PRELIMINARY DRAINAGE STUDY FOR MURRIETA APARTMENTS

DP-2018-1761, ZC-2018-1763, GP-2018-1762

CITY OF MURRIETA
CALIFORNIA

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DATE PREPARED:
MARCH 11, 2019
REVISED:
AUGUST 21, 2019
OCTOBER 11, 2019

This report has been prepared by or under the direction of the following registered civil engineer who attests to the technical information contained herein. The registered civil engineer has also judged the qualifications of any technical specialists providing engineering data upon which recommendations, conclusions, and decisions are based.

10/11/2019

Joseph L. Castaneda RCE 59835 Registered Civil Engineer	Date	Seal

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I. INTRODUCTION

APNs 913-210-005, 006, 007, 913-010-013, 033, 034, 035 and portions of 913-210.032 are in the process of entitlement review for the development of proposed apartments. The following ***project description*** has been developed by the project team:

"The project is a General Plan Amendment, Zone Change and Development Plan to change the existing Commercial General Plan land use, Neighborhood Commercial zoning to Multifamily Residential General Plan land use, Multi-Family 3 zoning and to develop multi-family housing totaling 234 units on a 8.37 acre site. The project site is located at the intersection of Delhaven Avenue and Date Street the south east corner and is comprised of Assessor Parcel Numbers (APN) 913-210-005, 006, 007, 010-013, 033, 034, 035 and portions of 913-210-032. The site is subject to the Commercial General Plan Land Use Designation and is Zoned Neighborhood Commercial. A General Plan and Zone Change Amendment is proposed. The site is undeveloped. Access would be provided by two private drives proposed to be located at Date Street and at Rising Hill Drive. Currently Earthwork being proposed would have an excavation depth of four feet below finish grade or two feet below the deepest footing, whichever is greater."

The Murrieta Apartment is a proposed high density residential project in the City of Murrieta, California. The site is bounded by Date Street to the north, detached medium density residential units to the south, commercial land use to the west and existing commercial development to the east, see Figure 1. The project area drains into storm drain infrastructure constructed by Assessment District 161. The existing drainage area currently drains into the Winchester Road Storm Drain system that was constructed as part of Assessment District 161 which is a regional storm drain maintained and operated by RCFC&WCD, see Excerpt A.

The purpose of this study is to determine the required storm drain improvements and infrastructure that will adequately convey the peak 100-year flows from the project site and treat the required water quality volume prior to discharging from the project site. The scope of work for this report includes:

- Determine the peak 100-year and 10-year flow rates for the post-project condition for the onsite and offsite areas using the Rational Method as outlined in the RCFC&WCD Hydrology Manual.
- Identify storm drain alignments to protect the project site and can adequately convey the peak tributary flow rates.
- Preparation of a hydrology and hydraulics report supporting the design, which consists of hydrological and analytical results and exhibits.

II. PROJECT SITE AND DRAINAGE OVERVIEW

The Murrieta Apartments (DP-2018-1761) is proposing a high density multi-family development in the City of Murrieta. The project is proposing 234 residential lots. The proposed project is proposing a subsurface water quality basin that will promote infiltration of the water quality runoff and will mitigate hydromodifications. All runoff generated by the project site will be collected and conveyed into the Winchester Road Storm Drain which has been designed to collect runoff from the project area.

The existing terrain currently slopes from a ridge point on the project and slopes downward in the northerly, southerly and easterly directions. The current runoff is a sheet flow condition that flows over terrain that is sparsely covered with natural vegetation. The natural terrain slopes from approximately 10% to a maximum of 50%. The existing terrain flows into the adjacent communities and properties and will eventually surface flow into the existing Winchester Road Storm Drain.

The Winchester Road Storm Drain is a 54-inch concrete pipe that extends along Winchester Road and ultimately terminates into the existing golf course north of Murrieta Hot Springs Road. The 54-inch storm drain will ultimately discharge flows into Tucalota Creek.

III. HYDROLOGY ANALYSIS

The RCFC&WCD Hydrology Manual (Reference 1) was used to develop the hydrological parameters for the rational method. The calculations were performed using the computer program developed by Civil Cadd/Civil Design.

The existing soil classification for the area consists of Soil “A” and Soil “C”, as shown in the soils map provided in Exhibit D. The soils information was obtained from the United States Department of Agriculture, Natural Resources Conservation Service (NRCS).

The following rainfall depths were obtained from RCFC&WCD Hydrology Manual which are included as Exhibit E.

Storm Event	1-hour (in)
2-Year	0.50
100-Year	1.20
Slope Intensity Curve	0.55

The rational method hydrology analyses utilized apartments as designated in the RCFC&WCD Hydrology Manual to represent the proposed development for the drainage areas within the project site. The apartment land use implements an impervious area of 80%.

The rational method hydrology was completed using three hydrology models for the pre-project condition and 1 model for the post project condition. The results of the pre-project hydrology analyses are as follows:

Table 1 - Pre-Project Flow Rates

Area	Acreage	100 Year Flow Rate (ft^3/s)	10 Year Flow Rate (ft^3/s)
A	4.23	12.59	8.01
B	1.62	4.65	2.86
C	1.93	5.73	3.68

The results of the post-project hydrology analyses are as follows:

Table 2 - Post-Project Flow Rates

Area	Acreage	100 Year Flow Rate (ft^3/s)	10 Year Flow Rate (ft^3/s)
A	7.29	15.55	9.96
B	0.42	0.43	0.23
C	0.70	1.78	1.11

The pre-project analyses modeled three watershed areas designated as Areas A, B, and C. Area A is tributary to the northerly portion of the project site, Area B is tributary to the south easterly portion of the project site, and Area C is tributary to Rising Hill Drive. The post-project condition utilized these same watershed designations to represent the areas tributary to those same areas.

Area C1 in the post-project condition utilized ¼ acre residential land use in the hydrology calculations since user defined land use is not permitted within the CivilD program for initial areas, therefore the closest representation of the land use must be selected. Since the area is composed of landscaped slopes and commercial streets, ¼ acre residential land use was chosen since it has an impervious percentage of 50%. Area C1 is approximately 50% streets and 50% landscaped slopes, resulting in approximately 50% impervious.

Based upon the hydrology analyses, it would appear that the project site is diverting area between the three watersheds, all areas are tributary to the existing Winchester Road Storm Drain. Additionally, the area that is receiving more area is Area A, which all onsite Area A is tributary to the subsurface basin, which will significantly reduce the 100-year flow rate with the incorporation of the subsurface system. Currently, flows from existing Area C discharge into Rising Hill Drive, and based upon Google Imagery, the flows are eroding the existing slope and causing sediment to be conveyed into the street. During the post-project condition, a large portion of these flows will be conveyed to the subsurface system, and the remaining sloped area tributary to Rising Hill Drive will be landscaped. Therefore, the project will be improving the current flooding condition.

During Final Engineering, detailed basin routing will be performed for the 100-year storm event for the subsurface system to demonstrate the actual reduction in flows.

IV. STORM DRAIN FACILITIES

The project site will construct subsurface storm drain to convey the peak 100-year flow rates emanating from the project site to a proposed subsurface basin that has been sized for to mitigate hydromodifications. The project will use a total of 3 catch basins and 2 grate inlets. The flow rate and the opening length to each catch basin are listed in Table 3 based on the post-project condition nodes.

Table 3 - Flow Rates to Proposed Catch Basins

Node	Catch Basin Number	100 Year Flow Rate (ft^3/s)	10 Year Flow Rate (ft^3/s)	Catch Basin Length (ft)
102	#1	4.7	3.0	4
104	#2	4.4	2.8	4
107	#3	8.8	5.7	7

The proposed catch basins are located in sump conditions. The proposed catch basins will be required to have the minimum openings shown on Table 3.

In addition to the catch basins, the project will implement the use of two grate inlets at the project entrance from Date Street. These grate inlets will maximize capturing flow rate before leaving the project site. Additionally, the inlets will be used to dewater the porous paver area that was identified in the WQMP. The porous paver area defined as DMA C, has been designed as source control area or self-retaining area that will allow 3 inches of maximum ponding in the porous paver reservoir.

The proposed project is proposing a total of 4 storm drain systems, as shown on Exhibit B, that are defined as follows:

Line A is a proposed 24-inch storm drain system that will convey flows from the subsurface basin to the existing Winchester Road Storm Drain. Additionally, the Line A system will include a connector pipe that will collect low flows from the modular wetlands and proposed catch basin on Date Street. The catch basin on Date Street has been provided to collect the flows from Area A5 that bypass the trench drain and discharge from the sloped area adjacent to Date Street. The minimum slope of Line A shall be 2%.

Line A1 is a storm drain system that collects flows from Area A2 at a sump location at the most easterly point of the project. The Line A1 system will also confluence with the Line A2 System. The flow rate for Line A1 will range from 4.4 ft^3/s to 8.5 ft^3/s. The Line A1 system downstream of the confluence point shall be a 24-inch storm drain

with a minimum slope of 0.5%. Upstream of the confluence point the storm drain will be an 18-inch storm drain.

Line A2 is a storm drain that collects flows from Area A1 at a sump location. The flows for the 100 year storm event are 4.7 ft^3/s. The Line A2 system from the confluence point to the proposed catch basin will be an 18-inch storm drain.

Line A3 is a storm drain that collects flows from Area A3 and A4 at a sump location. The flows for the 100 year storm event are 8.8 ft^3/s. The proposed storm drain will be a 24-inch storm drain.

V. CONCLUSIONS

The hydrology analyses evaluated the project site to determine the peak flow rates emanating from the project and the necessary drainage improvements required to flood protect the site. Based upon the results, the following can be concluded:

- The proposed subsurface basin and storm drain systems have been designed to adequately convey the peak 100-year flow rates emanating from the project.
- The proposed subsurface basins will adequately address water quality treatment and hydromodifications as discussed in the WQMP.

IV. Capacity of Existing Storm Drain in Old Date Street

Riverside County Flood Control and Water Conservation District currently owns and maintains a 54-inch diameter storm drain pipeline in Old Date Street. This facility (Assessment District No. 161 Winchester Road Storm Drain) currently collects storm runoff from the subject property and surrounding properties and conveys accumulated flows downstream to Tucalota Creek. Currently, this storm drain collects local flows from the subject site further downstream than is being proposed by the project design. In order to determine if moving the inflows to a point further upstream in the storm drain will have a detrimental affect, the following steps were taken:

1) Attempts were made to obtain copies of the hydrology report for the Winchester Road Storm Drain, however the report and associated computations could not be located.
2) The watershed upstream of Murrieta Hot Springs Road was then analyzed to determine the time of concentration, which was established as 32.2 minutes the intersection of Old Date Street and Del Haven Avenue. According to the storm drain plans, the accepted Q100 at that location is 166.4 cfs. The main purpose of this step was to model the time of concentration for the longest flow path in order to develop a time of concentration that could be used for the confluence analyses
3) Flows from the subject property and the adjacent 2.6 acres were confluenced with flows from the upper watershed using a time of concentration of 32.2 minutes (Node 6)
4) Flows from the two commercial developments on both sides of Old Date Street were then confluenced with the cumulative upstream runoff (Node 9).
5) Street flows from Old Date Street were confluence in at the end of the existing culdesac (Node 11)
6) Street flows from Winchester Road were confluence at the existing catch basin (Node 14)
7) Flows from the two existing commercial developments on Winchester Road were confluence at Nodes 16 and 18.
8) The cumulative Q100 at Node 18 was calculated to be 196 cfs …. vs 203.4 cfs shown on the storm drain plans, a difference of about 3 and a half percent.
9) Hydraulic grade line computations were performed using the newly computed runoff values and plotted on the storm drain plans
10) These HGL computations show that the storm drain is expected to function in an acceptable manner if flows from the subject site enter the storm drain at the proposed location.

Attachments:

A) Hydrology Computations
B) Hydraulic Computations
C) Regional Hydrology Map
D) Storm Drain Plans With HGL

A. HYDROLOGY COMPUTATIONS

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 10/02/19 File:APARTMENT.out

NODE 1 TO 2 TIME OF CONCENTRATION CALC ONLY

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

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

Program License Serial Number 6109

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

2 year, 1 hour precipitation = 0.500(In.)
100 year, 1 hour precipitation = 1.200(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.200(In/Hr)
Slope of intensity duration curve = 0.5500

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

Initial area flow distance = 1000.000(Ft.)
Top (of initial area) elevation = 1295.000(Ft.)
Bottom (of initial area) elevation = 1243.000(Ft.)
Difference in elevation = 52.000(Ft.)
Slope = 0.05200 s(percent)= 5.20
TC = k(0.940)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 26.911 min.
Rainfall intensity = 1.865(In/Hr) for a 100.0 year storm
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.719
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 74.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 9.391(CFS)
Total initial stream area = 7.000(Ac.)
Pervious area fraction = 1.000

++
Process from Point/Station 2.000 to Point/Station 3.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation = 1243.000(Ft.)
End of natural channel elevation = 1118.000(Ft.)
Length of natural channel = 2781.000(Ft.)
Estimated mean flow rate at midpoint of channel = 64.398(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow = 8.83(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
Normal channel slope = 0.0449
Corrected/adjusted channel slope = 0.0449
Travel time = 5.25 min. TC = 32.16 min.

