

**PRELIMINARY HYDROLOGY REPORT
FOR**

**TTM 37858
Moreno Valley, CA**

Prepared for:

**RC Hobbs Companies
1428 E. Chapman Avenue
Orange, CA 92866**

Initial Report: April 15, 2020

Prepared by:


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Preliminary Drainage Report

Wednesday, April 15, 2020

INTRODUCTION

The following report and calculations were prepared to analyze the 2, 10 & 100-year storm runoff from the development of the TTM 37858 at the northeast corner of Bradshaw Circle and Cactus Avenue in the City of Moreno Valley, Ca. Two infiltration basins are proposed for both mitigation of increased runoff from the site and for onsite BMPs for treatment of site runoff.

SITE BACKGROUND

The proposed project is located on the north side of Cactus Avenue with Bradshaw Circle on the west side of the property. The property is vacant and undeveloped and slopes from east to west.

There is a large undeveloped parcel adjacent to the property on the east property line that drains to swale along the east property line and conveys that offsite drainage to Cactus Avenue at the southeast corner of the property. There are single family residential properties immediately adjacent to the site along the north property line.

The soil type for the area is Type B per Plate C-1.17 “Hydrologic Soils Group Map for Sunnymead” from the Riverside County Hydrology Manual.

METHODOLOGY

Subareas were determined based on the proposed grading of the site. A link-node model was created for each subarea, with flow path length and elevations shown for the upstream and downstream nodes for the subarea. Peak flowrates were determined for each subarea using the CivilDesign Corporation “RIV” rational method hydrology software. The results of those calculations are shown on the site hydrology map included with this report. Separate maps for the existing and developed condition are included with this report.

ANALYSES/DISCUSSION

Rational method hydrology calculations have been prepared for 2, 10 & 100-year existing and proposed condition for the project site. In the existing condition site drainage sheet flows across the property to the west towards Bradshaw Circle. There is a high point at the knuckle of Bradshaw Circle with a portion of the site drainage (Area 1) flowing southerly to Cactus Avenue where it is collected by a series of catch basins along the Cactus Avenue and placed into an offsite storm drain in the existing condition. Area 2 flows go offsite along Bradshaw Circle to the west and thence out to Cactus Avenue where the flows are collected by a series of catch basins along Cactus Avenue.

In the developed condition, the site has been designed to maintain the drainage area flow split with flows being routed through two onsite water quality infiltration basins. The infiltration basins will be located in the proposed landscape area onsite adjacent to Bradshaw Circle street right-of-way and will discharge to Bradshaw Circle.

The drainage areas and peak 2, 10 & 100-year discharges are summarized below:

Rational Method Calculations

Existing Condition

Description	Area (Ac.)	2-year discharge (cfs)	10-year discharge (cfs)	100-year discharge (cfs)	Tc min.
Area 1	2.93	1.62	3.48	5.90	15.27
Area 2	2.01	1.18	2.51	4.24	14.00

Proposed Condition

Description	Area (Ac.)	2-year discharge (cfs)	10-year discharge (cfs)	100-year discharge (cfs)	Tc min.
Area 1	2.13	1.84	3.08	4.91	11.92
Area 2	0.77	0.84	1.42	2.23	7.66
Area 3	1.68	1.46	2.44	3.89	11.85
2 & 3	2.45	6.60	12.28	21.60	13.85

PROPOSED PROJECT BMP's

Based on soil infiltration test results we have selected an infiltration basin onsite as the method for treatment of onsite flows. The details of the proposed infiltration basin system are described in detail in the Preliminary Water Quality Management Plan prepared for this project.

CONCLUSION

Based on the calculations and proposed improvements, onsite flows can be conveyed to suitable points of disposal, and the proposed site development will not impact offsite properties.

Appendix A
Existing Condition Rational Method Calculations

2-year
10-year
100-year

ttm37858ex2a

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 04/15/20

File:ttm37858ex2a.out

TTM 37858 EXISTING CONDITION
2-year flow rates - Area 1
RMB

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

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

Program License Serial Number 6288

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

Storm event (year) = 2.00 Antecedent Moisture Condition = 1

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 = 2.0

Calculated rainfall intensity data:

1 hour intensity = 0.554(In/Hr)

Slope of intensity duration curve = 0.5000

++++
Process from Point/Station 100.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 604.000(Ft.)
Top (of initial area) elevation = 67.400(Ft.)
Bottom (of initial area) elevation = 56.300(Ft.)
Difference in elevation = 11.100(Ft.)
Slope = 0.01838 s(percent)= 1.84
TC = $k(0.530)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$
Initial area time of concentration = 15.270 min.
Rainfall intensity = 1.099(In/Hr) for a 2.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.503
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 1) = 60.60
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 1.620(CFS)
Total initial stream area = 2.930(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 2.93 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 1.000
Area averaged RI index number = 78.0

ttm37858ex2b

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0

Rational Hydrology Study

Date: 04/15/20

File:ttm37858ex2b.out

TTM 37858 EXISTING CONDITION
2-year flow rates Area 2
RMB

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

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

Program License Serial Number 6288

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

Storm event (year) = 2.00 Antecedent Moisture Condition = 1

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 = 2.0

Calculated rainfall intensity data:

1 hour intensity = 0.554(In/Hr)

