time of concentration = 9.046 min.
Effective stream area after confluence = 11.030(Ac.)

Process from Point/Station 18.000 to Point/Station 24.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 770.500(Ft.)
Downstream point/station elevation = 770.000(Ft.)
Pipe length = 70.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 20.740(CFS)
Nearest computed pipe diameter = 27.00(In.)
Calculated individual pipe flow = 20.740(CFS)
Normal flow depth in pipe = 18.14(In.)
Flow top width inside pipe = 25.35(In.)
Critical Depth = 19.13(In.)
Pipe flow velocity = 7.30(Ft/s)
Travel time through pipe = 0.16 min.
Time of concentration (TC) = 9.21 min.
End of computations, total study area = 11.03 (Ac.)
The following figures maybe used for a unit hydrograph study of the same area.
Area averaged pervious area fraction(Ap) = 0.162
Area averaged RI index number = 75.1

***** 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 [Mira Loma] area used.

10 year storm 10 minute intensity = 1.960(In/Hr)

10 year storm 60 minute intensity = 0.760(In/Hr)

100 year storm 10 minute intensity = 3.100(In/Hr)

100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 10.0

Calculated rainfall intensity data:

1 hour intensity = 0.760(In/Hr)

Slope of intensity duration curve = 0.5300

Process from Point/Station 23.000 to Point/Station 25.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 580.000(Ft.)

Top (of initial area) elevation = 779.500(Ft.)

Bottom (of initial area) elevation = 771.000(Ft.)

Difference in elevation = 8.500(Ft.)

Slope = 0.01466 s(percent)= 1.47

TC = $k(0.300)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$

Initial area time of concentration = 8.898 min.

Rainfall intensity = 2.090(In/Hr) for a 10.0 year storm

COMMERCIAL subarea type

Runoff Coefficient = 0.884

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 1.000

RI index for soil(AMC 2) = 75.00

Pervious area fraction = 0.100; Impervious fraction = 0.900

Initial subarea runoff = 0.924(CFS)

Total initial stream area = 0.500(Ac.)

Pervious area fraction = 0.100

End of computations, total study area = 0.50 (Ac.)

The following figures may

be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100

Area averaged RI index number = 75.0

***** 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 [Mira Loma] area used.

10 year storm 10 minute intensity = 1.960(In/Hr)

10 year storm 60 minute intensity = 0.760(In/Hr)

100 year storm 10 minute intensity = 3.100(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 = 0.5300

Process from Point/Station 1.000 to Point/Station 2.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 342.000(Ft.)
Top (of initial area) elevation = 804.000(Ft.)
Bottom (of initial area) elevation = 786.500(Ft.)
Difference in elevation = 17.500(Ft.)
Slope = 0.05117 s(percent)= 5.12
 $TC = k(0.300)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 5.610 min.
Rainfall intensity = 4.214(In/Hr) for a 100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.891
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 75.00
Pervious area fraction = 0.100; Impervious fraction = 0.900
Initial subarea runoff = 4.244(CFS)
Total initial stream area = 1.130(Ac.)
Pervious area fraction = 0.100

Process from Point/Station 2.000 to Point/Station 3.000
**** SUBAREA FLOW ADDITION ****

COMMERCIAL subarea type
Runoff Coefficient = 0.891
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 75.00
Pervious area fraction = 0.100; Impervious fraction = 0.900
Time of concentration = 5.61 min.
Rainfall intensity = 4.214(In/Hr) for a 100.0 year storm
Subarea runoff = 0.000(CFS) for 0.000(Ac.)
Total runoff = 4.244(CFS) Total area = 1.130(Ac.)

Process from Point/Station 3.000 to Point/Station 3.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1

Stream flow area = 1.130(Ac.)
 Runoff from this stream = 4.244(CFS)
 Time of concentration = 5.61 min.
 Rainfall intensity = 4.214(In/Hr)

 Process from Point/Station 4.000 to Point/Station 3.000
 **** INITIAL AREA EVALUATION ****

Initial area flow distance = 480.000(Ft.)
 Top (of initial area) elevation = 786.500(Ft.)
 Bottom (of initial area) elevation = 778.000(Ft.)
 Difference in elevation = 8.500(Ft.)
 Slope = 0.01771 s(percent)= 1.77
 $TC = k(0.323)*[(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 8.552 min.
 Rainfall intensity = 3.370(In/Hr) for a 100.0 year storm
 APARTMENT subarea type
 Runoff Coefficient = 0.879
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 75.00
 Pervious area fraction = 0.200; Impervious fraction = 0.800
 Initial subarea runoff = 5.213(CFS)
 Total initial stream area = 1.760(Ac.)
 Pervious area fraction = 0.200