Adding area flow to channel
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.705
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 74.00

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Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.691(In/Hr) for a   100.0 year storm
Subarea runoff =     97.725(CFS) for     82.000(Ac.)
Total runoff =    107.116(CFS)  Total area =      89.000(Ac.)
End of computations, total study area =           89.00 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  74.0
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Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
Rational Hydrology Study Date: 10/02/19 File:APARTMENT2.out

NODE 3 TO 18

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

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

Program License Serial Number 6109

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

2 year, 1 hour precipitation = 0.500(In.)
100 year, 1 hour precipitation = 1.200(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.200(In/Hr)
Slope of intensity duration curve = 0.5500

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Process from Point/Station 3.000 to Point/Station 6.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****

Rainfall intensity = 1.690(In/Hr) for a 100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.876
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 69.00
Pervious area fraction = 0.100; Impervious fraction = 0.900
User specified values are as follows:
TC = 32.20 min. Rain intensity = 1.69(In/Hr)
Total area = 89.00(Ac.) Total runoff = 166.40(CFS)

++

Process from Point/Station 3.000 to Point/Station 6.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area = 89.000(Ac.)
Runoff from this stream = 166.400(CFS)
Time of concentration = 32.20 min.
Rainfall intensity = 1.690(In/Hr)
Program is now starting with Main Stream No. 2

++

Process from Point/Station 4.000 to Point/Station 6.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****

Rainfall intensity = 3.288(In/Hr) for a 100.0 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 = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 69.00
Pervious area fraction = 0.100; Impervious fraction = 0.900
User specified values are as follows:
TC = 9.60 min. Rain intensity = 3.29(In/Hr)
Total area = 6.80(Ac.) Total runoff = 14.80(CFS)

++

Process from Point/Station 4.000 to Point/Station 6.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

```
In Main Stream number: 2
Stream flow area =      6.800(Ac.)
Runoff from this stream =     14.800(CFS)
Time of concentration =    9.60 min.
Rainfall intensity =     3.288(In/Hr)
Program is now starting with Main Stream No. 3


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Process from Point/Station        5.000 to Point/Station        6.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   450.000(Ft.)
Top (of initial area) elevation =  1160.000(Ft.)
Bottom (of initial area) elevation =  1117.000(Ft.)
Difference in elevation =    43.000(Ft.)
Slope =    0.09556  s(percent)=       9.56
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    5.525 min.
Rainfall intensity =      4.455(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 = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =     10.302(CFS)
Total initial stream area =        2.600(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station        5.000 to Point/Station        6.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      2.600(Ac.)
Runoff from this stream =     10.302(CFS)
Time of concentration =    5.53 min.
Rainfall intensity =     4.455(In/Hr)
Summary of stream data:

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


1      166.400     32.20                 1.690
2       14.800      9.60                 3.288
3       10.302      5.53                 4.455
Largest stream flow has longer time of concentration
Qp =    166.400 + sum of
          Qb         Ia/Ib
          14.800 *    0.514 =      7.607
          Qb         Ia/Ib
          10.302 *    0.379 =      3.907
Qp =    177.914

Total of 3 main streams to confluence:
Flow rates before confluence point:
     166.400      14.800      10.302
Area of streams before confluence:
       89.000        6.800        2.600


Results of confluence:
Total flow rate =    177.914(CFS)
Time of concentration =    32.200 min.
Effective stream area after confluence  =     98.400(Ac.)


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Process from Point/Station        6.000 to Point/Station        9.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________________
Upstream point/station elevation =  1117.000(Ft.)
Downstream point/station elevation =  1110.000(Ft.)
Pipe length  =   440.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   177.914(CFS)
Given pipe size =     54.00(In.)
Calculated individual pipe flow  =   177.914(CFS)
Normal flow depth in pipe =   33.84(In.)
Flow top width inside pipe =   52.24(In.)
Critical Depth =   46.41(In.)
Pipe flow velocity =     16.96(Ft/s)
Travel time through pipe =    0.43 min.
Time of concentration (TC) =    32.63 min.


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Process from Point/Station        6.000 to Point/Station        9.000
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**** CONFLUENCE OF MAIN STREAMS ****
_____
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =   98.400(Ac.)
Runoff from this stream =   177.914(CFS)
Time of concentration =   32.63 min.
Rainfall intensity =   1.677(In/Hr)
Program is now starting with Main Stream No. 2

++
Process from Point/Station   7.000 to Point/Station   9.000
**** INITIAL AREA EVALUATION ****
_____
Initial area flow distance =   350.000(Ft.)
Top (of initial area) elevation = 1130.000(Ft.)
Bottom (of initial area) elevation = 1110.000(Ft.)
Difference in elevation =   20.000(Ft.)
Slope =   0.05714 s(percent)=   5.71
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   5.538 min.
Rainfall intensity =   4.450(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 = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 69.00
Pervious area fraction = 0.100; Impervious fraction = 0.900
Initial subarea runoff =   12.663(CFS)
Total initial stream area =   3.200(Ac.)
Pervious area fraction = 0.100

++
Process from Point/Station   7.000 to Point/Station   9.000
**** CONFLUENCE OF MAIN STREAMS ****
_____
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =   3.200(Ac.)
Runoff from this stream =   12.663(CFS)
Time of concentration =   5.54 min.
Rainfall intensity =   4.450(In/Hr)
Program is now starting with Main Stream No. 3

++
Process from Point/Station   8.000 to Point/Station   9.000
**** INITIAL AREA EVALUATION ****
_____
Initial area flow distance =   350.000(Ft.)
Top (of initial area) elevation = 1130.000(Ft.)
Bottom (of initial area) elevation = 1110.000(Ft.)
Difference in elevation =   20.000(Ft.)
Slope =   0.05714 s(percent)=   5.71
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   5.538 min.
Rainfall intensity =   4.450(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 = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 69.00
Pervious area fraction = 0.100; Impervious fraction = 0.900
Initial subarea runoff =   9.893(CFS)
Total initial stream area =   2.500(Ac.)
Pervious area fraction = 0.100

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Process from Point/Station   8.000 to Point/Station   9.000
**** CONFLUENCE OF MAIN STREAMS ****
_____
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =   2.500(Ac.)
Runoff from this stream =   9.893(CFS)
Time of concentration =   5.54 min.
Rainfall intensity =   4.450(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	177.914	32.63	1.677
2	12.663	5.54	4.450
3	9.893	5.54	4.450

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Largest stream flow has longer time of concentration
Qp =    177.914 + sum of
          Qb          Ia/Ib
          12.663 *    0.377 =      4.774
          Qb          Ia/Ib
           9.893 *    0.377 =      3.730
Qp =    186.417

Total of 3 main streams to confluence:
Flow rates before confluence point:
     177.914      12.663       9.893
Area of streams before confluence:
       98.400        3.200        2.500


Results of confluence:
Total flow rate =    186.417(CFS)
Time of concentration =    32.632 min.
Effective stream area after confluence  =    104.100(Ac.)


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Process from Point/Station        9.000 to Point/Station       11.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________________
Upstream point/station elevation =  1110.000(Ft.)
Downstream point/station elevation =  1103.000(Ft.)
Pipe length  =   360.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   186.417(CFS)
Given pipe size =     54.00(In.)
Calculated individual pipe flow  =   186.417(CFS)
Normal flow depth in pipe =   32.67(In.)
Flow top width inside pipe =   52.80(In.)
Critical Depth =   47.25(In.)
Pipe flow velocity =     18.54(Ft/s)
Travel time through pipe =    0.32 min.
Time of concentration (TC) =    32.96 min.


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Process from Point/Station        9.000 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 =    104.100(Ac.)
Runoff from this stream =    186.417(CFS)
Time of concentration =   32.96 min.
Rainfall intensity =     1.668(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station       10.000 to Point/Station       11.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  1165.000(Ft.)
Bottom (of initial area) elevation =  1103.000(Ft.)
Difference in elevation =    62.000(Ft.)
Slope =    0.06200  s(percent)=       6.20
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.292 min.
Rainfall intensity =      3.564(In/Hr) for a   100.0 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 = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      9.168(CFS)
Total initial stream area =        2.900(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 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 =      2.900(Ac.)
Runoff from this stream =      9.168(CFS)
Time of concentration =    8.29 min.
Rainfall intensity =     3.564(In/Hr)
Summary of stream data:

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

```
1      186.417     32.96                 1.668
2        9.168      8.29                 3.564
Largest stream flow has longer time of concentration
Qp =    186.417 + sum of
          Qb          Ia/Ib
           9.168 *    0.468 =      4.292
Qp =    190.709

Total of 2 main streams to confluence:
Flow rates before confluence point:
     186.417       9.168
Area of streams before confluence:
      104.100        2.900


Results of confluence:
Total flow rate =    190.709(CFS)
Time of concentration =    32.956 min.
Effective stream area after confluence  =    107.000(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station       14.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________________
Upstream point/station elevation =  1103.000(Ft.)
Downstream point/station elevation =  1101.000(Ft.)
Pipe length  =   130.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   190.709(CFS)
Given pipe size =     54.00(In.)
Calculated individual pipe flow  =   190.709(CFS)
Normal flow depth in pipe =   35.95(In.)
Flow top width inside pipe =   50.94(In.)
Critical Depth =   47.63(In.)
Pipe flow velocity =     16.97(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =    33.08 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station       14.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =    107.000(Ac.)
Runoff from this stream =    190.709(CFS)
Time of concentration =   33.08 min.
Rainfall intensity =     1.665(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       14.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   480.000(Ft.)
Top (of initial area) elevation =  1125.000(Ft.)
Bottom (of initial area) elevation =  1104.000(Ft.)
Difference in elevation =    21.000(Ft.)
Slope =    0.04375  s(percent)=       4.38
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.629 min.
Rainfall intensity =      4.031(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.888
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.865(CFS)
Total initial stream area =        0.800(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       14.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.800(Ac.)
Runoff from this stream =      2.865(CFS)
Time of concentration =    6.63 min.
Rainfall intensity =     4.031(In/Hr)
Summary of stream data:

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

```
1      190.709     33.08                 1.665
2        2.865      6.63                 4.031
Largest stream flow has longer time of concentration
Qp =    190.709 + sum of
          Qb          Ia/Ib
           2.865 *    0.413 =      1.183
Qp =    191.892

Total of 2 main streams to confluence:
Flow rates before confluence point:
     190.709       2.865
Area of streams before confluence:
      107.000        0.800


Results of confluence:
Total flow rate =    191.892(CFS)
Time of concentration =    33.084 min.
Effective stream area after confluence  =    107.800(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       16.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________________
Upstream point/station elevation =  1101.000(Ft.)
Downstream point/station elevation =  1100.000(Ft.)
Pipe length  =   130.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   191.892(CFS)
Given pipe size =     54.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
     3.628(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =      1.237(Ft.)
 Minor friction loss =      3.391(Ft.)  K-factor =   1.50
Pipe flow velocity =     12.07(Ft/s)
Travel time through pipe =    0.18 min.
Time of concentration (TC) =    33.26 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       16.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =    107.800(Ac.)
Runoff from this stream =    191.892(CFS)
Time of concentration =   33.26 min.
Rainfall intensity =     1.660(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.000 to Point/Station       16.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   250.000(Ft.)
Top (of initial area) elevation =  1130.000(Ft.)
Bottom (of initial area) elevation =  1100.000(Ft.)
Difference in elevation =    30.000(Ft.)
Slope =    0.12000  s(percent)=      12.00
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Warning: TC computed to be less than 5 min.; program is assuming the
time of concentration is 5 minutes.
Initial area time of concentration =    5.000 min.
Rainfall intensity =      4.707(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 = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      5.026(CFS)
Total initial stream area =        1.200(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.000 to Point/Station       16.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.200(Ac.)
Runoff from this stream =      5.026(CFS)
Time of concentration =    5.00 min.
Rainfall intensity =     4.707(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
```

```
 No.       (CFS)       (min)                (In/Hr)


1      191.892     33.26                1.660
2        5.026      5.00                4.707
Largest stream flow has longer time of concentration
Qp =    191.892 + sum of
          Qb          Ia/Ib
           5.026 *    0.353 =      1.772
Qp =    193.665

Total of 2 main streams to confluence:
Flow rates before confluence point:
     191.892       5.026
Area of streams before confluence:
      107.800        1.200


Results of confluence:
Total flow rate =    193.665(CFS)
Time of concentration =    33.263 min.
Effective stream area after confluence  =    109.000(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       16.000 to Point/Station       18.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
______________________________________________________________________________
Upstream point/station elevation =  1100.000(Ft.)
Downstream point/station elevation =  1096.000(Ft.)
Pipe length  =   360.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   193.665(CFS)
Given pipe size =     54.00(In.)
Calculated individual pipe flow  =   193.665(CFS)
Normal flow depth in pipe =   41.34(In.)
Flow top width inside pipe =   45.75(In.)
Critical Depth =   47.88(In.)
Pipe flow velocity =     14.81(Ft/s)
Travel time through pipe =    0.41 min.
Time of concentration (TC) =    33.67 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       16.000 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 =    109.000(Ac.)
Runoff from this stream =    193.665(CFS)
Time of concentration =   33.67 min.
Rainfall intensity =     1.649(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       17.000 to Point/Station       18.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   290.000(Ft.)
Top (of initial area) elevation =  1120.000(Ft.)
Bottom (of initial area) elevation =  1096.000(Ft.)
Difference in elevation =    24.000(Ft.)
Slope =    0.08276  s(percent)=       8.28
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Warning: TC computed to be less than 5 min.; program is assuming the
time of concentration is 5 minutes.
Initial area time of concentration =    5.000 min.
Rainfall intensity =      4.707(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 = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      5.864(CFS)
Total initial stream area =        1.400(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       17.000 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 =      1.400(Ac.)
Runoff from this stream =      5.864(CFS)
Time of concentration =    5.00 min.
Rainfall intensity =     4.707(In/Hr)
Summary of stream data:
```

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


1      193.665     33.67                1.649
2        5.864      5.00                4.707
Largest stream flow has longer time of concentration
Qp =    193.665 + sum of
          Qb         Ia/Ib
           5.864 *    0.350 =      2.054
Qp =    195.719

Total of 2 main streams to confluence:
Flow rates before confluence point:
     193.665       5.864
Area of streams before confluence:
      109.000        1.400