Slope of intensity duration curve = 0.5000

++++
Process from Point/Station 200.000 to Point/Station 201.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 516.000(Ft.)
Top (of initial area) elevation = 69.200(Ft.)
Bottom (of initial area) elevation = 58.500(Ft.)
Difference in elevation = 10.700(Ft.)
Slope = 0.02074 s(percent)= 2.07
TC = $k(0.530)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$
Initial area time of concentration = 13.996 min.
Rainfall intensity = 1.148(In/Hr) for a 2.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.513
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 1) = 60.60
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 1.183(CFS)
Total initial stream area = 2.010(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 2.01 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 1.000
Area averaged RI index number = 78.0

ttm37858ex10a

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 04/15/20

File:ttm37858ex10a.out

TTM 37858 EXISTING CONDITION
10-YEAR FLOW RATES - AREA 1
RMB

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

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

Program License Serial Number 6288

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 100.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 604.000(Ft.)
Top (of initial area) elevation = 67.400(Ft.)
Bottom (of initial area) elevation = 56.300(Ft.)
Difference in elevation = 11.100(Ft.)
Slope = 0.01838 s(percent)= 1.84
TC = $k(0.530)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$
Initial area time of concentration = 15.270 min.
Rainfall intensity = 1.625(In/Hr) for a 10.0 year storm
UNDEVELOPED (poor cover) subarea
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) = 78.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 3.481(CFS)
Total initial stream area = 2.930(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 2.93 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 1.000
Area averaged RI index number = 78.0

ttm37858ex10b

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 04/15/20

File:ttm37858ex10b.out

TTM 37858 EXISTING CONDITION
10-YEAR FLOW RATES - AREA 2
RMB

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

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

Program License Serial Number 6288

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 200.000 to Point/Station 201.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 516.000(Ft.)
Top (of initial area) elevation = 69.200(Ft.)
Bottom (of initial area) elevation = 58.500(Ft.)
Difference in elevation = 10.700(Ft.)
Slope = 0.02074 s(percent)= 2.07
TC = $k(0.530)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$
Initial area time of concentration = 13.996 min.
Rainfall intensity = 1.698(In/Hr) for a 10.0 year storm
UNDEVELOPED (poor cover) subarea
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) = 78.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 2.514(CFS)
Total initial stream area = 2.010(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 2.01 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 1.000
Area averaged RI index number = 78.0

ttm37858ex100a

Riverside County Rational Hydrology Program

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Rational Hydrology Study Date: 04/15/20

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TTM 37858 EXISTING CONDITON
100-YEAR FLOW RATES - AREA 1
RMB

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

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

Program License Serial Number 6288

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

Storm event (year) = 100.00 Antecedent Moisture Condition = 3

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 100.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 604.000(Ft.)
Top (of initial area) elevation = 67.400(Ft.)
Bottom (of initial area) elevation = 56.300(Ft.)
Difference in elevation = 11.100(Ft.)
Slope = 0.01838 s(percent)= 1.84
TC = $k(0.530)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$
Initial area time of concentration = 15.270 min.
Rainfall intensity = 2.379(In/Hr) for a 100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.846
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 3) = 89.80
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 5.897(CFS)
Total initial stream area = 2.930(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 2.93 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 1.000
Area averaged RI index number = 78.0

ttm37858ex100b

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0

Rational Hydrology Study

Date: 04/15/20

File:ttm37858ex100b.out

TTM 37858 EXISTING CONDITON
100-YEAR FLOW RATES - AREA 2
RMB

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

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

Program License Serial Number 6288

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

Storm event (year) = 100.00 Antecedent Moisture Condition = 3

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 200.000 to Point/Station 201.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 516.000(Ft.)
Top (of initial area) elevation = 69.200(Ft.)
Bottom (of initial area) elevation = 58.500(Ft.)
Difference in elevation = 10.700(Ft.)
Slope = 0.02074 s(percent)= 2.07
TC = $k(0.530)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$
Initial area time of concentration = 13.996 min.
Rainfall intensity = 2.485(In/Hr) for a 100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.848
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 3) = 89.80
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 4.236(CFS)
Total initial stream area = 2.010(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 2.01 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 1.000
Area averaged RI index number = 78.0

Appendix B
Proposed Condition Rational Method Calculations

2-year
10-year
100-year

TTM37858dev2a

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 03/28/20

File:TTM37858dev2a.out

TTM 37858 - Drainage Area A
Developed Condition - 2 year flow rates
RMB

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

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

Program License Serial Number 6288

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

Storm event (year) = 2.00 Antecedent Moisture Condition = 1

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 = 2.0
Calculated rainfall intensity data:
1 hour intensity = 0.554(In/Hr)
Slope of intensity duration curve = 0.5000

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

Initial area flow distance = 636.000(Ft.)
Top (of initial area) elevation = 64.500(Ft.)
Bottom (of initial area) elevation = 57.100(Ft.)
Difference in elevation = 7.400(Ft.)
Slope = 0.01164 s(percent)= 1.16
TC = $k(0.370)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$
Initial area time of concentration = 11.924 min.
Rainfall intensity = 1.244(In/Hr) for a 2.0 year storm
CONDOMINIUM subarea type
Runoff Coefficient = 0.693
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 1) = 36.00
Pervious area fraction = 0.350; Impervious fraction = 0.650
Initial subarea runoff = 1.840(CFS)
Total initial stream area = 2.134(Ac.)
Pervious area fraction = 0.350