 Process from Point/Station 3.000 to Point/Station 3.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 1.760(Ac.)
 Runoff from this stream = 5.213(CFS)
 Time of concentration = 8.55 min.
 Rainfall intensity = 3.370(In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	4.244	5.61	4.214
2	5.213	8.55	3.370

Largest stream flow has longer time of concentration
 $Q_p = 5.213 + \text{sum of}$
 $Q_b \quad I_a/I_b$
 $4.244 * 0.800 = 3.394$
 $Q_p = 8.608$

Total of 2 streams to confluence:
 Flow rates before confluence point:
 4.244 5.213
 Area of streams before confluence:
 1.130 1.760
 Results of confluence:
 Total flow rate = 8.608(CFS)
 Time of concentration = 8.552 min.
 Effective stream area after confluence = 2.890(Ac.)

 Process from Point/Station 3.000 to Point/Station 5.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 778.000(Ft.)
 Downstream point/station elevation = 773.000(Ft.)
 Pipe length = 36.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 8.608(CFS)
 Nearest computed pipe diameter = 12.00(In.)
 Calculated individual pipe flow = 8.608(CFS)
 Normal flow depth in pipe = 7.03(In.)
 Flow top width inside pipe = 11.82(In.)
 Critical depth could not be calculated.
 Pipe flow velocity = 17.98(Ft/s)
 Travel time through pipe = 0.03 min.
 Time of concentration (TC) = 8.59 min.

 Process from Point/Station 5.000 to Point/Station 5.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
 Stream flow area = 2.890(Ac.)
 Runoff from this stream = 8.608(CFS)
 Time of concentration = 8.59 min.
 Rainfall intensity = 3.363(In/Hr)

 Process from Point/Station 6.000 to Point/Station 7.000
 **** INITIAL AREA EVALUATION ****

Initial area flow distance = 483.000(Ft.)
 Top (of initial area) elevation = 782.800(Ft.)
 Bottom (of initial area) elevation = 778.000(Ft.)
 Difference in elevation = 4.800(Ft.)
 Slope = 0.00994 s(percent)= 0.99
 $TC = k(0.323)*[(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 9.623 min.
 Rainfall intensity = 3.165(In/Hr) for a 100.0 year storm
 APARTMENT subarea type
 Runoff Coefficient = 0.878
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 75.00
 Pervious area fraction = 0.200; Impervious fraction = 0.800
 Initial subarea runoff = 3.779(CFS)
 Total initial stream area = 1.360(Ac.)
 Pervious area fraction = 0.200

 Process from Point/Station 7.000 to Point/Station 5.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 778.000(Ft.)
 Downstream point/station elevation = 773.000(Ft.)
 Pipe length = 32.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 3.779(CFS)
 Nearest computed pipe diameter = 9.00(In.)
 Calculated individual pipe flow = 3.779(CFS)
 Normal flow depth in pipe = 4.91(In.)
 Flow top width inside pipe = 8.96(In.)
 Critical depth could not be calculated.
 Pipe flow velocity = 15.34(Ft/s)
 Travel time through pipe = 0.03 min.
 Time of concentration (TC) = 9.66 min.

 Process from Point/Station 5.000 to Point/Station 5.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 1.360(Ac.)
 Runoff from this stream = 3.779(CFS)
 Time of concentration = 9.66 min.
 Rainfall intensity = 3.159(In/Hr)
 Summary of stream data:

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

1	8.608	8.59	3.363
2	3.779	9.66	3.159

Largest stream flow has longer or shorter time of concentration

Qp = 8.608 + sum of
 $Qa \quad Tb/Ta$
 $3.779 * 0.889 = 3.359$
 Qp = 11.967

Total of 2 streams to confluence:
 Flow rates before confluence point:
 8.608 3.779

Area of streams before confluence:
 2.890 1.360

Results of confluence:
 Total flow rate = 11.967(CFS)
 Time of concentration = 8.585 min.
 Effective stream area after confluence = 4.250(Ac.)

Process from Point/Station 5.000 to Point/Station 8.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 773.000(Ft.)
Downstream point/station elevation = 772.500(Ft.)
Pipe length = 23.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 11.967(CFS)
Nearest computed pipe diameter = 18.00(In.)
Calculated individual pipe flow = 11.967(CFS)
Normal flow depth in pipe = 11.88(In.)
Flow top width inside pipe = 17.05(In.)
Critical Depth = 15.76(In.)
Pipe flow velocity = 9.68(Ft/s)
Travel time through pipe = 0.04 min.
Time of concentration (TC) = 8.62 min.