Results of confluence:
Total flow rate =    195.719(CFS)
Time of concentration =    33.668 min.
Effective stream area after confluence  =    110.400(Ac.)
End of computations, total study area =          110.40 (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 =  69.0
```

B. HYDRAULIC COMPUTATIONS

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS) / SF Ave	Vel Head / HF	Energy Grd.El. / SE Dpth	Super Elev / Froude N	Critical Depth / Norm Dp	Flow Top Width	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
2228.370	1096.030	5.770	1101.800	196.00	12.32	2.36	1104.16	.00	4.01	.00	4.500	.000	.00	1 .0
JUNCT STR	.0050					.0098	.02	5.77	.00		.013	.00	.00	PIPE
2230.370	1096.040	5.874	1101.914	194.00	12.20	2.31	1104.22	.00	3.99	.00	4.500	.000	.00	1 .0
379.390	.0104					.0097	3.69	5.87	.00	3.56	.013	.00	.00	PIPE
2609.760	1100.000	5.722	1105.722	194.00	12.20	2.31	1108.03	.00	3.99	.00	4.500	.000	.00	1 .0
JUNCT STR	.0150					.0096	.02	5.72	.00		.013	.00	.00	PIPE
2611.760	1100.030	5.804	1105.834	192.00	12.07	2.26	1108.10	.00	3.98	.00	4.500	.000	.00	1 .0
127.730	.0108					.0095	1.22	5.80	.00	3.46	.013	.00	.00	PIPE
2739.490	1101.410	5.755	1107.165	192.00	12.07	2.26	1109.43	.00	3.98	.00	4.500	.000	.00	1 .0
JUNCT STR	.0150					.0095	.02	5.75	.00		.013	.00	.00	PIPE
2741.490	1101.440	5.790	1107.230	191.00	12.01	2.24	1109.47	.00	3.97	.00	4.500	.000	.00	1 .0
137.970	.0111					.0094	1.30	5.79	.00	3.41	.013	.00	.00	PIPE
2879.460	1102.970	5.562	1108.532	191.00	12.01	2.24	1110.77	.00	3.97	.00	4.500	.000	.00	1 .0
JUNCT STR	.0100					.0092	.02	5.56	.00		.013	.00	.00	PIPE
2881.460	1102.990	5.739	1108.729	187.00	11.76	2.15	1110.88	.00	3.94	.00	4.500	.000	.00	1 .0
99.916	.0110					.0090	.90	5.74	.00	3.36	.013	.00	.00	PIPE
2981.375	1104.086	5.625	1109.711	187.00	11.76	2.15	1111.86	.00	3.94	.00	4.500	.000	.00	1 .0
HYDRAULIC JUMP														

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS) / SF Ave	Vel Head / HF	Energy Grd.El. / SE Dpth	Super Elev / Froude N	Critical Depth / Norm Dp	Flow Top Width	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
2981.375	1104.086	2.666	1106.752	187.00	19.06	5.64	1112.39	.00	3.94	4.42	4.500	.000	.00	1 .0
35.915	.0110					.0220	.79	2.67	2.25	3.36	.013	.00	.00	PIPE
3017.290	1104.480	2.578	1107.057	187.00	19.85	6.12	1113.18	.00	3.94	4.45	4.500	.000	.00	1 .0
72.685	.0256					.0225	1.63	2.58	2.40	2.50	.013	.00	.00	PIPE
3089.975	1106.339	2.627	1108.966	187.00	19.40	5.84	1114.81	.00	3.94	4.44	4.500	.000	.00	1 .0
84.572	.0256					.0206	1.74	2.63	2.32	2.50	.013	.00	.00	PIPE
3174.547	1108.503	2.733	1111.236	187.00	18.50	5.31	1116.55	.00	3.94	4.40	4.500	.000	.00	1 .0
50.152	.0256					.0182	.91	2.73	2.15	2.50	.013	.00	.00	PIPE
3224.699	1109.786	2.846	1112.632	187.00	17.64	4.83	1117.46	.00	3.94	4.34	4.500	.000	.00	1 .0
33.791	.0256					.0161	.55	2.85	1.99	2.50	.013	.00	.00	PIPE
3258.490	1110.650	2.966	1113.616	187.00	16.82	4.39	1118.01	.00	3.94	4.27	4.500	.000	.00	1 .0
JUNCT STR	.0200					.0171	.03	2.97	1.84		.013	.00	.00	PIPE
3260.490	1110.690	2.662	1113.352	178.00	18.17	5.13	1118.48	.00	3.87	4.42	4.500	.000	.00	1 .0
59.786	.0232					.0180	1.08	2.66	2.15	2.50	.013	.00	.00	PIPE
3320.276	1112.074	2.754	1114.828	178.00	17.45	4.73	1119.56	.00	3.87	4.39	4.500	.000	.00	1 .0
44.979	.0232					.0161	.73	2.75	2.02	2.50	.013	.00	.00	PIPE

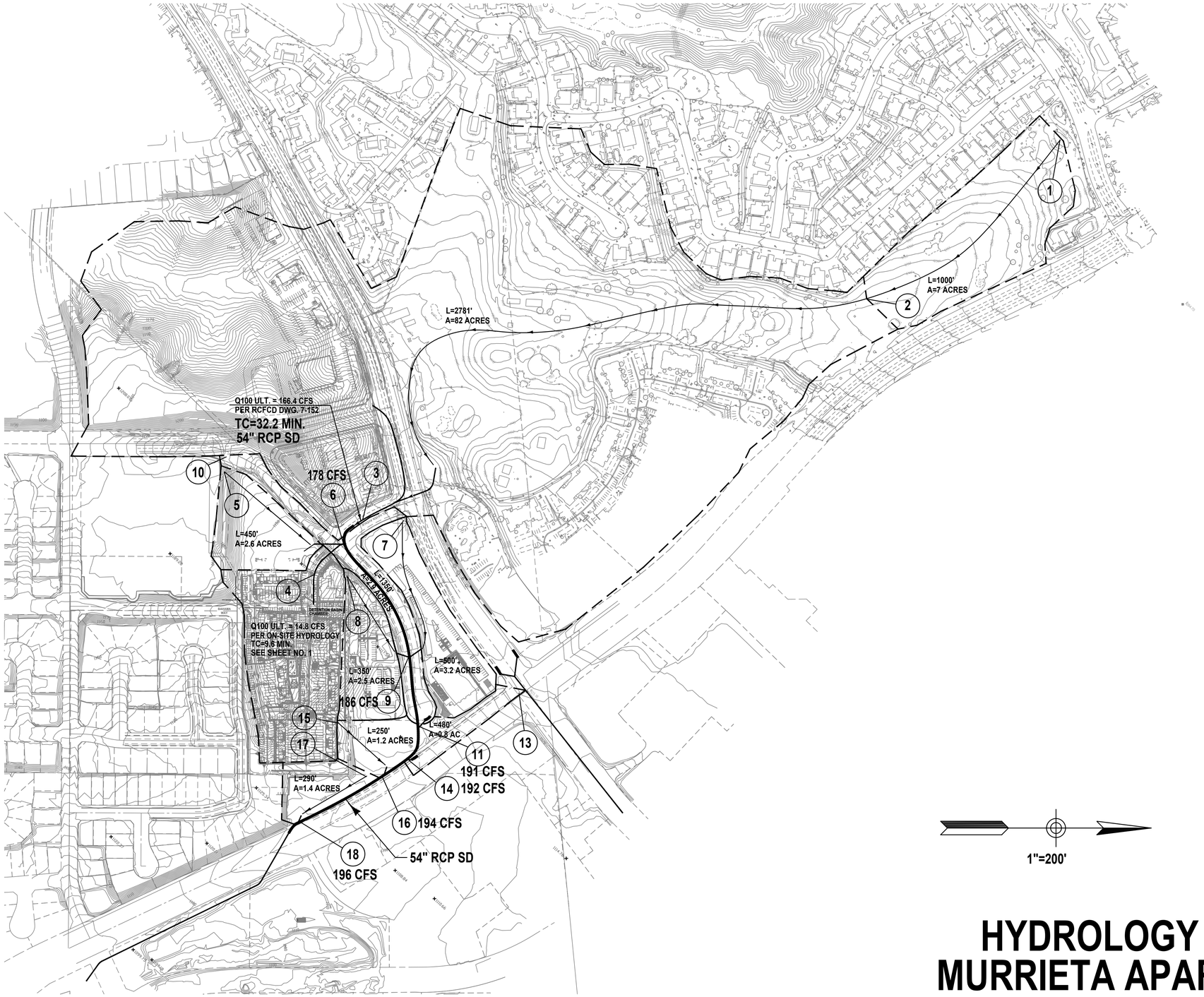
3365.254	1113.115	2.868	1115.983	178.00	16.64	4.30	1120.28	.00	3.87	4.33	4.500	.000	.00	1	.0
30.456	.0232				.0143	.44	2.87	1.87	2.50	.013		.00	.00	PIPE	

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope				SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
3395.710	1113.820	2.989	1116.810	178.00	15.87	3.91	1120.72	.00	3.87	4.25	4.500	.000	.00	1	.0
21.580	.0232				.0127	.27	2.99	1.72	2.50	.013		.00	.00	PIPE	
3417.290	1114.320	3.120	1117.440	178.00	15.13	3.55	1120.99	.00	3.87	4.15	4.500	.000	.00	1	.0
106.436	.0125				.0117	1.24	3.12	1.58	3.07	.013		.00	.00	PIPE	
3523.726	1115.651	3.181	1118.832	178.00	14.81	3.41	1122.24	.00	3.87	4.10	4.500	.000	.00	1	.0
95.949	.0125				.0108	1.04	3.18	1.52	3.07	.013		.00	.00	PIPE	
3619.675	1116.851	3.327	1120.177	178.00	14.12	3.10	1123.27	.00	3.87	3.95	4.500	.000	.00	1	.0
43.222	.0125				.0097	.42	3.33	1.39	3.07	.013		.00	.00	PIPE	
3662.896	1117.391	3.486	1120.877	178.00	13.46	2.82	1123.69	.00	3.87	3.76	4.500	.000	.00	1	.0
20.770	.0125				.0087	.18	3.49	1.27	3.07	.013		.00	.00	PIPE	
3683.666	1117.651	3.663	1121.314	178.00	12.84	2.56	1123.87	.00	3.87	3.50	4.500	.000	.00	1	.0
6.334	.0125				.0079	.05	3.66	1.14	3.07	.013		.00	.00	PIPE	
3690.000	1117.730	3.868	1121.598	178.00	12.24	2.33	1123.92	.00	3.87	3.13	4.500	.000	.00	1	.0
JUNCT STR	.0120				.0074	.02	3.87	1.00		.013		.00	.00	PIPE	
3692.500	1117.760	4.687	1122.447	166.40	10.46	1.70	1124.15	.00	3.76	.00	4.500	.000	.00	1	.0
61.922	.0110				.0071	.44	4.69	.00	3.06	.013		.00	.00	PIPE	
3754.422	1118.443	4.500	1122.943	166.40	10.46	1.70	1124.64	.00	3.76	.00	4.500	.000	.00	1	.0
37.798	.0110				.0066	.25	4.50	.00	3.06	.013		.00	.00	PIPE	

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope				SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
3792.220	1118.860	4.262	1123.122	166.40	10.68	1.77	1124.89	.00	3.76	2.01	4.500	.000	.00	1	.0

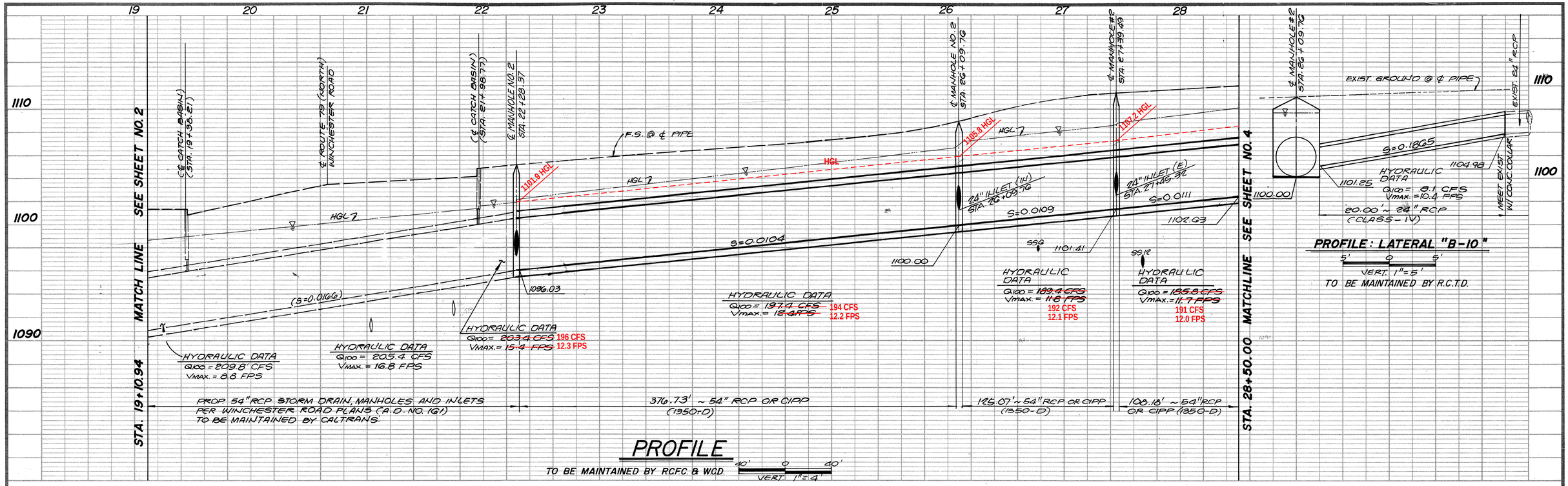
```
T1 MHSR ROAD EXIST 54" RCP                                                    0
T2
T3
SO   2228.3701096.030  1                          1101.800
JX   2230.3701096.040  3  2   .013    2.000         1097.280         45.0         .000
R    2609.7601100.000  3      .013                                  .000    .000 1
JX   2611.7601100.030  5  4   .013    2.000         1101.250         45.0         .000
R    2739.4901101.410  5      .013                                  .000    .000 1
JX   2741.4901101.440  7  6   .013    1.000         1102.660         45.0         .000
R    2879.4601102.970  7      .013                                  .000    .000 0
JX   2881.4601102.990  9  8   .013    4.000         1104.220         45.0         .000
R    3017.2901104.480  9      .013                                  .000    .000 1
R    3258.4901110.650  9      .013                                  .000    .000 0
JX   3260.4901110.690 12 10 11.013    4.500    4.5001111.9001111.900 45.0 45.0    .000
R    3417.2901114.320 12      .013                                  .000    .000 1
R    3690.0001117.730 12      .013                                  .000    .000 0