+++++
Process from Point/Station 102.000 to Point/Station 103.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 53.500(Ft.)
Downstream point/station elevation = 53.000(Ft.)
Pipe length = 9.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.840(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 1.840(CFS)
Normal flow depth in pipe = 3.32(In.)
Flow top width inside pipe = 13.97(In.)
Critical Depth = 6.12(In.)
Pipe flow velocity = 8.21(Ft/s)
Travel time through pipe = 0.02 min.
Time of concentration (TC) = 11.94 min.
End of computations, total study area = 2.13 (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 = 56.0

TTM37858dev2b

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0

Rational Hydrology Study Date: 03/28/20

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TTM 37858 - Drainage Area B
Developed Condition - 2 year flow rates
RMB

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

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

Program License Serial Number 6288

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

Storm event (year) = 2.00 Antecedent Moisture Condition = 1

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 = 2.0

Calculated rainfall intensity data:

1 hour intensity = 0.554(In/Hr)

Slope of intensity duration curve = 0.5000

++++
Process from Point/Station 201.000 to Point/Station 202.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 250.000(Ft.)
Top (of initial area) elevation = 62.900(Ft.)
Bottom (of initial area) elevation = 58.800(Ft.)
Difference in elevation = 4.100(Ft.)
Slope = 0.01640 s(percent)= 1.64
TC = $k(0.370)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$
Initial area time of concentration = 7.663 min.
Rainfall intensity = 1.551(In/Hr) for a 2.0 year storm
CONDOMINIUM subarea type
Runoff Coefficient = 0.710
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 1) = 36.00
Pervious area fraction = 0.350; Impervious fraction = 0.650
Initial subarea runoff = 0.848(CFS)
Total initial stream area = 0.770(Ac.)
Pervious area fraction = 0.350

++++
Process from Point/Station 202.000 to Point/Station 203.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 55.800(Ft.)
Downstream point/station elevation = 55.000(Ft.)
Pipe length = 67.50(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 0.848(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 0.848(CFS)
Normal flow depth in pipe = 3.32(In.)
Flow top width inside pipe = 13.96(In.)
Critical Depth = 4.11(In.)
Pipe flow velocity = 3.79(Ft/s)
Travel time through pipe = 0.30 min.
Time of concentration (TC) = 7.96 min.

++++
Process from Point/Station 202.000 to Point/Station 203.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area = 0.770(Ac.)
Runoff from this stream = 0.848(CFS)

TTM37858dev2b

Time of concentration = 7.96 min.
Rainfall intensity = 1.522(In/Hr)
Program is now starting with Main Stream No. 2

++++
Process from Point/Station 101.000 to Point/Station 302.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 580.000(Ft.)
Top (of initial area) elevation = 64.500(Ft.)
Bottom (of initial area) elevation = 58.700(Ft.)
Difference in elevation = 5.800(Ft.)
Slope = 0.01000 s(percent)= 1.00
TC = $k(0.370)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$
Initial area time of concentration = 11.846 min.
Rainfall intensity = 1.248(In/Hr) for a 2.0 year storm
CONDOMINIUM subarea type
Runoff Coefficient = 0.694
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 1) = 36.00
Pervious area fraction = 0.350; Impervious fraction = 0.650
Initial subarea runoff = 1.458(CFS)
Total initial stream area = 1.685(Ac.)
Pervious area fraction = 0.350

++++
Process from Point/Station 302.000 to Point/Station 303.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 55.700(Ft.)
Downstream point/station elevation = 55.000(Ft.)
Pipe length = 43.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.458(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 1.458(CFS)
Normal flow depth in pipe = 4.01(In.)
Flow top width inside pipe = 14.98(In.)
Critical Depth = 5.43(In.)
Pipe flow velocity = 4.97(Ft/s)
Travel time through pipe = 0.14 min.
Time of concentration (TC) = 11.99 min.

+++++
 Process from Point/Station 302.000 to Point/Station 303.000
 **** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 2
 Stream flow area = 1.685(Ac.)
 Runoff from this stream = 1.458(CFS)
 Time of concentration = 11.99 min.
 Rainfall intensity = 1.240(In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	0.848	7.96	1.522
2	1.458	11.99	1.240

Largest stream flow has longer time of concentration

$$Q_p = 1.458 + \text{sum of } Q_b \cdot \frac{I_a}{I_b}$$

$$Q_p = 0.848 * 0.815 = 0.691$$

$$Q_p = 2.149$$

Total of 2 main streams to confluence:

Flow rates before confluence point:
 0.848 1.458
 Area of streams before confluence:
 0.770 1.685

Results of confluence:

Total flow rate = 2.149(CFS)
 Time of concentration = 11.990 min.
 Effective stream area after confluence = 2.455(Ac.)
 End of computations, total study area = 2.46 (Ac.)