Process from Point/Station 8.000 to Point/Station 9.000
**** SUBAREA FLOW ADDITION ****

UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.819
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 80.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Time of concentration = 8.62 min.
Rainfall intensity = 3.355(In/Hr) for a 100.0 year storm
Subarea runoff = 0.330(CFS) for 0.120(Ac.)
Total runoff = 12.297(CFS) Total area = 4.370(Ac.)

Process from Point/Station 9.000 to Point/Station 10.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 772.000(Ft.)
Downstream point/station elevation = 771.500(Ft.)
Pipe length = 37.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 12.297(CFS)
Nearest computed pipe diameter = 18.00(In.)
Calculated individual pipe flow = 12.297(CFS)
Normal flow depth in pipe = 14.86(In.)
Flow top width inside pipe = 13.66(In.)
Critical Depth = 15.90(In.)
Pipe flow velocity = 7.88(Ft/s)
Travel time through pipe = 0.08 min.
Time of concentration (TC) = 8.70 min.

Process from Point/Station 10.000 to Point/Station 11.000
**** SUBAREA FLOW ADDITION ****

UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.818
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 80.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Time of concentration = 8.70 min.
Rainfall intensity = 3.339(In/Hr) for a 100.0 year storm
Subarea runoff = 0.382(CFS) for 0.140(Ac.)
Total runoff = 12.679(CFS) Total area = 4.510(Ac.)

Process from Point/Station 11.000 to Point/Station 11.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area = 4.510(Ac.)
Runoff from this stream = 12.679(CFS)
Time of concentration = 8.70 min.
Rainfall intensity = 3.339(In/Hr)
Program is now starting with Main Stream No. 2

Process from Point/Station 6.000 to Point/Station 12.000

**** INITIAL AREA EVALUATION ****

Initial area flow distance = 158.000(Ft.)
 Top (of initial area) elevation = 782.800(Ft.)
 Bottom (of initial area) elevation = 779.400(Ft.)
 Difference in elevation = 3.400(Ft.)
 Slope = 0.02152 s(percent)= 2.15
 $TC = k(0.323)*[(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 5.274 min.
 Rainfall intensity = 4.354(In/Hr) for a 100.0 year storm
 APARTMENT subarea type
 Runoff Coefficient = 0.883
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 75.00
 Pervious area fraction = 0.200; Impervious fraction = 0.800
 Initial subarea runoff = 0.500(CFS)
 Total initial stream area = 0.130(Ac.)
 Pervious area fraction = 0.200

 Process from Point/Station 12.000 to Point/Station 13.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 779.400(Ft.)
 Downstream point/station elevation = 773.000(Ft.)
 Pipe length = 320.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 0.500(CFS)
 Nearest computed pipe diameter = 6.00(In.)
 Calculated individual pipe flow = 0.500(CFS)
 Normal flow depth in pipe = 3.46(In.)
 Flow top width inside pipe = 5.93(In.)
 Critical Depth = 4.33(In.)
 Pipe flow velocity = 4.27(Ft/s)
 Travel time through pipe = 1.25 min.
 Time of concentration (TC) = 6.52 min.

 Process from Point/Station 13.000 to Point/Station 13.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 2 in normal stream number 1
 Stream flow area = 0.130(Ac.)
 Runoff from this stream = 0.500(CFS)
 Time of concentration = 6.52 min.
 Rainfall intensity = 3.890(In/Hr)

 Process from Point/Station 12.000 to Point/Station 14.000
 **** INITIAL AREA EVALUATION ****

Initial area flow distance = 306.000(Ft.)
 Top (of initial area) elevation = 779.400(Ft.)
 Bottom (of initial area) elevation = 778.200(Ft.)
 Difference in elevation = 1.200(Ft.)
 Slope = 0.00392 s(percent)= 0.39
 $TC = k(0.323)*[(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 9.656 min.
 Rainfall intensity = 3.160(In/Hr) for a 100.0 year storm
 APARTMENT subarea type
 Runoff Coefficient = 0.878
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 75.00
 Pervious area fraction = 0.200; Impervious fraction = 0.800
 Initial subarea runoff = 2.330(CFS)
 Total initial stream area = 0.840(Ac.)
 Pervious area fraction = 0.200

 Process from Point/Station 14.000 to Point/Station 13.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 778.200(Ft.)
 Downstream point/station elevation = 773.000(Ft.)
 Pipe length = 14.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 2.330(CFS)
 Nearest computed pipe diameter = 6.00(In.)