JX   3692.5001117.760 15 14   .013   11.600         1118.980         45.0         .000
R    3792.2201118.860 15      .013                                  .000    .000 1
SH   3792.2201118.860 15                          1118.860
CD   1  4   1    .000   4.500     .000  .000  .000   .00
CD   2  4   1    .000   2.000     .000  .000  .000   .00
CD   3  4   1    .000   4.500     .000  .000  .000   .00
CD   4  4   1    .000   2.000     .000  .000  .000   .00
CD   5  4   1    .000   4.500     .000  .000  .000   .00
CD   6  4   1    .000   2.000     .000  .000  .000   .00
CD   7  4   1    .000   4.500     .000  .000  .000   .00
CD   8  4   1    .000   2.000     .000  .000  .000   .00
CD   9  4   1    .000   4.500     .000  .000  .000   .00
CD  10  4   1    .000   2.000     .000  .000  .000   .00
CD  11  4   1    .000   2.000     .000  .000  .000   .00
CD  12  4   1    .000   4.500     .000  .000  .000   .00
CD  13  4   1    .000   2.000     .000  .000  .000   .00
CD  14  4   1    .000   2.000     .000  .000  .000   .00
CD  15  4   1    .000   4.500     .000  .000  .000   .00
Q           166.400   .0
```

C. REGIONAL HYDROLOGY MAP



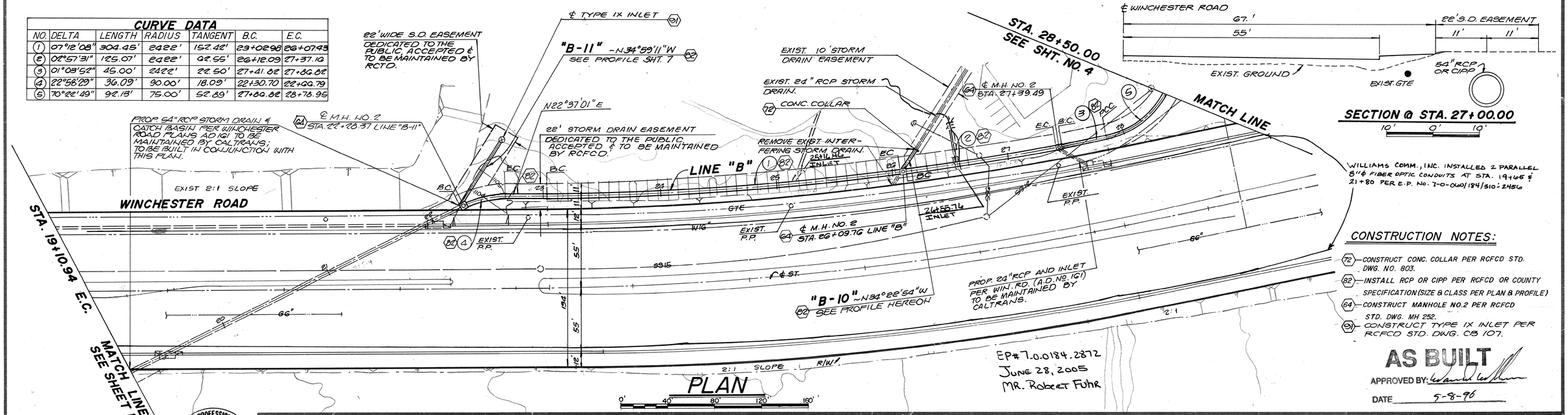
HYDROLOGY MAP
MURRIETA APARTMENT

D. STORM DRAIN PLANS W/HGL



CURVE DATA

NO.	DELTA	LENGTH	RADIUS	TANGENT	B.C.	E.C.
(1)	07°12'08"	304.45'	2422'	152.42'	23+02.98	26+07.43
(2)	02°57'31"	125.07'	2422'	62.55'	26+12.09	27+37.16
(3)	01°03'52"	45.00'	2422'	22.50'	27+41.82	27+86.82
(4)	22°56'29"	36.09'	90.00'	18.09'	22+30.70	22+66.79
(5)	70°22'49"	92.13'	75.00'	52.89'	27+82.82	28+76.95



SECTION @ STA. 27+00.00
10' 0' 10'

WILLIAMS COMM., INC. INSTALLED 2 PARALLEL 8"ϕ FIBER OPTIC CONDUITS AT STA. 19+46 & 21+80 PER E.P. No. 7-0-0401184/510-2456

CONSTRUCTION NOTES:

(72) CONSTRUCT CONC. COLLAR PER RCFCD STD. DWG. NO. 803.
(82) INSTALL RCP OR CIPP PER RCFCD OR COUNTY SPECIFICATION (SIZE & CLASS PER PLAN & PROFILE)
(64) CONSTRUCT MANHOLE NO.2 PER RCFCD STD. DWG. MH 252.
(51) CONSTRUCT TYPE IX INLET PER RCFCD STD. DWG. CB 107.

EP# 7.0.0184.2872
JUNE 28, 2005
MR. Robert Fuhr

AS BUILT
APPROVED BY: [signature]
DATE 5-8-96

REGISTERED PROFESSIONAL ENGINEER CHARLES A. COLLINS No. 34490 CIVIL STATE OF CALIFORNIA

RANPAC ENGINEERING CORP.
27447 Enterprise Circle West
Temecula, California 92390
Tel. (909) 676-7000

SUBMITTED BY: [signature]
REGISTERED CIVIL ENGINEER NO. 34490
EXP. 9/30/95
DATE: 3/31/95

BENCH MARK: SEE SHEET NO. 1

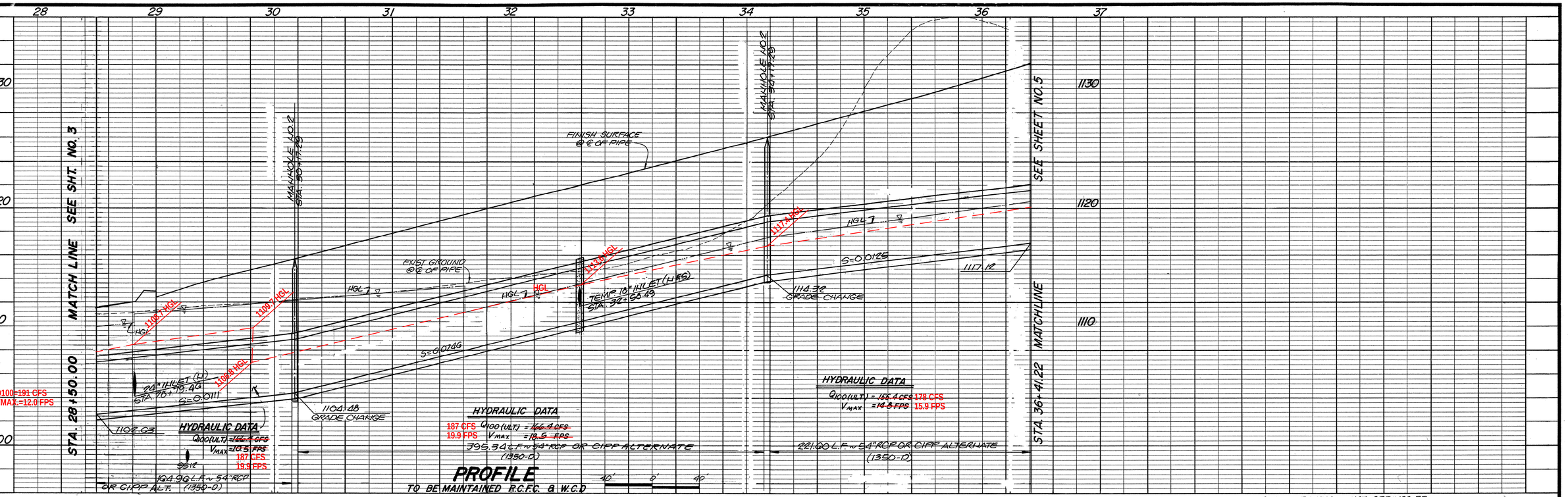
REVISIONS			
REF.	DESCRIPTION	APPR.	DATE

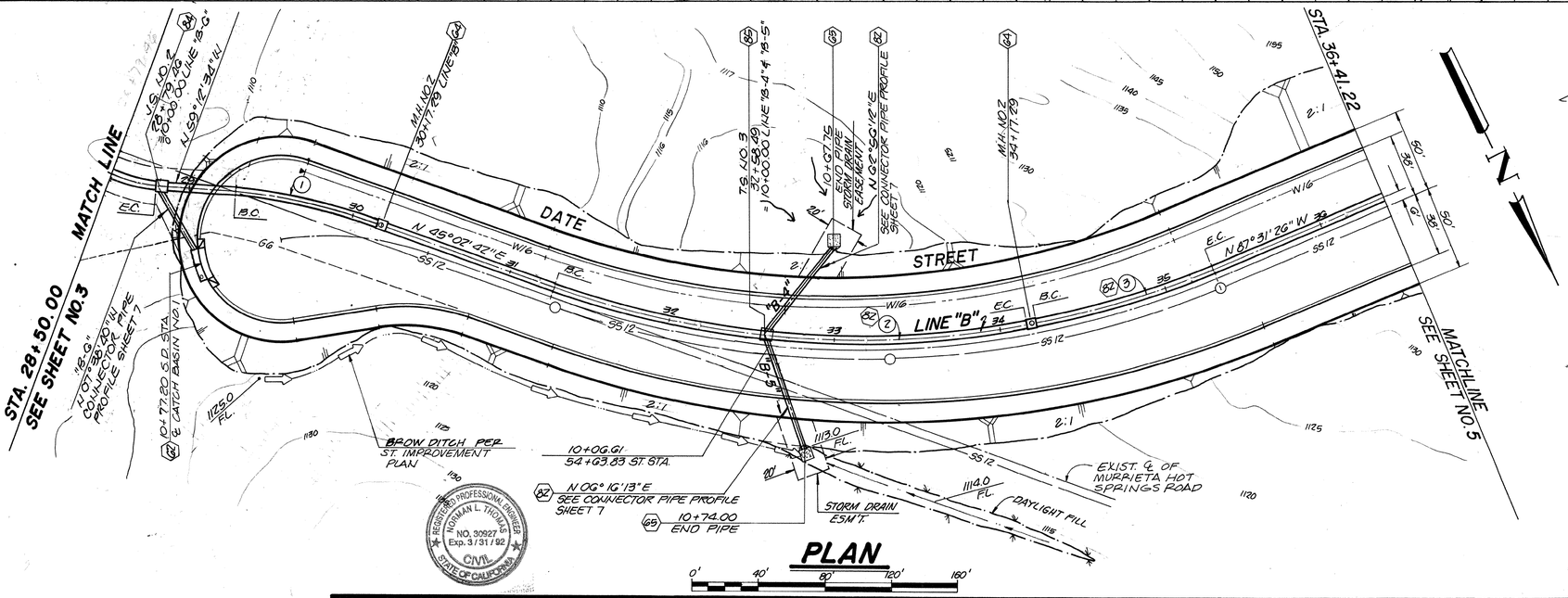
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: [signature] PLANNING ENGINEERING DATE: 6/29/94
APPROVED BY: [signature] CHIEF ENGINEER DATE: 7-5-94

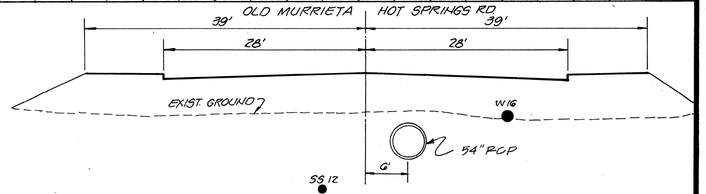
County of Riverside
APPROVED BY: [signature] FOR TRANS. DEPT. RIVERSIDE COUNTY, CALIF. DATE: 3/8/94

ASSESSMENT DISTRICT NO. 161
WINCHESTER ROAD STORM DRAIN
STA. 19+10.94 TO STA. 28+50.00

PROJECT NO. 7-0-184
DRAWING NO. 7-152
SHEET NO. 3 OF 8







SECTION @ STA. 31+00.00

10' 0' 10'

CURVE DATA

NO.	DELTA	RADIUS	LENGTH	TANGENT	B.C.	E.C.
(1)	14°09'52"	350'	88.00'	44.23'	29+26.96	30+14.96
(2)	30°17'27"	544'	287.60'	147.25'	31+27.36	34+14.96
(3)	11°41'30"	544'	111.06'	55.72'	34+19.02	35+30.08
(4)						
(5)						
(6)						

CONSTRUCTION NOTES

(62) CONSTRUCT CATCH BASIN NO.1 LOCAL DEPRESSION NO.2 CASE "C" PER RCFCD STD. DWG. NO. CB. 100 & LD 201 (W=21' & V=8.29')

(64) CONSTRUCT MANHOLE NO.2 PER RCFCD STD. DWG. M.H.252

(65) CONSTRUCT TEMPORARY INLET APRON SEE DETAIL ON SHEET NO. 8

(82) INSTALL REINFORCED CONCRETE PIPE PER RCFCD OR COUNTY SPECIFICATIONS:

(84) CONSTRUCT JUNCTION STRUCTURE NO.2 PER RCFCD ST. J.S.227 SEE DET. ON SHEET NO.8

(85) CONSTRUCT TRANSITION STRUCTURE NO.3 PER RCFCD STD. DWG. NO. TS 303

AS BUILT

APPROVED BY: [signature]

DATE 5-8-96

REGISTERED PROFESSIONAL ENGINEER NORMAN L. THOMAS NO. 30927 Exp. 3/31/92 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER ROBERT TAMBORSKI 22875 EXP. 3/31/91 CIVIL STATE OF CALIFORNIA

RANPAC ENGINEERING CORP.
27447 Enterprise Circle West
Temecula, California 92390
Tel. (714) 676-7000

SUBMITTED BY: [signature]
REGISTERED CIVIL ENGINEER NO. 30927
EXP. 3/31/92
DATE: 4/11/91

BENCH MARK: SEE SHEET NO.1

REVISIONS			
REF.	DESCRIPTION	APPR	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

RECOMMENDED FOR APPROVAL BY: [signature] PLANNING ENGINEERING DATE: 6/29/91

APPROVED BY: [signature] CHIEF ENGINEER DATE: 7-5-91

County of Riverside

APPROVED BY: [signature] FOR TRANS. DEPT. RIVERSIDE COUNTY, CALIF. DATE: 4/26/91

ASSESSMENT DISTRICT NO. 161

WINCHESTER RD. STORM DRAIN

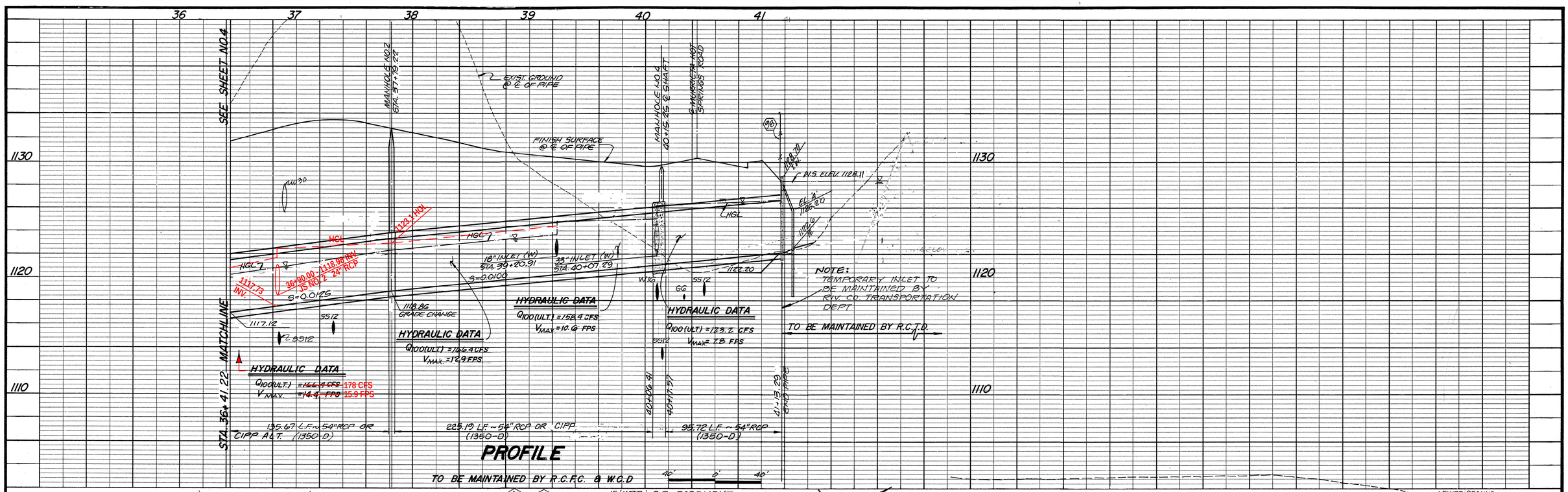
STA. 28+50.00 TO STA. 36+41.22

(DATE STREET)

PROJECT NO. 7-0-184

DRAWING NO. 7-152

SHEET NO. 4 OF 8



CURVE DATA					
NO.	DELTA	RADIUS	LENGTH	TANGENT	B.C.	E.C.
(1)	98°23'47"	79.00'	135.67'	91.52'	36+41.22	37+76.89
(2)	19°10'52"	356'	186.13'	93.95	37+81.55	39+67.68

CONSTRUCTION NOTES

(61) CONSTRUCT MOD. CATCH BASIN NO. 1 LOCAL DEPRESSION NO. 2 CASE "C" PER RCFCD STD. DWG. NO. CB. 100 & LD 201

(64) CONSTRUCT MANHOLE NO. 2 PER RCFCD STD. DWG. M.H.252

(82) INSTALL REINFORCED CONCRETE PIPE PER RCFCD OR COUNTY SPECIFICATIONS:

(84) CONSTRUCT JUNCTION STRUCTURE NO. 4 PER RCFCD STD. J.S. 229

(85) CONSTRUCT MANHOLE NO.4 PER RCFCD STD. M.H. 254 (SEE DET. ON SHT. 8)

(90) CONSTRUCT PIPE CULVERT HEADWALL PER CALTRANS STD. PLANS D-86-B (W=5.5', L=7', ELEV 'A' = 1126.20

(98) CONSTRUCT FENCE PER RCFCD & WCD STD. DWG. NO. M 801. (6' HIGH)

(91) CONSTRUCT TYPE IX INLET PER R.C.F.C.D. STD. DWG. CB-107.

~~(99) INSTALL 14' CHAIN LINK DOUBLE GATE PER RCFCD & WCD STD. DWG. NO. 801.~~

~~(92) CONST. 3" P.C. GUNITE SLOPE PROTECTION (AIR PLACED) WITH 6" x 6", 10 / 10 GAGE W.W.F. REINFORCEMENT~~

AS BUILT
APPROVED BY: Edward D. Lattin
DATE 5-8-96

REGISTERED PROFESSIONAL ENGINEER NORMAN L. THOMAS NO. 30927 Exp. 3/31/92 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER ELBERT EUNICE, JR. 22875 Exp. 3/31/93 CIVIL STATE OF CALIFORNIA

RANPAC ENGINEERING CORP.
27447 Enterprise Circle West
Temecula, California 92390
Tel. (714) 676-7000

SUBMITTED BY: Norman Thomas
REGISTERED CIVIL ENGINEER NO. 30927
EXP. 3/31/92
DATE: 4/11/91

BENCH MARK: SEE SHEET NO.1

REVISIONS			
REF.	DESCRIPTION	APPR	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

RECOMMENDED FOR APPROVAL BY: Frank J. Davis
PLANNING ENGINEERING
DATE: 6/29/94

APPROVED BY: Kenneth Edwards
CHIEF ENGINEER
DATE: 7-5-94

County of Riverside

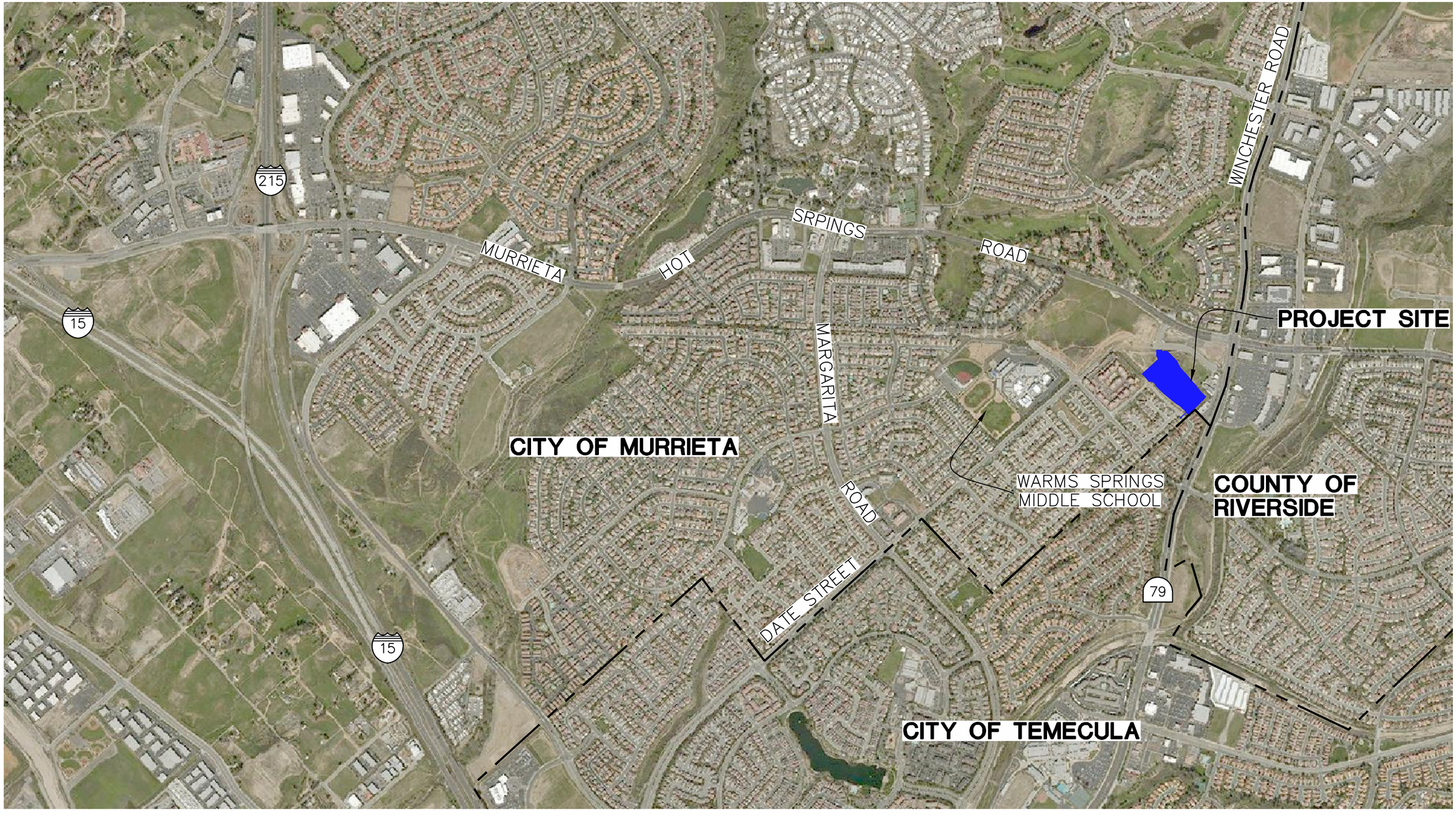
APPROVED BY: Thomas F. Cunningham
FOR TRANS. DEPT.
RIVERSIDE COUNTY, CALIF. DATE: 6/26/91

ASSESSMENT DISTRICT NO. 161
WINCHESTER RD. STORM DRAIN
STA. 36+23.93 TO STA. 40+96.00
(DELHAVEN ST.)

PROJECT NO. 7-0-184
DRAWING NO. 7-152
SHEET NO. 5 OF 8

FIGURES

FIGURE 1: VICINITY MAP



MURRIETA APARTMENTS - DP-2018-1761

N

JLC Engineering & Consulting, Inc.
41660 IVY STREET, SUITE A
MURRIETA, CA 92562
PH. 951.304.9552 FAX 951.304.3568

FIGURE 1

Drawing Name: O:\124.16.18\Engineering\Hydrology_Plan\Exhibits\FIGURE 1.dwg
Last Opened: Mar 12, 2019 - 2:45pm by joe

APPENDICES

APPENDIX A: PRE-PROJECT CONDITION RATIONAL METHOD ANALYSIS

APPENDIX A.1: AREA "A"

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
Rational Hydrology Study Date: 10/10/19 File:ARA1EX100.out

MURRIETA APARTMENTS EXISTING CONDITION HYDROLOGY
RATIONAL METHOD ANALYSIS, 100-YEAR STORM EVENT
FILENAME: ARA1EX100

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

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

Program License Serial Number 433

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

2 year, 1 hour precipitation = 0.500(In.)
100 year, 1 hour precipitation = 1.200(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.200(In/Hr)
Slope of intensity duration curve = 0.5500

++

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

Initial area flow distance = 433.000(Ft.)
Top (of initial area) elevation = 1171.000(Ft.)
Bottom (of initial area) elevation = 1148.000(Ft.)
Difference in elevation = 23.000(Ft.)
Slope = 0.05312 s(percent)= 5.31
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 10.810 min.
Rainfall intensity = 3.080(In/Hr) for a 100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.841
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 86.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 3.677(CFS)
Total initial stream area = 1.420(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 1.42 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number = 86.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
Rational Hydrology Study Date: 08/20/19 File:ARA2EX100.out

MURRIETA APARTMENTS EXISTING CONDITION HYDROLOGY
RATIONAL METHOD ANALYSIS, 100-YEAR STORM EVENT
FILENAME: ARA2EX100

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

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

Program License Serial Number 433

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

2 year, 1 hour precipitation = 0.500(In.)
100 year, 1 hour precipitation = 1.200(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.200(In/Hr)
Slope of intensity duration curve = 0.5500

++
Process from Point/Station 103.000 to Point/Station 104.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 285.000(Ft.)
Top (of initial area) elevation = 1172.000(Ft.)
Bottom (of initial area) elevation = 1125.000(Ft.)
Difference in elevation = 47.000(Ft.)
Slope = 0.16491 s(percent)= 16.49
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 7.291 min.
Rainfall intensity = 3.825(In/Hr) for a 100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.852
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 86.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 6.385(CFS)
Total initial stream area = 1.960(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 1.96 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number = 86.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
Rational Hydrology Study Date: 08/20/19 File:ARA3EX100.out

MURRIETA APARTMENTS EXISTING CONDITION HYDROLOGY
RATIONAL METHOD ANALYSIS, 100-YEAR STORM EVENT
FILENAME: ARA3EX100

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

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

Program License Serial Number 433

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

2 year, 1 hour precipitation = 0.500(In.)
100 year, 1 hour precipitation = 1.200(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.200(In/Hr)
Slope of intensity duration curve = 0.5500

++

Process from Point/Station 105.000 to Point/Station 106.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 385.000(Ft.)
Top (of initial area) elevation = 1172.000(Ft.)
Bottom (of initial area) elevation = 1121.000(Ft.)
Difference in elevation = 51.000(Ft.)
Slope = 0.13247 s(percent)= 13.25
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 8.591 min.
Rainfall intensity = 3.495(In/Hr) for a 100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.847
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 86.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 2.517(CFS)
Total initial stream area = 0.850(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 0.85 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number = 86.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
Rational Hydrology Study Date: 10/10/19 File:ARA1EX10.out

MURRIETA APARTMENTS EXISTING CONDITION HYDROLOGY
RATIONAL METHOD ANALYSIS, 10-YEAR STORM EVENT
FILENAME: ARA1EX10

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

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

Program License Serial Number 433

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

2 year, 1 hour precipitation = 0.500(In.)
100 year, 1 hour precipitation = 1.200(In.)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.788(In/Hr)
Slope of intensity duration curve = 0.5500

++

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

Initial area flow distance = 433.000(Ft.)
Top (of initial area) elevation = 1171.000(Ft.)
Bottom (of initial area) elevation = 1148.000(Ft.)
Difference in elevation = 23.000(Ft.)
Slope = 0.05312 s(percent)= 5.31
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 10.810 min.
Rainfall intensity = 2.023(In/Hr) for a 10.0 year storm
UNDEVELOPED (poor 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 = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 86.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 2.334(CFS)
Total initial stream area = 1.420(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 1.42 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number = 86.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
Rational Hydrology Study Date: 08/20/19 File:ARA2EX10.out

MURRIETA APARTMENTS EXISTING CONDITION HYDROLOGY
RATIONAL METHOD ANALYSIS, 10-YEAR STORM EVENT
FILENAME: ARA2EX10

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

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

Program License Serial Number 433

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

2 year, 1 hour precipitation = 0.500(In.)
100 year, 1 hour precipitation = 1.200(In.)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.788(In/Hr)
Slope of intensity duration curve = 0.5500

++

Process from Point/Station 103.000 to Point/Station 104.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 285.000(Ft.)
Top (of initial area) elevation = 1172.000(Ft.)
Bottom (of initial area) elevation = 1125.000(Ft.)
Difference in elevation = 47.000(Ft.)
Slope = 0.16491 s(percent)= 16.49
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 7.291 min.
Rainfall intensity = 2.512(In/Hr) for a 10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.828
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 86.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 4.078(CFS)
Total initial stream area = 1.960(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 1.96 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number = 86.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
Rational Hydrology Study Date: 08/20/19 File:ARA3EX10.out

MURRIETA APARTMENTS EXISTING CONDITION HYDROLOGY
RATIONAL METHOD ANALYSIS, 10-YEAR STORM EVENT
FILENAME: ARA3EX10

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

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

Program License Serial Number 433

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

2 year, 1 hour precipitation = 0.500(In.)
100 year, 1 hour precipitation = 1.200(In.)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.788(In/Hr)
Slope of intensity duration curve = 0.5500

++

Process from Point/Station 105.000 to Point/Station 106.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 385.000(Ft.)
Top (of initial area) elevation = 1172.000(Ft.)
Bottom (of initial area) elevation = 1121.000(Ft.)
Difference in elevation = 51.000(Ft.)
Slope = 0.13247 s(percent)= 13.25
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 8.591 min.
Rainfall intensity = 2.295(In/Hr) for a 10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.822
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 86.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 1.604(CFS)
Total initial stream area = 0.850(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 0.85 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number = 86.0

APPENDIX A.2: AREA "B"

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
Rational Hydrology Study Date: 08/20/19 File:ARBEX100.out

MURRIETA APARTMENTS EXISTING CONDITION HYDROLOGY
RATIONAL METHOD ANALYSIS, 100-YEAR STORM EVENT
FILENAME: ARBEX100

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

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

Program License Serial Number 433

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

2 year, 1 hour precipitation = 0.500(In.)
100 year, 1 hour precipitation = 1.200(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.200(In/Hr)
Slope of intensity duration curve = 0.5500

++

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

Initial area flow distance = 312.000(Ft.)
Top (of initial area) elevation = 1159.000(Ft.)
Bottom (of initial area) elevation = 1118.000(Ft.)
Difference in elevation = 41.000(Ft.)
Slope = 0.13141 s(percent)= 13.14
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 7.911 min.
Rainfall intensity = 3.657(In/Hr) for a 100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.785
Decimal fraction soil group A = 0.769
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.231
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 71.39
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 4.652(CFS)
Total initial stream area = 1.620(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 1.62 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number = 71.4

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
Rational Hydrology Study Date: 08/20/19 File:ARBEX10.out

MURRIETA APARTMENTS EXISTING CONDITION HYDROLOGY
RATIONAL METHOD ANALYSIS, 10-YEAR STORM EVENT
FILENAME: ARBEX10

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

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

Program License Serial Number 433

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

2 year, 1 hour precipitation = 0.500(In.)
100 year, 1 hour precipitation = 1.200(In.)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.788(In/Hr)
Slope of intensity duration curve = 0.5500

++

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

Initial area flow distance = 312.000(Ft.)
Top (of initial area) elevation = 1159.000(Ft.)
Bottom (of initial area) elevation = 1118.000(Ft.)
Difference in elevation = 41.000(Ft.)
Slope = 0.13141 s(percent)= 13.14
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 7.911 min.
Rainfall intensity = 2.402(In/Hr) for a 10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.736
Decimal fraction soil group A = 0.769
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.231
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 71.39
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 2.864(CFS)
Total initial stream area = 1.620(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 1.62 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number = 71.4

APPENDIX A.3: AREA "C"

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
Rational Hydrology Study Date: 08/20/19 File:ARCEX100.out

MURRIETA APARTMENTS EXISTING CONDITION HYDROLOGY
RATIONAL METHOD ANALYSIS, 100-YEAR STORM EVENT
FILENAME: ARCEX100

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

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

Program License Serial Number 433

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

2 year, 1 hour precipitation = 0.500(In.)
100 year, 1 hour precipitation = 1.200(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.200(In/Hr)
Slope of intensity duration curve = 0.5500

++

Process from Point/Station 301.000 to Point/Station 302.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 138.000(Ft.)
Top (of initial area) elevation = 1172.000(Ft.)
Bottom (of initial area) elevation = 1147.000(Ft.)
Difference in elevation = 25.000(Ft.)
Slope = 0.18116 s(percent)= 18.12
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 5.353 min.
Rainfall intensity = 4.533(In/Hr) for a 100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.859
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 86.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 2.687(CFS)
Total initial stream area = 0.690(Ac.)
Pervious area fraction = 1.000

++

Process from Point/Station 302.000 to Point/Station 304.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****

Top of street segment elevation = 1147.000(Ft.)
End of street segment elevation = 1125.000(Ft.)
Length of street segment = 534.000(Ft.)