The following figures may be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 0.350
 Area averaged RI index number = 56.0

TTM37893dev10

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 03/28/20

File:TTM37893dev10.out

TTM 37893 - Mission & Agate
Developed Condition - 10 year flow rates
Including offsite area - mini warehouse storage
RMB

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

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

Program License Serial Number 6288

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 100.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****

TTM37893dev10

Initial area flow distance = 928.000(Ft.)
 Top (of initial area) elevation = 102.700(Ft.)
 Bottom (of initial area) elevation = 85.000(Ft.)
 Difference in elevation = 17.700(Ft.)
 Slope = 0.01907 s(percent)= 1.91
 $TC = k(0.390)*[(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 13.243 min.
 Rainfall intensity = 1.693(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 = 2.920(CFS)
 Total initial stream area = 2.370(Ac.)
 Pervious area fraction = 0.500

++++
 Process from Point/Station 101.500 to Point/Station 201.500
 **** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 79.500(Ft.)
 Downstream point/station elevation = 79.200(Ft.)
 Pipe length = 36.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 2.920(CFS)
 Given pipe size = 18.00(In.)
 Calculated individual pipe flow = 2.920(CFS)
 Normal flow depth in pipe = 6.81(In.)
 Flow top width inside pipe = 17.46(In.)
 Critical Depth = 7.79(In.)
 Pipe flow velocity = 4.76(Ft/s)
 Travel time through pipe = 0.13 min.
 Time of concentration (TC) = 13.37 min.

++++
 Process from Point/Station 101.500 to Point/Station 201.500
 **** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
 In Main Stream number: 1
 Stream flow area = 2.370(Ac.)
 Runoff from this stream = 2.920(CFS)
 Time of concentration = 13.37 min.

TTM37893dev10

Rainfall intensity = 1.684(In/Hr)
Program is now starting with Main Stream No. 2

++++
Process from Point/Station 200.000 to Point/Station 201.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 957.000(Ft.)
Top (of initial area) elevation = 103.000(Ft.)
Bottom (of initial area) elevation = 85.000(Ft.)
Difference in elevation = 18.000(Ft.)
Slope = 0.01881 s(percent)= 1.88
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 13.445 min.
Rainfall intensity = 1.679(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 = 3.565(CFS)
Total initial stream area = 2.920(Ac.)
Pervious area fraction = 0.500

++++
Process from Point/Station 201.000 to Point/Station 201.500
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 2
Stream flow area = 2.920(Ac.)
Runoff from this stream = 3.565(CFS)
Time of concentration = 13.44 min.
Rainfall intensity = 1.679(In/Hr)
Summary of stream data:

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

1	2.920	13.37	1.684
2	3.565	13.44	1.679

Largest stream flow has longer time of concentration

TTM37893dev10

$Q_p = 3.565 + \text{sum of}$
 $Q_b \quad I_a/I_b$
 $2.920 * 0.997 = 2.912$
 $Q_p = 6.477$

Total of 2 main streams to confluence:

Flow rates before confluence point:

2.920 3.565

Area of streams before confluence:

2.370 2.920

Results of confluence:

Total flow rate = 6.477(CFS)

Time of concentration = 13.445 min.

Effective stream area after confluence = 5.290(Ac.)

++++++
 Process from Point/Station 101.000 to Point/Station 201.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1

Stream flow area = 5.290(Ac.)

Runoff from this stream = 6.477(CFS)

Time of concentration = 13.44 min.

Rainfall intensity = 1.679(In/Hr)

++++++
 Process from Point/Station 300.000 to Point/Station 301.000
 **** INITIAL AREA EVALUATION ****

Initial area flow distance = 807.000(Ft.)

Top (of initial area) elevation = 113.300(Ft.)

Bottom (of initial area) elevation = 98.100(Ft.)

Difference in elevation = 15.200(Ft.)

Slope = 0.01884 s(percent)= 1.88

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

Initial area time of concentration = 9.658 min.

Rainfall intensity = 2.001(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

TTM37893dev10

Pervious area fraction = 0.100; Impervious fraction = 0.900
Initial subarea runoff = 6.660(CFS)
Total initial stream area = 3.830(Ac.)
Pervious area fraction = 0.100

++++
Process from Point/Station 301.000 to Point/Station 302.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 98.100(Ft.)
Downstream point/station elevation = 79.500(Ft.)
Pipe length = 957.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 6.660(CFS)
Given pipe size = 24.00(In.)
Calculated individual pipe flow = 6.660(CFS)
Normal flow depth in pipe = 7.49(In.)
Flow top width inside pipe = 22.24(In.)
Critical Depth = 10.97(In.)
Pipe flow velocity = 7.96(Ft/s)
Travel time through pipe = 2.00 min.
Time of concentration (TC) = 11.66 min.

++++
Process from Point/Station 302.000 to Point/Station 201.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 3.830(Ac.)
Runoff from this stream = 6.660(CFS)
Time of concentration = 11.66 min.
Rainfall intensity = 1.811(In/Hr)
Summary of stream data:

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

1	6.477	13.44	1.679
2	6.660	11.66	1.811

Largest stream flow has longer or shorter time of concentration
Qp = 6.660 + sum of
Qa Tb/Ta
6.477 * 0.867 = 5.618
Qp = 12.278

Total of 2 streams to confluence:

TTM37893dev10

Flow rates before confluence point:

6.477 6.660

Area of streams before confluence:

5.290 3.830

Results of confluence:

Total flow rate = 12.278(CFS)

Time of concentration = 11.661 min.

Effective stream area after confluence = 9.120(Ac.)

End of computations, total study area = 9.12 (Ac.)