Calculated individual pipe flow = 2.330(CFS)
 Normal flow depth in pipe = 3.63(In.)
 Flow top width inside pipe = 5.86(In.)
 Critical depth could not be calculated.
 Pipe flow velocity = 18.73(Ft/s)
 Travel time through pipe = 0.01 min.
 Time of concentration (TC) = 9.67 min.

 Process from Point/Station 13.000 to Point/Station 13.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 2 in normal stream number 2
 Stream flow area = 0.840(Ac.)
 Runoff from this stream = 2.330(CFS)
 Time of concentration = 9.67 min.
 Rainfall intensity = 3.158(In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	0.500	6.52	3.890
2	2.330	9.67	3.158

Largest stream flow has longer time of concentration
 $Q_p = 2.330 + \text{sum of } Q_b \text{ Ia/Ib}$
 $Q_p = 0.500 * 0.812 = 0.406$
 $Q_p = 2.736$

Total of 2 streams to confluence:
 Flow rates before confluence point:
 0.500 2.330
 Area of streams before confluence:
 0.130 0.840
 Results of confluence:
 Total flow rate = 2.736(CFS)
 Time of concentration = 9.668 min.
 Effective stream area after confluence = 0.970(Ac.)

 Process from Point/Station 13.000 to Point/Station 15.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 773.000(Ft.)
 Downstream point/station elevation = 771.500(Ft.)
 Pipe length = 104.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 2.736(CFS)
 Nearest computed pipe diameter = 12.00(In.)
 Calculated individual pipe flow = 2.736(CFS)
 Normal flow depth in pipe = 6.97(In.)
 Flow top width inside pipe = 11.84(In.)
 Critical Depth = 8.50(In.)
 Pipe flow velocity = 5.78(Ft/s)
 Travel time through pipe = 0.30 min.
 Time of concentration (TC) = 9.97 min.

 Process from Point/Station 15.000 to Point/Station 11.000
 **** SUBAREA FLOW ADDITION ****

UNDEVELOPED (good cover) subarea
 Runoff Coefficient = 0.813
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 80.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
 Time of concentration = 9.97 min.
 Rainfall intensity = 3.107(In/Hr) for a 100.0 year storm
 Subarea runoff = 0.000(CFS) for 0.000(Ac.)
 Total runoff = 2.736(CFS) Total area = 0.970(Ac.)

 Process from Point/Station 11.000 to Point/Station 11.000
 **** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
 In Main Stream number: 2
 Stream flow area = 0.970(Ac.)

Runoff from this stream = 2.736(CFS)
 Time of concentration = 9.97 min.
 Rainfall intensity = 3.107(In/Hr)
 Program is now starting with Main Stream No. 3

 Process from Point/Station 14.000 to Point/Station 16.000
 **** INITIAL AREA EVALUATION ****

Initial area flow distance = 180.000(Ft.)
 Top (of initial area) elevation = 778.200(Ft.)
 Bottom (of initial area) elevation = 774.000(Ft.)
 Difference in elevation = 4.200(Ft.)
 Slope = 0.02333 s(percent)= 2.33
 $TC = k(0.323)*[(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 5.467 min.
 Rainfall intensity = 4.272(In/Hr) for a 100.0 year storm
 APARTMENT subarea type
 Runoff Coefficient = 0.883
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 75.00
 Pervious area fraction = 0.200; Impervious fraction = 0.800
 Initial subarea runoff = 1.433(CFS)
 Total initial stream area = 0.380(Ac.)
 Pervious area fraction = 0.200

 Process from Point/Station 16.000 to Point/Station 17.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 774.000(Ft.)
 Downstream point/station elevation = 771.500(Ft.)
 Pipe length = 36.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 1.433(CFS)
 Nearest computed pipe diameter = 6.00(In.)
 Calculated individual pipe flow = 1.433(CFS)
 Normal flow depth in pipe = 4.76(In.)
 Flow top width inside pipe = 4.86(In.)
 Critical depth could not be calculated.
 Pipe flow velocity = 8.58(Ft/s)
 Travel time through pipe = 0.07 min.
 Time of concentration (TC) = 5.54 min.

 Process from Point/Station 17.000 to Point/Station 11.000
 **** SUBAREA FLOW ADDITION ****

UNDEVELOPED (good cover) subarea
 Runoff Coefficient = 0.834
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 80.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
 Time of concentration = 5.54 min.
 Rainfall intensity = 4.243(In/Hr) for a 100.0 year storm
 Subarea runoff = 0.000(CFS) for 0.000(Ac.)
 Total runoff = 1.433(CFS) Total area = 0.380(Ac.)