```
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      3.420(CFS)
Depth of flow =   0.244(Ft.), Average velocity =   3.637(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   5.861(Ft.)
Flow velocity =   3.64(Ft/s)
Travel time =    2.45 min.     TC =    7.80  min.
 Adding area flow to street
COMMERCIAL subarea type
Runoff Coefficient = 0.884
Decimal fraction soil group A = 0.173
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.827
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  62.60
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      3.686(In/Hr) for a   100.0 year storm
Subarea runoff =      1.336(CFS) for      0.410(Ac.)
Total runoff =      4.022(CFS)        Total area =       1.100(Ac.)
Street flow at end of street =      4.022(CFS)
Half street flow at end of street =      2.011(CFS)
Depth of flow =   0.255(Ft.), Average velocity =   3.749(Ft/s)
Flow width (from curb towards crown)=   6.402(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      302.000 to Point/Station      304.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      1.100(Ac.)
Runoff from this stream =      4.022(CFS)
Time of concentration =    7.80 min.
Rainfall intensity =     3.686(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      303.000 to Point/Station      304.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   479.000(Ft.)
Top (of initial area) elevation =  1169.000(Ft.)
Bottom (of initial area) elevation =  1125.000(Ft.)
Difference in elevation =    44.000(Ft.)
Slope =    0.09186  s(percent)=       9.19
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.088 min.
Rainfall intensity =      3.199(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.831
Decimal fraction soil group A = 0.137
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.863
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  83.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      2.207(CFS)
Total initial stream area =        0.830(Ac.)
Pervious area fraction = 1.000
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      303.000 to Point/Station      304.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.830(Ac.)
Runoff from this stream =      2.207(CFS)
Time of concentration =   10.09 min.
Rainfall intensity =     3.199(In/Hr)
Summary of stream data:

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


1        4.022      7.80                 3.686
2        2.207     10.09                 3.199
Largest stream flow has longer or shorter time of concentration
Qp =      4.022 + sum of
          Qa          Tb/Ta
           2.207 *    0.773 =      1.707
Qp =      5.729

Total of 2 streams to confluence:
Flow rates before confluence point:
       4.022       2.207
Area of streams before confluence:
        1.100        0.830
Results of confluence:
Total flow rate =      5.729(CFS)
Time of concentration =     7.800 min.
Effective stream area after confluence =      1.930(Ac.)
End of computations, total study area =            1.93 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.809
Area averaged RI index number =  79.9
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
Rational Hydrology Study Date: 08/20/19 File:ARCEX10.out

MURRIETA APARTMENTS EXISTING CONDITION HYDROLOGY
RATIONAL METHOD ANALYSIS, 10-YEAR STORM EVENT
FILENAME: ARCEX10

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

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

Program License Serial Number 433

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

2 year, 1 hour precipitation = 0.500(In.)
100 year, 1 hour precipitation = 1.200(In.)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.788(In/Hr)
Slope of intensity duration curve = 0.5500

++

Process from Point/Station 301.000 to Point/Station 302.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 138.000(Ft.)
Top (of initial area) elevation = 1172.000(Ft.)
Bottom (of initial area) elevation = 1147.000(Ft.)
Difference in elevation = 25.000(Ft.)
Slope = 0.18116 s(percent)= 18.12
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 5.353 min.
Rainfall intensity = 2.977(In/Hr) for a 10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.839
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 86.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 1.723(CFS)
Total initial stream area = 0.690(Ac.)
Pervious area fraction = 1.000

++

Process from Point/Station 302.000 to Point/Station 304.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****

Top of street segment elevation = 1147.000(Ft.)
End of street segment elevation = 1125.000(Ft.)
Length of street segment = 534.000(Ft.)

```
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      2.235(CFS)
Depth of flow =   0.216(Ft.), Average velocity =   3.404(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   4.490(Ft.)
Flow velocity =   3.40(Ft/s)
Travel time =    2.61 min.     TC =    7.97  min.
 Adding area flow to street
COMMERCIAL subarea type
Runoff Coefficient = 0.878
Decimal fraction soil group A = 0.173
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.827
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  62.60
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      2.392(In/Hr) for a    10.0 year storm
Subarea runoff =      0.861(CFS) for      0.410(Ac.)
Total runoff =      2.584(CFS)        Total area =       1.100(Ac.)
Street flow at end of street =      2.584(CFS)
Half street flow at end of street =      1.292(CFS)
Depth of flow =   0.226(Ft.), Average velocity =   3.471(Ft/s)
Flow width (from curb towards crown)=   4.954(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      302.000 to Point/Station      304.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      1.100(Ac.)
Runoff from this stream =      2.584(CFS)
Time of concentration =    7.97 min.
Rainfall intensity =     2.392(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      303.000 to Point/Station      304.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   479.000(Ft.)
Top (of initial area) elevation =  1169.000(Ft.)
Bottom (of initial area) elevation =  1125.000(Ft.)
Difference in elevation =    44.000(Ft.)
Slope =    0.09186  s(percent)=       9.19
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.088 min.
Rainfall intensity =      2.101(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.799
Decimal fraction soil group A = 0.137
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.863
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  83.40
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      1.393(CFS)
Total initial stream area =        0.830(Ac.)
Pervious area fraction = 1.000
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      303.000 to Point/Station      304.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.830(Ac.)
Runoff from this stream =      1.393(CFS)
Time of concentration =   10.09 min.
Rainfall intensity =     2.101(In/Hr)
Summary of stream data:

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


1        2.584      7.97                2.392
2        1.393     10.09                2.101
Largest stream flow has longer or shorter time of concentration
Qp =      2.584 + sum of
          Qa          Tb/Ta
           1.393 *    0.790 =      1.101
Qp =      3.684

Total of 2 streams to confluence:
Flow rates before confluence point:
       2.584       1.393
Area of streams before confluence:
        1.100        0.830
Results of confluence:
Total flow rate =      3.684(CFS)
Time of concentration =     7.968 min.
Effective stream area after confluence =      1.930(Ac.)
End of computations, total study area =            1.93 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.809
Area averaged RI index number =  79.9
```

APPENDIX B: POST-PROJECT CONDITION RATIONAL METHOD ANALYSIS

APPENDIX B.1: AREA "A"

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
Rational Hydrology Study Date: 08/20/19 File:ARA1P100.out

MURRIETA APARTMENTS POST-PROJECT CONDITION HYDROLOGY
RATIONAL METHOD ANALYSIS, 100-YEAR STORM EVENT
FILENAME: ARA1P100

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

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

Program License Serial Number 433

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

2 year, 1 hour precipitation = 0.500(In.)
100 year, 1 hour precipitation = 1.200(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.200(In/Hr)
Slope of intensity duration curve = 0.5500

++

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

Initial area flow distance = 643.000(Ft.)
Top (of initial area) elevation = 1147.000(Ft.)
Bottom (of initial area) elevation = 1144.000(Ft.)
Difference in elevation = 3.000(Ft.)
Slope = 0.00467 s(percent)= 0.47
TC = k(0.323)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.552 min.
Rainfall intensity = 2.837(In/Hr) for a 100.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.861
Decimal fraction soil group A = 0.170
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.830
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 62.71
Pervious area fraction = 0.200; Impervious fraction = 0.800
Initial subarea runoff = 4.664(CFS)
Total initial stream area = 1.910(Ac.)
Pervious area fraction = 0.200

++

Process from Point/Station 102.000 to Point/Station 105.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1140.000(Ft.)
Downstream point/station elevation = 1138.000(Ft.)
Pipe length = 350.00(Ft.) Manning's N = 0.013

```
No. of pipes = 1  Required pipe flow  =     4.664(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.664(CFS)
Normal flow depth in pipe =   11.73(In.)
Flow top width inside pipe =   12.39(In.)
Critical Depth =   10.51(In.)
Pipe flow velocity =      4.53(Ft/s)
Travel time through pipe =    1.29 min.
Time of concentration (TC) =    13.84 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      105.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      1.910(Ac.)
Runoff from this stream =      4.664(CFS)
Time of concentration =   13.84 min.
Rainfall intensity =     2.689(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   384.000(Ft.)
Top (of initial area) elevation =  1146.000(Ft.)
Bottom (of initial area) elevation =  1144.300(Ft.)
Difference in elevation =     1.700(Ft.)
Slope =    0.00443  s(percent)=       0.44
TC = k(0.323)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.321 min.
Rainfall intensity =      3.160(In/Hr) for a   100.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.858
Decimal fraction soil group A = 0.290
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.710
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  58.27
Pervious area fraction =  0.200; Impervious fraction =  0.800
Initial subarea runoff =      4.366(CFS)
Total initial stream area =        1.610(Ac.)
Pervious area fraction = 0.200


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1140.300(Ft.)
Downstream point/station elevation =  1138.000(Ft.)
Pipe length  =   227.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.366(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.366(CFS)
Normal flow depth in pipe =    9.00(In.)
Flow top width inside pipe =   14.70(In.)
Critical Depth =   10.16(In.)
Pipe flow velocity =      5.68(Ft/s)
Travel time through pipe =    0.67 min.
Time of concentration (TC) =    10.99 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.610(Ac.)
```

```
Runoff from this stream =      4.366(CFS)
Time of concentration =   10.99 min.
Rainfall intensity =     3.053(In/Hr)
Summary of stream data:

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


1        4.664     13.84                 2.689
2        4.366     10.99                 3.053
Largest stream flow has longer time of concentration
Qp =      4.664 + sum of
          Qb         Ia/Ib
           4.366 *    0.881 =      3.845
Qp =      8.509

Total of 2 streams to confluence:
Flow rates before confluence point:
       4.664       4.366
Area of streams before confluence:
        1.910        1.610
Results of confluence:
Total flow rate =      8.509(CFS)
Time of concentration =    13.840 min.
Effective stream area after confluence =      3.520(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      108.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1138.000(Ft.)
Downstream point/station elevation =  1136.000(Ft.)
Pipe length  =   356.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.509(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     8.509(CFS)
Normal flow depth in pipe =   13.15(In.)
Flow top width inside pipe =   20.32(In.)
Critical Depth =   13.01(In.)
Pipe flow velocity =      5.37(Ft/s)
Travel time through pipe =    1.11 min.
Time of concentration (TC) =    14.94 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      108.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      3.520(Ac.)
Runoff from this stream =      8.509(CFS)
Time of concentration =   14.94 min.
Rainfall intensity =     2.577(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.000 to Point/Station      107.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   491.000(Ft.)
Top (of initial area) elevation =  1147.600(Ft.)
Bottom (of initial area) elevation =  1141.000(Ft.)
Difference in elevation =     6.600(Ft.)
Slope =    0.01344  s(percent)=       1.34
TC = k(0.323)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.119 min.
Rainfall intensity =      3.382(In/Hr) for a   100.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.873
```

```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.200; Impervious fraction =  0.800
Initial subarea runoff =      4.842(CFS)
Total initial stream area =        1.640(Ac.)
Pervious area fraction = 0.200


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.000 to Point/Station      107.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
APARTMENT subarea type
Runoff Coefficient = 0.873
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.200; Impervious fraction =  0.800
Time of concentration =     9.12 min.
Rainfall intensity =      3.382(In/Hr) for a   100.0 year storm
Subarea runoff =      3.927(CFS) for      1.330(Ac.)
Total runoff =      8.768(CFS)        Total area =       2.970(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.000 to Point/Station      108.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1137.000(Ft.)
Downstream point/station elevation =  1136.000(Ft.)
Pipe length  =     4.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.768(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     8.768(CFS)
Normal flow depth in pipe =    5.95(In.)
Flow top width inside pipe =   12.00(In.)
Critical depth could not be calculated.
Pipe flow velocity =     22.60(Ft/s)
Travel time through pipe =    0.00 min.
Time of concentration (TC) =     9.12 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.000 to Point/Station      108.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.970(Ac.)
Runoff from this stream =      8.768(CFS)
Time of concentration =    9.12 min.
Rainfall intensity =     3.382(In/Hr)
Summary of stream data:

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


1        8.509     14.94                2.577
2        8.768      9.12                3.382
Largest stream flow has longer or shorter time of concentration
Qp =      8.768 + sum of
          Qa          Tb/Ta
           8.509 *    0.610 =      5.194
Qp =     13.962

Total of 2 streams to confluence:
```

```
Flow rates before confluence point:
       8.509       8.768
Area of streams before confluence:
        3.520        2.970
Results of confluence:
Total flow rate =     13.962(CFS)
Time of concentration =     9.122 min.
Effective stream area after confluence =      6.490(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      109.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1136.000(Ft.)
Downstream point/station elevation =  1131.000(Ft.)
Pipe length  =   293.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    13.962(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    13.962(CFS)
Normal flow depth in pipe =   12.63(In.)
Flow top width inside pipe =   20.56(In.)
Critical Depth =   16.65(In.)
Pipe flow velocity =      9.24(Ft/s)
Travel time through pipe =    0.53 min.
Time of concentration (TC) =     9.65 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      109.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
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 = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =     9.65 min.
Rainfall intensity =      3.278(In/Hr) for a   100.0 year storm
Subarea runoff =      0.784(CFS) for      0.270(Ac.)
Total runoff =     14.747(CFS)        Total area =       6.760(Ac.)
End of computations, total study area =            6.76 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.196
Area averaged RI index number =  64.7
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
Rational Hydrology Study Date: 10/10/19 File:ARA6P100.out

MURRIETA APARTMENTS POST-PROJECT CONDITION HYDROLOGY
RATIONAL METHOD ANALYSIS, 100-YEAR STORM EVENT
FILENAME: ARA6P100

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

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

Program License Serial Number 433

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

2 year, 1 hour precipitation = 0.500(In.)
100 year, 1 hour precipitation = 1.200(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.200(In/Hr)
Slope of intensity duration curve = 0.5500

++

Process from Point/Station 111.000 to Point/Station 112.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 477.000(Ft.)
Top (of initial area) elevation = 1141.000(Ft.)
Bottom (of initial area) elevation = 1123.000(Ft.)
Difference in elevation = 18.000(Ft.)
Slope = 0.03774 s(percent)= 3.77
TC = k(0.940)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 21.340 min.
Rainfall intensity = 2.119(In/Hr) for a 100.0 year storm
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.712
Decimal fraction soil group A = 0.100
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.900
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 70.40
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 0.799(CFS)
Total initial stream area = 0.530(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 0.53 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number = 70.4

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
Rational Hydrology Study Date: 08/20/19 File:ARA1P10.out

MURRIETA APARTMENTS POST-PROJECT CONDITION HYDROLOGY
RATIONAL METHOD ANALYSIS, 10-YEAR STORM EVENT
FILENAME: ARA1P10

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

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

Program License Serial Number 433

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

2 year, 1 hour precipitation = 0.500(In.)
100 year, 1 hour precipitation = 1.200(In.)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.788(In/Hr)
Slope of intensity duration curve = 0.5500

++

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

Initial area flow distance = 643.000(Ft.)
Top (of initial area) elevation = 1147.000(Ft.)
Bottom (of initial area) elevation = 1144.000(Ft.)
Difference in elevation = 3.000(Ft.)
Slope = 0.00467 s(percent)= 0.47
TC = k(0.323)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.552 min.
Rainfall intensity = 1.863(In/Hr) for a 10.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.846
Decimal fraction soil group A = 0.170
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.830
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 62.71
Pervious area fraction = 0.200; Impervious fraction = 0.800
Initial subarea runoff = 3.011(CFS)
Total initial stream area = 1.910(Ac.)
Pervious area fraction = 0.200

++

Process from Point/Station 102.000 to Point/Station 105.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1140.000(Ft.)
Downstream point/station elevation = 1138.000(Ft.)
Pipe length = 350.00(Ft.) Manning's N = 0.013