The following figures may

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

Area averaged pervious area fraction(A_p) = 0.332

Area averaged RI index number = 56.0

TTM37858dev10B

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0

Rational Hydrology Study

Date: 02/16/20

File:TTM37858dev10B.out

TTM 37858 - Drainage Area B
Developed Condition - 10 year flow rates
RMB

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

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

Program License Serial Number 6288

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 201.000 to Point/Station 202.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 250.000(Ft.)
Top (of initial area) elevation = 62.900(Ft.)
Bottom (of initial area) elevation = 58.800(Ft.)
Difference in elevation = 4.100(Ft.)
Slope = 0.01640 s(percent)= 1.64
TC = $k(0.370)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$
Initial area time of concentration = 7.663 min.
Rainfall intensity = 2.294(In/Hr) for a 10.0 year storm
CONDOMINIUM subarea type
Runoff Coefficient = 0.801
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 = 0.350; Impervious fraction = 0.650
Initial subarea runoff = 1.416(CFS)
Total initial stream area = 0.770(Ac.)
Pervious area fraction = 0.350

++++
Process from Point/Station 202.000 to Point/Station 203.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 55.800(Ft.)
Downstream point/station elevation = 55.000(Ft.)
Pipe length = 67.50(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.416(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 1.416(CFS)
Normal flow depth in pipe = 4.28(In.)
Flow top width inside pipe = 15.32(In.)
Critical Depth = 5.34(In.)
Pipe flow velocity = 4.40(Ft/s)
Travel time through pipe = 0.26 min.
Time of concentration (TC) = 7.92 min.

++++
Process from Point/Station 202.000 to Point/Station 203.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area = 0.770(Ac.)
Runoff from this stream = 1.416(CFS)

TTM37858dev10B

Time of concentration = 7.92 min.
Rainfall intensity = 2.257(In/Hr)
Program is now starting with Main Stream No. 2

+++++
Process from Point/Station 101.000 to Point/Station 302.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 580.000(Ft.)
Top (of initial area) elevation = 64.500(Ft.)
Bottom (of initial area) elevation = 58.700(Ft.)
Difference in elevation = 5.800(Ft.)
Slope = 0.01000 s(percent)= 1.00
TC = $k(0.370)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$
Initial area time of concentration = 11.846 min.
Rainfall intensity = 1.845(In/Hr) for a 10.0 year storm
CONDOMINIUM subarea type
Runoff Coefficient = 0.786
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 = 0.350; Impervious fraction = 0.650
Initial subarea runoff = 2.444(CFS)
Total initial stream area = 1.685(Ac.)
Pervious area fraction = 0.350

+++++
Process from Point/Station 302.000 to Point/Station 303.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 55.700(Ft.)
Downstream point/station elevation = 55.000(Ft.)
Pipe length = 43.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 2.444(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 2.444(CFS)
Normal flow depth in pipe = 5.20(In.)
Flow top width inside pipe = 16.32(In.)
Critical Depth = 7.10(In.)
Pipe flow velocity = 5.77(Ft/s)
Travel time through pipe = 0.12 min.
Time of concentration (TC) = 11.97 min.

Process from Point/Station 302.000 to Point/Station 303.000
 ***** CONFLUENCE OF MAIN STREAMS *****

The following data inside Main Stream is listed:

In Main Stream number: 2
 Stream flow area = 1.685(Ac.)
 Runoff from this stream = 2.444(CFS)
 Time of concentration = 11.97 min.
 Rainfall intensity = 1.836(In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	1.416	7.92	2.257
2	2.444	11.97	1.836

Largest stream flow has longer time of concentration

$$Q_p = 2.444 + \text{sum of } Q_b \cdot \frac{I_a}{I_b}$$

$$Q_p = 1.416 * 0.813 = 1.151$$

$$Q_p = 3.595$$

Total of 2 main streams to confluence:

Flow rates before confluence point:
 1.416 2.444
 Area of streams before confluence:
 0.770 1.685

Results of confluence:

Total flow rate = 3.595(CFS)
 Time of concentration = 11.970 min.
 Effective stream area after confluence = 2.455(Ac.)
 End of computations, total study area = 2.46 (Ac.)

The following figures may be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 0.350
 Area averaged RI index number = 56.0

ttm37858dev100

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0

Rational Hydrology Study Date: 02/16/20

File:ttm37858dev100.out

TTM 37858 Drainage Area A
Developed Condition - 100-year flow rates
RMB

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

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

Program License Serial Number 6288

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

Storm event (year) = 100.00 Antecedent Moisture Condition = 3

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 101.000 to Point/Station 102.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 636.000(Ft.)
Top (of initial area) elevation = 64.500(Ft.)
Bottom (of initial area) elevation = 57.100(Ft.)
Difference in elevation = 7.400(Ft.)
Slope = 0.01164 s(percent)= 1.16
TC = $k(0.370)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$
Initial area time of concentration = 11.924 min.
Rainfall intensity = 2.692(In/Hr) for a 100.0 year storm
CONDOMINIUM subarea type
Runoff Coefficient = 0.855
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 3) = 74.80
Pervious area fraction = 0.350; Impervious fraction = 0.650
Initial subarea runoff = 4.911(CFS)
Total initial stream area = 2.134(Ac.)
Pervious area fraction = 0.350

++++
Process from Point/Station 102.000 to Point/Station 103.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 53.500(Ft.)
Downstream point/station elevation = 53.000(Ft.)
Pipe length = 9.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 4.911(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 4.911(CFS)
Normal flow depth in pipe = 5.44(In.)
Flow top width inside pipe = 16.53(In.)
Critical Depth = 10.22(In.)
Pipe flow velocity = 10.92(Ft/s)
Travel time through pipe = 0.01 min.
Time of concentration (TC) = 11.94 min.
End of computations, total study area = 2.13 (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 = 56.0