 Process from Point/Station 11.000 to Point/Station 11.000
 **** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 3
 Stream flow area = 0.380(Ac.)
 Runoff from this stream = 1.433(CFS)
 Time of concentration = 5.54 min.
 Rainfall intensity = 4.243(In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	12.679	8.70	3.339
2	2.736	9.97	3.107
3	1.433	5.54	4.243

Largest stream flow has longer or shorter time of concentration

Qp = 12.679 + sum of
Qa Tb/Ta
2.736 * 0.873 = 2.388
Qb Ia/Ib
1.433 * 0.787 = 1.128
Qp = 16.196

Total of 3 main streams to confluence:

Flow rates before confluence point:
12.679 2.736 1.433

Area of streams before confluence:
4.510 0.970 0.380

Results of confluence:

Total flow rate = 16.196(CFS)
Time of concentration = 8.703 min.
Effective stream area after confluence = 5.860(Ac.)

Process from Point/Station 11.000 to Point/Station 18.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 771.000(Ft.)
Downstream point/station elevation = 770.500(Ft.)
Pipe length = 31.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 16.196(CFS)
Nearest computed pipe diameter = 21.00(In.)
Calculated individual pipe flow = 16.196(CFS)
Normal flow depth in pipe = 14.27(In.)
Flow top width inside pipe = 19.60(In.)
Critical Depth = 17.80(In.)
Pipe flow velocity = 9.31(Ft/s)
Travel time through pipe = 0.06 min.
Time of concentration (TC) = 8.76 min.

Process from Point/Station 18.000 to Point/Station 18.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 1
Stream flow area = 5.860(Ac.)
Runoff from this stream = 16.196(CFS)
Time of concentration = 8.76 min.
Rainfall intensity = 3.327(In/Hr)
Program is now starting with Main Stream No. 2

Process from Point/Station 19.000 to Point/Station 20.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 528.000(Ft.)
Top (of initial area) elevation = 802.000(Ft.)
Bottom (of initial area) elevation = 780.000(Ft.)
Difference in elevation = 22.000(Ft.)
Slope = 0.04167 s(percent) = 4.17
TC = $k(0.300)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$
Initial area time of concentration = 6.954 min.
Rainfall intensity = 3.760(In/Hr) for a 100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.890
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 75.00
Pervious area fraction = 0.100; Impervious fraction = 0.900
Initial subarea runoff = 13.762(CFS)
Total initial stream area = 4.110(Ac.)
Pervious area fraction = 0.100

Process from Point/Station 20.000 to Point/Station 21.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 780.000(Ft.)
Downstream point/station elevation = 775.000(Ft.)
Pipe length = 509.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 13.762(CFS)
Nearest computed pipe diameter = 21.00(In.)

Calculated individual pipe flow = 13.762(CFS)
 Normal flow depth in pipe = 15.23(In.)
 Flow top width inside pipe = 18.74(In.)
 Critical Depth = 16.55(In.)
 Pipe flow velocity = 7.36(Ft/s)
 Travel time through pipe = 1.15 min.
 Time of concentration (TC) = 8.11 min.

 Process from Point/Station 21.000 to Point/Station 21.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 2 in normal stream number 1
 Stream flow area = 4.110(Ac.)
 Runoff from this stream = 13.762(CFS)
 Time of concentration = 8.11 min.
 Rainfall intensity = 3.467(In/Hr)

 Process from Point/Station 22.000 to Point/Station 23.000
 **** INITIAL AREA EVALUATION ****

Initial area flow distance = 196.000(Ft.)
 Top (of initial area) elevation = 782.800(Ft.)
 Bottom (of initial area) elevation = 779.500(Ft.)
 Difference in elevation = 3.300(Ft.)
 Slope = 0.01684 s(percent)= 1.68
 $TC = k(0.300)*[(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 5.608 min.
 Rainfall intensity = 4.215(In/Hr) for a 100.0 year storm
 COMMERCIAL subarea type
 Runoff Coefficient = 0.891
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 1.000
 RI index for soil(AMC 2) = 75.00
 Pervious area fraction = 0.100; Impervious fraction = 0.900
 Initial subarea runoff = 3.982(CFS)
 Total initial stream area = 1.060(Ac.)
 Pervious area fraction = 0.100

 Process from Point/Station 23.000 to Point/Station 21.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 779.500(Ft.)
 Downstream point/station elevation = 775.000(Ft.)
 Pipe length = 118.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 3.982(CFS)
 Nearest computed pipe diameter = 12.00(In.)
 Calculated individual pipe flow = 3.982(CFS)
 Normal flow depth in pipe = 6.50(In.)
 Flow top width inside pipe = 11.96(In.)
 Critical Depth = 10.15(In.)
 Pipe flow velocity = 9.15(Ft/s)
 Travel time through pipe = 0.21 min.
 Time of concentration (TC) = 5.82 min.