```
No. of pipes = 1  Required pipe flow  =     3.011(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.011(CFS)
Normal flow depth in pipe =    8.52(In.)
Flow top width inside pipe =   14.86(In.)
Critical Depth =    8.38(In.)
Pipe flow velocity =      4.19(Ft/s)
Travel time through pipe =    1.39 min.
Time of concentration (TC) =    13.95 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      105.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      1.910(Ac.)
Runoff from this stream =      3.011(CFS)
Time of concentration =   13.95 min.
Rainfall intensity =     1.758(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   384.000(Ft.)
Top (of initial area) elevation =  1146.000(Ft.)
Bottom (of initial area) elevation =  1144.300(Ft.)
Difference in elevation =     1.700(Ft.)
Slope =    0.00443  s(percent)=       0.44
TC = k(0.323)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.321 min.
Rainfall intensity =      2.075(In/Hr) for a    10.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.843
Decimal fraction soil group A = 0.290
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.710
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  58.27
Pervious area fraction =  0.200; Impervious fraction =  0.800
Initial subarea runoff =      2.817(CFS)
Total initial stream area =        1.610(Ac.)
Pervious area fraction = 0.200


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1140.300(Ft.)
Downstream point/station elevation =  1138.000(Ft.)
Pipe length  =   227.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.817(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.817(CFS)
Normal flow depth in pipe =    8.02(In.)
Flow top width inside pipe =   11.30(In.)
Critical Depth =    8.63(In.)
Pipe flow velocity =      5.06(Ft/s)
Travel time through pipe =    0.75 min.
Time of concentration (TC) =    11.07 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.610(Ac.)
```

```
Runoff from this stream =      2.817(CFS)
Time of concentration =   11.07 min.
Rainfall intensity =     1.996(In/Hr)
Summary of stream data:

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


1        3.011     13.95                1.758
2        2.817     11.07                1.996
Largest stream flow has longer time of concentration
Qp =      3.011 + sum of
          Qb         Ia/Ib
           2.817 *    0.881 =      2.481
Qp =      5.492

Total of 2 streams to confluence:
Flow rates before confluence point:
       3.011       2.817
Area of streams before confluence:
        1.910        1.610
Results of confluence:
Total flow rate =      5.492(CFS)
Time of concentration =    13.945 min.
Effective stream area after confluence =      3.520(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      108.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1138.000(Ft.)
Downstream point/station elevation =  1136.000(Ft.)
Pipe length  =   356.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.492(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     5.492(CFS)
Normal flow depth in pipe =   11.07(In.)
Flow top width inside pipe =   17.52(In.)
Critical Depth =   10.84(In.)
Pipe flow velocity =      4.82(Ft/s)
Travel time through pipe =    1.23 min.
Time of concentration (TC) =    15.18 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      108.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      3.520(Ac.)
Runoff from this stream =      5.492(CFS)
Time of concentration =   15.18 min.
Rainfall intensity =     1.678(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.000 to Point/Station      107.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   491.000(Ft.)
Top (of initial area) elevation =  1147.600(Ft.)
Bottom (of initial area) elevation =  1141.000(Ft.)
Difference in elevation =     6.600(Ft.)
Slope =    0.01344  s(percent)=       1.34
TC = k(0.323)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.119 min.
Rainfall intensity =      2.221(In/Hr) for a    10.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.862
```

```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.200; Impervious fraction =  0.800
Initial subarea runoff =      3.139(CFS)
Total initial stream area =        1.640(Ac.)
Pervious area fraction = 0.200


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.000 to Point/Station      107.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
APARTMENT subarea type
Runoff Coefficient = 0.862
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.200; Impervious fraction =  0.800
Time of concentration =     9.12 min.
Rainfall intensity =      2.221(In/Hr) for a    10.0 year storm
Subarea runoff =      2.545(CFS) for      1.330(Ac.)
Total runoff =      5.684(CFS)        Total area =       2.970(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.000 to Point/Station      108.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1137.000(Ft.)
Downstream point/station elevation =  1136.000(Ft.)
Pipe length  =     4.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.684(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     5.684(CFS)
Normal flow depth in pipe =    5.48(In.)
Flow top width inside pipe =    8.78(In.)
Critical depth could not be calculated.
Pipe flow velocity =     20.18(Ft/s)
Travel time through pipe =    0.00 min.
Time of concentration (TC) =     9.12 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.000 to Point/Station      108.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.970(Ac.)
Runoff from this stream =      5.684(CFS)
Time of concentration =    9.12 min.
Rainfall intensity =     2.220(In/Hr)
Summary of stream data:

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


1        5.492     15.18                 1.678
2        5.684      9.12                 2.220
Largest stream flow has longer or shorter time of concentration
Qp =      5.684 + sum of
          Qa          Tb/Ta
           5.492 *    0.601 =      3.301
Qp =      8.985

Total of 2 streams to confluence:
```

```
Flow rates before confluence point:
       5.492       5.684
Area of streams before confluence:
        3.520        2.970
Results of confluence:
Total flow rate =      8.985(CFS)
Time of concentration =     9.122 min.
Effective stream area after confluence =      6.490(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      109.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1136.000(Ft.)
Downstream point/station elevation =  1131.000(Ft.)
Pipe length  =   293.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.985(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     8.985(CFS)
Normal flow depth in pipe =   13.50(In.)
Flow top width inside pipe =    9.00(In.)
Critical Depth =   13.86(In.)
Pipe flow velocity =      7.73(Ft/s)
Travel time through pipe =    0.63 min.
Time of concentration (TC) =     9.75 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      109.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
COMMERCIAL subarea type
Runoff Coefficient = 0.880
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =     9.75 min.
Rainfall intensity =      2.140(In/Hr) for a    10.0 year storm
Subarea runoff =      0.509(CFS) for      0.270(Ac.)
Total runoff =      9.494(CFS)        Total area =       6.760(Ac.)
End of computations, total study area =            6.76 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.196
Area averaged RI index number =  64.7
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
Rational Hydrology Study Date: 10/10/19 File:ARA6P10.out

MURRIETA APARTMENTS POST-PROJECT CONDITION HYDROLOGY
RATIONAL METHOD ANALYSIS, 10-YEAR STORM EVENT
FILENAME: ARA6P10

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

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

Program License Serial Number 433

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

2 year, 1 hour precipitation = 0.500(In.)
100 year, 1 hour precipitation = 1.200(In.)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.788(In/Hr)
Slope of intensity duration curve = 0.5500

++

Process from Point/Station 111.000 to Point/Station 112.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 477.000(Ft.)
Top (of initial area) elevation = 1141.000(Ft.)
Bottom (of initial area) elevation = 1123.000(Ft.)
Difference in elevation = 18.000(Ft.)
Slope = 0.03774 s(percent)= 3.77
TC = k(0.940)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 21.340 min.
Rainfall intensity = 1.391(In/Hr) for a 10.0 year storm
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.642
Decimal fraction soil group A = 0.100
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.900
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 70.40
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 0.473(CFS)
Total initial stream area = 0.530(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 0.53 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number = 70.4

APPENDIX B.2: AREA "B"

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
Rational Hydrology Study Date: 08/20/19 File:ARBP100.out

MURRIETA APARTMENTS POST-PROJECT CONDITION HYDROLOGY
RATIONAL METHOD ANALYSIS, 100-YEAR STORM EVENT
FILENAME: ARBP100

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

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

Program License Serial Number 433

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

2 year, 1 hour precipitation = 0.500(In.)
100 year, 1 hour precipitation = 1.200(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.200(In/Hr)
Slope of intensity duration curve = 0.5500

++

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

Initial area flow distance = 218.000(Ft.)
Top (of initial area) elevation = 1121.000(Ft.)
Bottom (of initial area) elevation = 1118.000(Ft.)
Difference in elevation = 3.000(Ft.)
Slope = 0.01376 s(percent)= 1.38
TC = k(0.940)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 19.089 min.
Rainfall intensity = 2.253(In/Hr) for a 100.0 year storm
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.458
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 38.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 0.433(CFS)
Total initial stream area = 0.420(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 0.42 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number = 38.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
Rational Hydrology Study Date: 08/20/19 File:ARBP10.out

MURRIETA APARTMENTS POST-PROJECT CONDITION HYDROLOGY
RATIONAL METHOD ANALYSIS, 10-YEAR STORM EVENT
FILENAME: ARBP10

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

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

Program License Serial Number 433

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

2 year, 1 hour precipitation = 0.500(In.)
100 year, 1 hour precipitation = 1.200(In.)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.788(In/Hr)
Slope of intensity duration curve = 0.5500

++

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

Initial area flow distance = 218.000(Ft.)
Top (of initial area) elevation = 1121.000(Ft.)
Bottom (of initial area) elevation = 1118.000(Ft.)
Difference in elevation = 3.000(Ft.)
Slope = 0.01376 s(percent)= 1.38
TC = k(0.940)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 19.089 min.
Rainfall intensity = 1.479(In/Hr) for a 10.0 year storm
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.364
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 38.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 0.226(CFS)
Total initial stream area = 0.420(Ac.)
Pervious area fraction = 1.000
End of computations, total study area = 0.42 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number = 38.0

APPENDIX B.3: AREA "C"

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
Rational Hydrology Study Date: 08/20/19 File:ARCP100.out

MURRIETA APARTMENTS POST-PROJECT CONDITION HYDROLOGY
RATIONAL METHOD ANALYSIS, 100-YEAR STORM EVENT
FILENAME: ARCP100

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

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

Program License Serial Number 433

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

2 year, 1 hour precipitation = 0.500(In.)
100 year, 1 hour precipitation = 1.200(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.200(In/Hr)
Slope of intensity duration curve = 0.5500

++

Process from Point/Station 301.000 to Point/Station 302.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 636.000(Ft.)
Top (of initial area) elevation = 1147.000(Ft.)
Bottom (of initial area) elevation = 1125.000(Ft.)
Difference in elevation = 22.000(Ft.)
Slope = 0.03459 s(percent)= 3.46
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 10.108 min.
Rainfall intensity = 3.196(In/Hr) for a 100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.794
Decimal fraction soil group A = 0.310
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.690
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 57.53
Pervious area fraction = 0.500; Impervious fraction = 0.500
Initial subarea runoff = 1.776(CFS)
Total initial stream area = 0.700(Ac.)
Pervious area fraction = 0.500
End of computations, total study area = 0.70 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.500
Area averaged RI index number = 57.5

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
Rational Hydrology Study Date: 08/20/19 File:ARCP10.out

MURRIETA APARTMENTS POST-PROJECT CONDITION HYDROLOGY
RATIONAL METHOD ANALYSIS, 10-YEAR STORM EVENT
FILENAME: ARCP10

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

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

Program License Serial Number 433

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

2 year, 1 hour precipitation = 0.500(In.)
100 year, 1 hour precipitation = 1.200(In.)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.788(In/Hr)
Slope of intensity duration curve = 0.5500

++

Process from Point/Station 301.000 to Point/Station 302.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 636.000(Ft.)
Top (of initial area) elevation = 1147.000(Ft.)
Bottom (of initial area) elevation = 1125.000(Ft.)
Difference in elevation = 22.000(Ft.)
Slope = 0.03459 s(percent)= 3.46
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 10.108 min.
Rainfall intensity = 2.099(In/Hr) for a 10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.756
Decimal fraction soil group A = 0.310
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.690
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 57.53
Pervious area fraction = 0.500; Impervious fraction = 0.500
Initial subarea runoff = 1.111(CFS)
Total initial stream area = 0.700(Ac.)
Pervious area fraction = 0.500
End of computations, total study area = 0.70 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.500
Area averaged RI index number = 57.5

APPENDIX C: INLET CALCULATIONS

Worksheet for Catch Basin #1

Project Description

Solve For	Spread

Input Data

Discharge		4.70	ft^3/s
Gutter Width		2.00	ft
Gutter Cross Slope		0.06	ft/ft
Road Cross Slope		0.02	ft/ft
Curb Opening Length		4.00	ft
Opening Height		0.83	ft
Curb Throat Type	Horizontal		
Local Depression		4.00	in
Local Depression Width		4.00	ft
Throat Incline Angle		90.00	degrees

Results

Spread	16.08	ft
Depth	0.41	ft
Gutter Depression	0.09	ft
Total Depression	0.42	ft

Worksheet for Catch Basin #2

Project Description

Solve For	Spread

Input Data

Discharge		4.40	ft^3/s
Gutter Width		2.00	ft
Gutter Cross Slope		0.06	ft/ft
Road Cross Slope		0.02	ft/ft
Curb Opening Length		4.00	ft
Opening Height		0.83	ft
Curb Throat Type	Horizontal		
Local Depression		4.00	in
Local Depression Width		4.00	ft
Throat Incline Angle		90.00	degrees