TTM37858dev100B

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0

Rational Hydrology Study

Date: 02/16/20

File:TTM37858dev100B.out

TTM 37858 Drainage Areas B & C
Developed Condition - 100-year flow rates
RMB

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

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

Program License Serial Number 6288

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

Storm event (year) = 100.00 Antecedent Moisture Condition = 3

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 201.000 to Point/Station 202.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 250.000(Ft.)
 Top (of initial area) elevation = 62.900(Ft.)
 Bottom (of initial area) elevation = 58.800(Ft.)
 Difference in elevation = 4.100(Ft.)
 Slope = 0.01640 s(percent)= 1.64
 $TC = k(0.370)*[(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 7.663 min.
 Rainfall intensity = 3.358(In/Hr) for a 100.0 year storm
 CONDOMINIUM subarea type
 Runoff Coefficient = 0.863
 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 3) = 74.80
 Pervious area fraction = 0.350; Impervious fraction = 0.650
 Initial subarea runoff = 2.231(CFS)
 Total initial stream area = 0.770(Ac.)
 Pervious area fraction = 0.350

++++
 Process from Point/Station 202.000 to Point/Station 203.000
 **** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 55.800(Ft.)
 Downstream point/station elevation = 55.000(Ft.)
 Pipe length = 67.50(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 2.231(CFS)
 Given pipe size = 18.00(In.)
 Calculated individual pipe flow = 2.231(CFS)
 Normal flow depth in pipe = 5.39(In.)
 Flow top width inside pipe = 16.49(In.)
 Critical Depth = 6.76(In.)
 Pipe flow velocity = 5.02(Ft/s)
 Travel time through pipe = 0.22 min.
 Time of concentration (TC) = 7.89 min.

++++
 Process from Point/Station 202.000 to Point/Station 203.000
 **** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
 In Main Stream number: 1
 Stream flow area = 0.770(Ac.)
 Runoff from this stream = 2.231(CFS)

TTM37858dev100B

Time of concentration = 7.89 min.
Rainfall intensity = 3.310(In/Hr)
Program is now starting with Main Stream No. 2

++++
Process from Point/Station 101.000 to Point/Station 302.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 580.000(Ft.)
Top (of initial area) elevation = 64.500(Ft.)
Bottom (of initial area) elevation = 58.700(Ft.)
Difference in elevation = 5.800(Ft.)
Slope = 0.01000 s(percent)= 1.00
TC = $k(0.370)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 11.846 min.
Rainfall intensity = 2.701(In/Hr) for a 100.0 year storm
CONDOMINIUM subarea type
Runoff Coefficient = 0.855
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 3) = 74.80
Pervious area fraction = 0.350; Impervious fraction = 0.650
Initial subarea runoff = 3.891(CFS)
Total initial stream area = 1.685(Ac.)
Pervious area fraction = 0.350

++++
Process from Point/Station 302.000 to Point/Station 303.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****

Upstream point/station elevation = 55.700(Ft.)
Downstream point/station elevation = 55.000(Ft.)
Pipe length = 43.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 3.891(CFS)
Given pipe size = 18.00(In.)
Calculated individual pipe flow = 3.891(CFS)
Normal flow depth in pipe = 6.64(In.)
Flow top width inside pipe = 17.37(In.)
Critical Depth = 9.04(In.)
Pipe flow velocity = 6.57(Ft/s)
Travel time through pipe = 0.11 min.
Time of concentration (TC) = 11.96 min.

Process from Point/Station 302.000 to Point/Station 303.000
 **** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 2
 Stream flow area = 1.685(Ac.)
 Runoff from this stream = 3.891(CFS)
 Time of concentration = 11.96 min.
 Rainfall intensity = 2.688(In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	2.231	7.89	3.310
2	3.891	11.96	2.688

Largest stream flow has longer time of concentration

$$Q_p = 3.891 + \text{sum of } Q_b \cdot \frac{I_a}{I_b}$$

$$Q_p = 2.231 * 0.812 = 1.812$$

$$Q_p = 5.703$$

Total of 2 main streams to confluence:

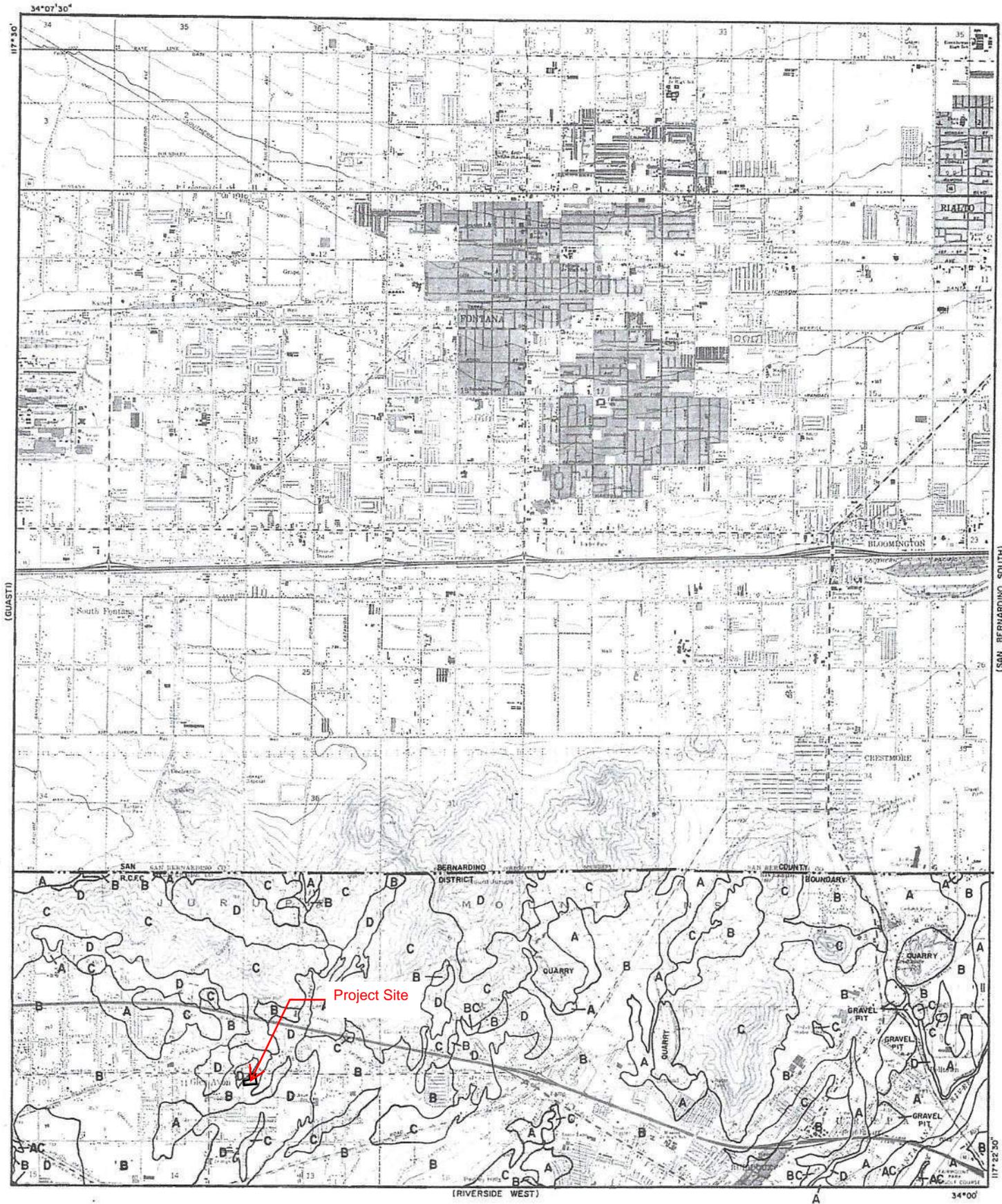
Flow rates before confluence point:
 2.231 3.891
 Area of streams before confluence:
 0.770 1.685

Results of confluence:

Total flow rate = 5.703(CFS)
 Time of concentration = 11.955 min.
 Effective stream area after confluence = 2.455(Ac.)
 End of computations, total study area = 2.46 (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 = 56.0



LEGEND

- SOILS GROUP BOUNDARY
- A SOILS GROUP DESIGNATION

RCFC & WCD
 HYDROLOGY MANUAL

0 FEET 5000

HYDROLOGIC SOILS GROUP MAP
FOR
FONTANA

Appendix C
Reference Materials

Soils Map

Hydrology Maps

TENTATIVE TRACT MAP NO. 37893

LEGAL DESCRIPTION:

THE LAND IS SITUATED IN THE COUNTY OF RIVERSIDE, CITY OF JURUPA VALLEY, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:

PARCELS 2 AND 3 OF PARCEL MAP 21212, IN THE CITY OF JURUPA VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AS SHOWN BY MAP ON FILE IN BOOK 153, PAGES 34 & 35, OF PARCEL MAPS, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA.

APNS: 171-101-072-3 & 171-101-073-7

DEVELOPER

RC HOBBS COMPANIES, INC.
1428 E. CHAPMAN AVENUE
ORANGE, CA 92866
ATTN: ROGER HOBBS
714-633-8100

HYDROLOGY DATA

100 YEAR - 1 YEAR RAINFALL INTENSITY = 1.20 INCH

10 YEAR - 1 HOUR RAINFALL INTENSITY = 0.82 INCH

SLOPE USED FOR RAINFALL INTENSITY CURVE = 0.500

AMC I USED FOR 2-YEAR STORM RUNOFF CALCULATIONS
AMC II USED FOR 10-YEAR STORM RUNOFF CALCULATIONS
AMC III USED FOR 100-YEAR STORM RUNOFF CALCULATIONS