 Process from Point/Station 21.000 to Point/Station 21.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 2 in normal stream number 2
 Stream flow area = 1.060(Ac.)
 Runoff from this stream = 3.982(CFS)
 Time of concentration = 5.82 min.
 Rainfall intensity = 4.131(In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	13.762	8.11	3.467
2	3.982	5.82	4.131
Largest stream flow has longer time of concentration			
Qp =	13.762 + sum of Qb	Ia/Ib	
	3.982 *	0.839 =	3.342
Qp =	17.104		

Total of 2 streams to confluence:
 Flow rates before confluence point:
 13.762 3.982
 Area of streams before confluence:
 4.110 1.060
 Results of confluence:
 Total flow rate = 17.104(CFS)
 Time of concentration = 8.106 min.
 Effective stream area after confluence = 5.170(Ac.)

 Process from Point/Station 21.000 to Point/Station 18.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 775.000(Ft.)
 Downstream point/station elevation = 770.500(Ft.)
 Pipe length = 363.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 17.104(CFS)
 Nearest computed pipe diameter = 21.00(In.)
 Calculated individual pipe flow = 17.104(CFS)
 Normal flow depth in pipe = 16.66(In.)
 Flow top width inside pipe = 17.00(In.)
 Critical Depth = 18.19(In.)
 Pipe flow velocity = 8.36(Ft/s)
 Travel time through pipe = 0.72 min.
 Time of concentration (TC) = 8.83 min.

 Process from Point/Station 18.000 to Point/Station 18.000
 **** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 2
 Stream flow area = 5.170(Ac.)
 Runoff from this stream = 17.104(CFS)
 Time of concentration = 8.83 min.
 Rainfall intensity = 3.313(In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	16.196	8.76	3.327
2	17.104	8.83	3.313

Largest stream flow has longer time of concentration
 $Q_p = 17.104 + \text{sum of } Q_b \text{ Ia/Ib}$
 $16.196 * 0.996 = 16.126$
 $Q_p = 33.230$

Total of 2 main streams to confluence:
 Flow rates before confluence point:
 16.196 17.104
 Area of streams before confluence:
 5.860 5.170
 Results of confluence:
 Total flow rate = 33.230(CFS)
 Time of concentration = 8.830 min.
 Effective stream area after confluence = 11.030(Ac.)

 Process from Point/Station 18.000 to Point/Station 24.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 770.500(Ft.)
 Downstream point/station elevation = 770.000(Ft.)
 Pipe length = 70.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 33.230(CFS)
 Nearest computed pipe diameter = 30.00(In.)
 Calculated individual pipe flow = 33.230(CFS)
 Normal flow depth in pipe = 23.53(In.)
 Flow top width inside pipe = 24.68(In.)
 Critical Depth = 23.53(In.)
 Pipe flow velocity = 8.04(Ft/s)
 Travel time through pipe = 0.15 min.
 Time of concentration (TC) = 8.98 min.
 End of computations, total study area = 11.03 (Ac.)
 The following figures maybe used for a unit hydrograph study of the same area.
 Area averaged pervious area fraction(Ap) = 0.162
 Area averaged RI index number = 75.1

***** 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 [Mira Loma] area used.

10 year storm 10 minute intensity = 1.960(In/Hr)

10 year storm 60 minute intensity = 0.760(In/Hr)

100 year storm 10 minute intensity = 3.100(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 = 0.5300

Process from Point/Station 23.000 to Point/Station 25.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 580.000(Ft.)

Top (of initial area) elevation = 779.500(Ft.)

Bottom (of initial area) elevation = 771.000(Ft.)

Difference in elevation = 8.500(Ft.)

Slope = 0.01466 s(percent)= 1.47

TC = k(0.300)*[(length^3)/(elevation change)]^0.2

Initial area time of concentration = 8.898 min.

Rainfall intensity = 3.300(In/Hr) for a 100.0 year storm

COMMERCIAL subarea type

Runoff Coefficient = 0.889

Decimal fraction soil group A = 0.000

Decimal fraction soil group B = 0.000

Decimal fraction soil group C = 0.000

Decimal fraction soil group D = 1.000

RI index for soil(AMC 2) = 75.00

Pervious area fraction = 0.100; Impervious fraction = 0.900

Initial subarea runoff = 1.467(CFS)

Total initial stream area = 0.500(Ac.)

Pervious area fraction = 0.100

End of computations, total study area = 0.50 (Ac.)

The following figures may

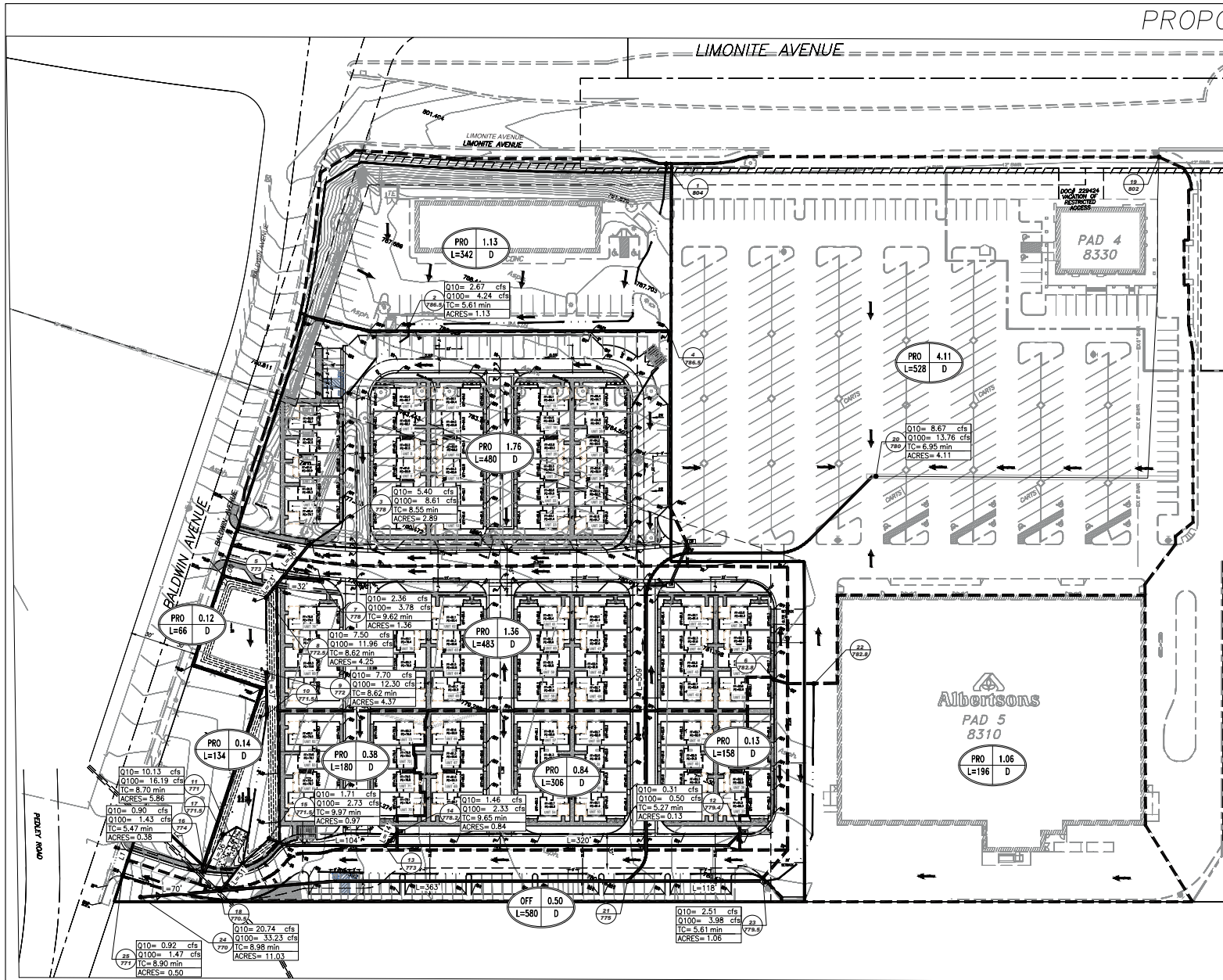
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100

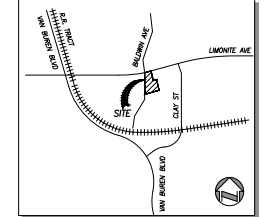
Area averaged RI index number = 75.0

PROPOSED HYDROLOGY MAP

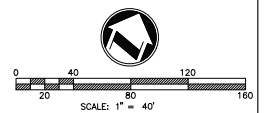
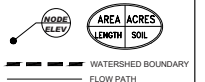
TRACT 39105- FIRESTONE



THOMAS BRO. GUIDE PG. 684 F-5.