ASSUMED HYDROLOGIC LAND USE: UNDEVELOPED

SOIL TYPE B

HYDROLOGY LEGEND

Q100 = 100-YEAR FLOW RATE

Q10 = 10-YEAR FLOW RATE

Q2 = 2-YEAR FLOW RATE

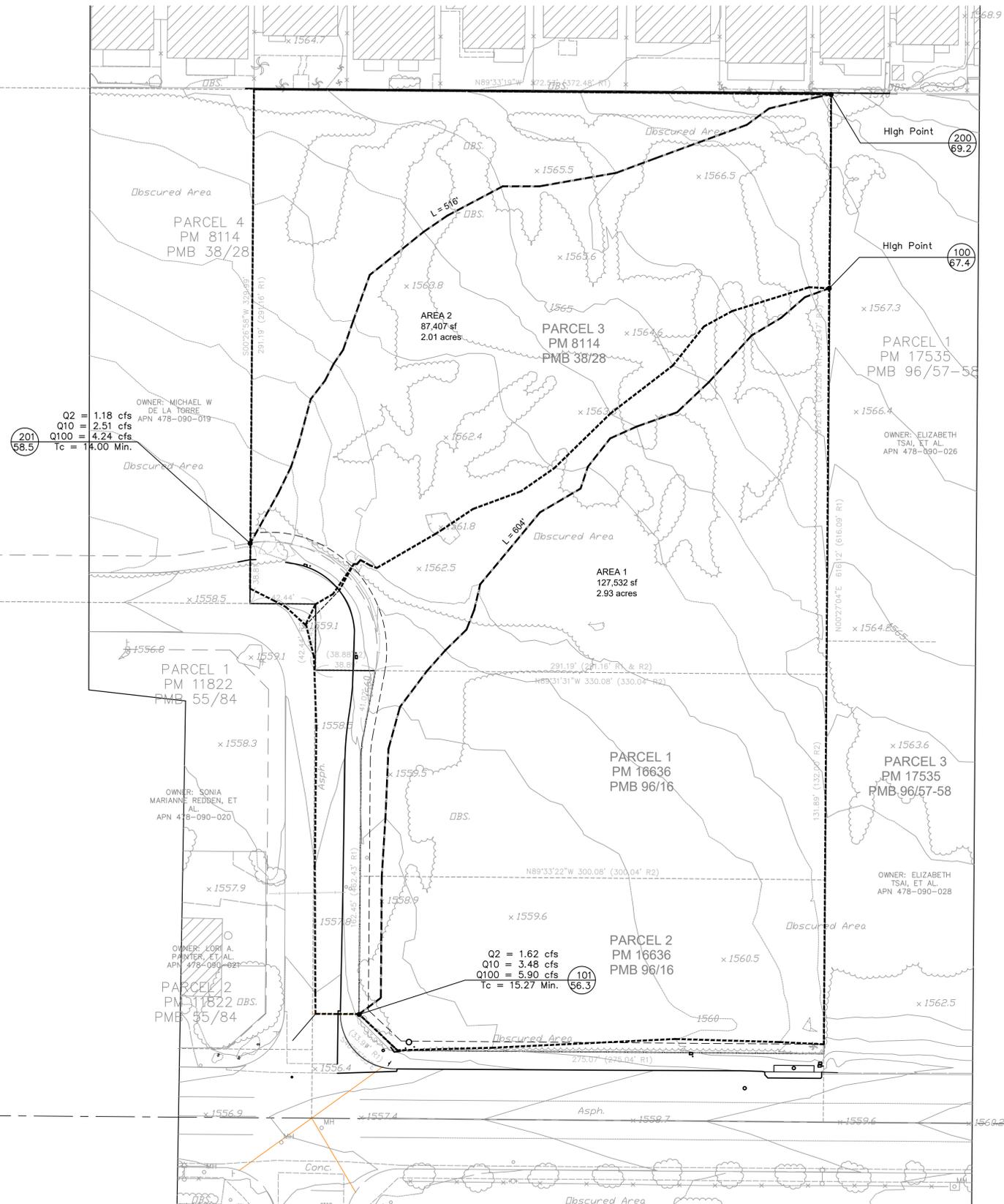
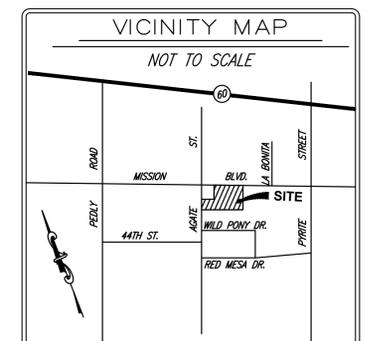
Tc = TIME OF CONCENTRATION - MINUTES

L = FLOW PATH LENGTH IN FEET

101
54.8

NODE NUMBER
ELEVATION

--- DRAINAGE AREA BOUNDARY
--- DRAINAGE FLOW PATH

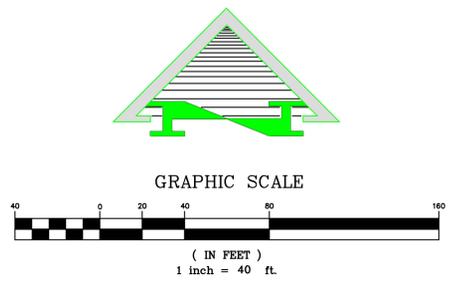


201
56.5

Q2 = 1.18 cfs
Q10 = 2.51 cfs
Q100 = 4.24 cfs
Tc = 14.00 Min.

101
56.3

Q2 = 1.62 cfs
Q10 = 3.48 cfs
Q100 = 5.90 cfs
Tc = 15.27 Min.



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Date _____ Robert M. Beers R.C.E. 39405 Expires 12-31-21

MARK	REVISIONS	APPR.	DATE

PREPARED FOR:
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TTM 37893
Existing Condition Hydrology Map
City of Jurupa Valley
CALIFORNIA

DATE March 26, 2020
JOB NO. _____
DRAWN BY R.A.H.
CHECKED BY R.M.B.
SHEET 1 OF 1