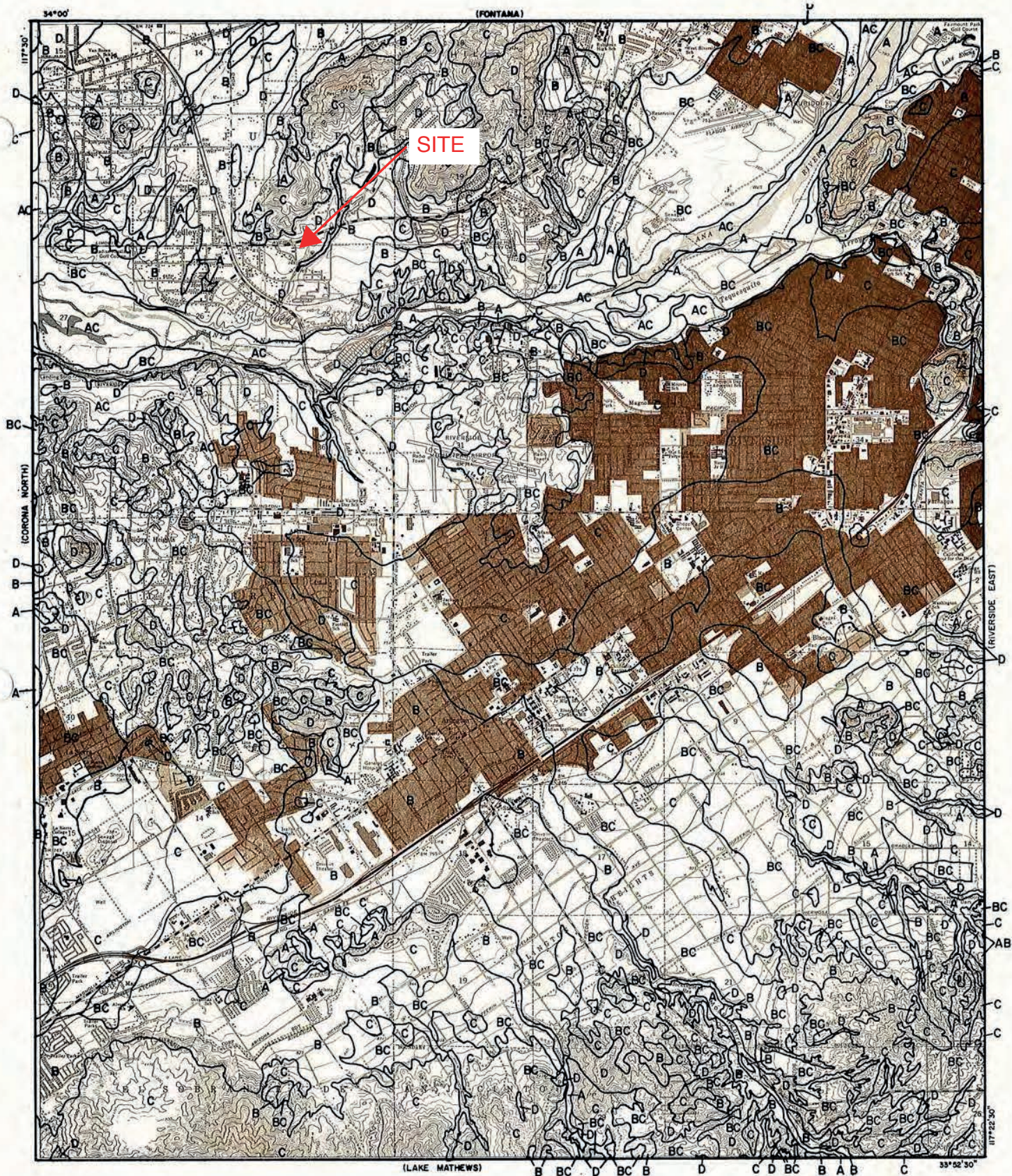
LEGEND



PROPOSED HYDROLOGY MAP
PREPARED BY
adkan ENGINEERS
Civil Engineering • Surveying • Planning
6979 Airport Drive, Riverside, CA 92504
Tel: (951) 688-0241 • Fax: (951) 688-0299

Section 3

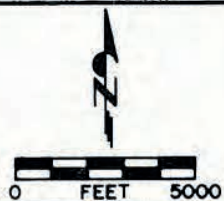
Riverside County Plates



LEGEND

- SOILS GROUP BOUNDARY
- A SOILS GROUP DESIGNATION

RCFC&WCD
HYDROLOGY MANUAL



HYDROLOGIC SOILS GROUP MAP FOR

"D"
Type

RIVERSIDE—WEST

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
<u>NATURAL COVERS -</u>					
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
<u>URBAN COVERS -</u>					
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
<u>AGRICULTURAL COVERS -</u>					
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. ($\frac{1}{2}$ 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**