Results

Spread	15.39	ft
Depth	0.39	ft
Gutter Depression	0.09	ft
Total Depression	0.42	ft

Worksheet for Catch Basin #3

Project Description

Solve For	Spread

Input Data

Discharge		8.80	ft^3/s
Gutter Width		2.00	ft
Gutter Cross Slope		0.06	ft/ft
Road Cross Slope		0.02	ft/ft
Curb Opening Length		7.00	ft
Opening Height		0.83	ft
Curb Throat Type	Horizontal		
Local Depression		4.00	in
Local Depression Width		4.00	ft
Throat Incline Angle		90.00	degrees

Results

Spread	20.86	ft
Depth	0.50	ft
Gutter Depression	0.09	ft
Total Depression	0.42	ft

APPENDIX D: STORM DRAIN CALCULATIONS

Worksheet for Line A-R1

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	2.00	ft
Discharge	14.80	ft^3/s

Results

Normal Depth	1.18	ft
Flow Area	1.93	ft^2
Wetted Perimeter	3.50	ft
Hydraulic Radius	0.55	ft
Top Width	1.97	ft
Critical Depth	1.39	ft
Percent Full	59.0	%
Critical Slope	0.00626	ft/ft
Velocity	7.68	ft/s
Velocity Head	0.92	ft
Specific Energy	2.10	ft
Froude Number	1.37	
Maximum Discharge	24.33	ft^3/s
Discharge Full	22.62	ft^3/s
Slope Full	0.00428	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	58.98	%
Downstream Velocity	Infinity	ft/s

Worksheet for Line A-R1

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.18	ft
Critical Depth	1.39	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00626	ft/ft

Worksheet for Line A-R2

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	2.00	ft
Discharge	14.00	ft^3/s

Results

Normal Depth	1.14	ft
Flow Area	1.85	ft^2
Wetted Perimeter	3.42	ft
Hydraulic Radius	0.54	ft
Top Width	1.98	ft
Critical Depth	1.35	ft
Percent Full	56.9	%
Critical Slope	0.00605	ft/ft
Velocity	7.58	ft/s
Velocity Head	0.89	ft
Specific Energy	2.03	ft
Froude Number	1.38	
Maximum Discharge	24.33	ft^3/s
Discharge Full	22.62	ft^3/s
Slope Full	0.00383	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	56.93	%
Downstream Velocity	Infinity	ft/s

Worksheet for Line A-R2

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.14	ft
Critical Depth	1.35	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00605	ft/ft

Worksheet for Line A1-R1

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00500	ft/ft
Diameter	2.00	ft
Discharge	8.50	ft^3/s

Results

Normal Depth	1.04	ft
Flow Area	1.64	ft^2
Wetted Perimeter	3.22	ft
Hydraulic Radius	0.51	ft
Top Width	2.00	ft
Critical Depth	1.04	ft
Percent Full	51.8	%
Critical Slope	0.00496	ft/ft
Velocity	5.17	ft/s
Velocity Head	0.42	ft
Specific Energy	1.45	ft
Froude Number	1.00	
Maximum Discharge	17.21	ft^3/s
Discharge Full	16.00	ft^3/s
Slope Full	0.00141	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	51.84	%
Downstream Velocity	Infinity	ft/s

Worksheet for Line A1-R1

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.04	ft
Critical Depth	1.04	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00496	ft/ft

Worksheet for Line A1-R2

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00500	ft/ft
Diameter	1.50	ft
Discharge	4.40	ft^3/s

Results

Normal Depth	0.83	ft
Flow Area	1.00	ft^2
Wetted Perimeter	2.52	ft
Hydraulic Radius	0.40	ft
Top Width	1.49	ft
Critical Depth	0.80	ft
Percent Full	55.4	%
Critical Slope	0.00555	ft/ft
Velocity	4.38	ft/s
Velocity Head	0.30	ft
Specific Energy	1.13	ft
Froude Number	0.94	
Maximum Discharge	7.99	ft^3/s
Discharge Full	7.43	ft^3/s
Slope Full	0.00175	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	55.39	%
Downstream Velocity	Infinity	ft/s

Worksheet for Line A1-R2

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.83	ft
Critical Depth	0.80	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00555	ft/ft

Worksheet for Line A3

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00500	ft/ft
Diameter	2.00	ft
Discharge	8.80	ft^3/s

Results

Normal Depth	1.06	ft
Flow Area	1.69	ft^2
Wetted Perimeter	3.26	ft
Hydraulic Radius	0.52	ft
Top Width	2.00	ft
Critical Depth	1.06	ft
Percent Full	52.9	%
Critical Slope	0.00501	ft/ft
Velocity	5.21	ft/s
Velocity Head	0.42	ft
Specific Energy	1.48	ft
Froude Number	1.00	
Maximum Discharge	17.21	ft^3/s
Discharge Full	16.00	ft^3/s
Slope Full	0.00151	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	52.93	%
Downstream Velocity	Infinity	ft/s

Worksheet for Line A3

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.06	ft
Critical Depth	1.06	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00501	ft/ft

Worksheet for Line A2

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00500	ft/ft
Diameter	1.50	ft
Discharge	4.70	ft³/s

Results

Normal Depth	0.87	ft
Flow Area	1.06	ft²
Wetted Perimeter	2.59	ft
Hydraulic Radius	0.41	ft
Top Width	1.48	ft
Critical Depth	0.83	ft
Percent Full	57.7	%
Critical Slope	0.00566	ft/ft
Velocity	4.45	ft/s
Velocity Head	0.31	ft
Specific Energy	1.17	ft
Froude Number	0.93	
Maximum Discharge	7.99	ft³/s
Discharge Full	7.43	ft³/s
Slope Full	0.00200	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	57.73	%
Downstream Velocity	Infinity	ft/s

Worksheet for Line A2

GVF Output Data

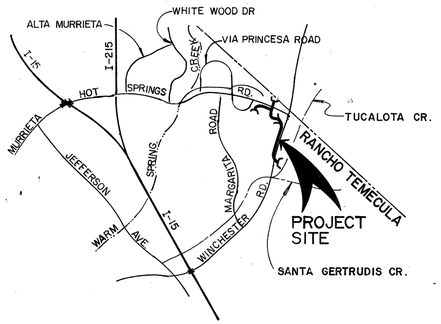
Upstream Velocity	Infinity	ft/s
Normal Depth	0.87	ft
Critical Depth	0.83	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00566	ft/ft

EXCERPTS

EXCERPT A: WINCHESTER ROAD STORM DRAIN

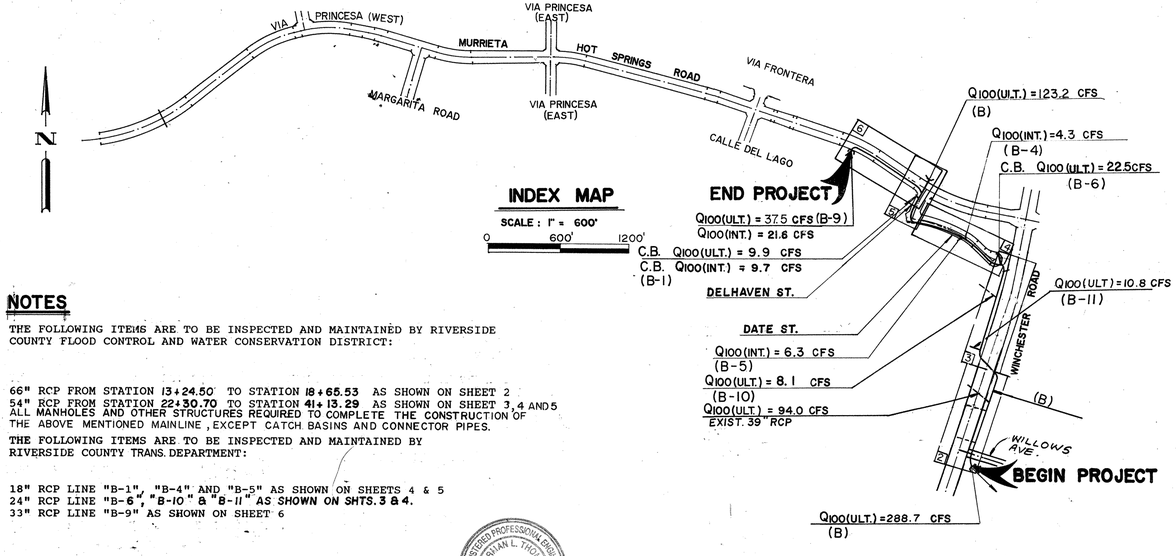
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

ASSESSMENT DISTRICT NO. 161



VICINITY MAP

NOT TO SCALE



INDEX MAP

SCALE: 1" = 600'

NOTES

THE FOLLOWING ITEMS ARE TO BE INSPECTED AND MAINTAINED BY RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT:

66" RCP FROM STATION 13+24.50 TO STATION 18+65.53 AS SHOWN ON SHEET 2
54" RCP FROM STATION 22+30.70 TO STATION 41+13.29 AS SHOWN ON SHEET 3,4 AND 5
ALL MANHOLES AND OTHER STRUCTURES REQUIRED TO COMPLETE THE CONSTRUCTION OF THE ABOVE MENTIONED MAINLINE, EXCEPT CATCH BASINS AND CONNECTOR PIPES.

THE FOLLOWING ITEMS ARE TO BE INSPECTED AND MAINTAINED BY RIVERSIDE COUNTY TRANS. DEPARTMENT:

18" RCP LINE "B-1", "B-4" AND "B-5" AS SHOWN ON SHEETS 4 & 5
24" RCP LINE "B-6", "B-10" & "B-11" AS SHOWN ON SHTS. 3 & 4.
33" RCP LINE "B-9" AS SHOWN ON SHEET 6

REGISTERED PROFESSIONAL ENGINEER NORMAN L. THOMAS NO. 30927 Exp. 3/31/92 CIVIL STATE OF CALIFORNIA

GENERAL NOTES

1. THE CONTRACTOR SHALL CONSTRUCT THE FLOOD CONTROL IMPROVEMENTS SHOWN ON THE DRAWINGS IN CONFORMANCE WITH THE REQUIREMENTS OF THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT'S MEMORANDUM OF UNDERSTANDING STANDARD SPECIFICATIONS DATED SEPTEMBER 1984, AND DESIGN MANUAL STANDARD DRAWINGS DATED MAY 1971.
2. IF AN ENCROACHMENT PERMIT IS REQUIRED FROM RIVERSIDE COUNTY FLOOD CONTROL, THEN CONTACT COEN COUWENBERG AT 714/275-1277. AFTER THE PERMIT IS ISSUED THE DISTRICT MUST BE NOTIFIED ONE WEEK PRIOR TO CONSTRUCTION.
3. CONSTRUCTION INSPECTION WILL BE PERFORMED BY RIVERSIDE COUNTY FLOOD CONTROL. CONTACT LEONARD DUNN AT 714/275-1288. THE DISTRICT MUST BE NOTIFIED TWO WEEKS PRIOR TO CONSTRUCTION.
4. ALL STATIONING REFERS TO CENTERLINE OF CONSTRUCTION UNLESS OTHERWISE NOTED.
5. STATIONING FOR LATERALS AND CONNECTOR PIPE REFER TO THE CENTERLINE-CENTERLINE INTERSECTION STATION.
6. FORTY-EIGHT HOURS BEFORE EXCAVATION, CALL UNDERGROUND SERVICE ALERT 1-800-422-4133.
7. ALL ELEVATIONS SHOWN ARE IN FEET AND DECIMALS THEREOF BASED ON U.S.C. & G.S. DATUM.
8. ALL CROSS SECTIONS ARE TAKEN LOOKING DOWNSTREAM.
9. ELEVATIONS OF UTILITIES ARE APPROXIMATE UNLESS OTHERWISE NOTED.
10. OPENINGS RESULTING FROM THE CUTTING OR PARTIAL REMOVAL OF EXISTING CULVERTS, PIPES OR SIMILAR STRUCTURES TO BE ABANDONED SHALL BE SEALED WITH 6" OF CLASS "B" CONCRETE.
11. PIPE CONNECTED TO THE MAINLINE PIPE SHALL CONFORM TO JUNCTION STRUCTURE NO. 4 (JS 229) UNLESS OTHERWISE NOTED.
12. BEDDING PIPE WITH LESS THAN TWO FEET OF COVER SHALL CONFORM TO LOS ANGELES COUNTY FLOOD CONTROL DISTRICT STANDARD DRAWINGS 2-D213.3 AND 2-D177 FOR CONCRETE BACKFILL IN TRENCHES. ALL OTHER PIPE SHALL CONFORM TO RCFC & WCD STD. DWG. M815.
13. BH-1 INDICATES SOIL BORING LOCATIONS BASED ON THE SOILS REPORT DATED 2/2/90. LOCATIONS SHOWN ARE APPROXIMATE.
14. "V" IS THE DEPTH OF INLET OF CATCH BASINS MEASURED FORM THE TOP OF CURB TO INVERT OF CONNECTOR PIPE.
15. CATCH BASINS SHALL BE LOCATED SO THAT LOCAL DEPRESSION SHALL BEGIN AT EXISTING CURB RETURN JOINT, UNLESS OTHERWISE SPECIFIED.
16. ALL CURBS, GUTTERS, SIDEWALKS, DRIVEWAYS AND OTHER EXISTING IMPROVEMENTS TO BE RECONSTRUCTED IN KIND AND AT THE SAME ELEVATION AND LOCATION AS THE EXISTING IMPROVEMENTS UNLESS OTHERWISE NOTED.
17. **FILTER BLANKET MATERIAL SHALL BE 12" THICK AND BE WELL GRADED WITHIN THE LIMITS SPECIFIED BELOW**

STONE SIZE IN INCHES	% SMALLER BY WEIGHT
12	100
8	75 - 100
6	60 - 80
4	40 - 60
1	5 - 25
3/8	0 - 10

18. ROCK RIPRAP SHALL CONFORM TO CALTRANS STANDARD SPECIFICATION SECTION 72 METHOD. ROCK SIZE AS PER PLAN.

FILTER FABRIC:
MIRAFI 700X OR EQUIVALENT FILTER BLANKET SHALL BE 12" THICK AND WELL GRADED WITHIN THE LIMITS SPECIFIED.

NOTES:
1. PLANS SHALL SPECIFY:
   a) ROCK CLASS AND THICKNESS (T)
   b) FILTER MATERIAL NUMBER OF LAYERS & THICKNESS

INDEX

R.C.F.C.D. STANDARD DRAWINGS

CB 100	CATCH BASIN NO. 1
LD 201	LOCAL DEPRESSION NO.2
MH 252	MANHOLE NO. 2
JS 227	JUNCTION STRUCTURE NO.2
JS 229	JUNCTION STRUCTURE NO.4
M 803	CONCRETE COLLAR
MH 251	MANHOLE NO. 1

CALTRANS STANDARD DRAWINGS

D86B	PIPE CULVERT HEADWALL

BENCHMARK DESCRIPTION

ELEVATION 1091.074 DATE: 9-13-82
RIVERSIDE COUNTY DESIGNATION: T-46-81 STAMPED ON 2 & 1/2" BRASS DISK IN CONCRETE WALL FROM THE INTERSECTION OF RANCHO CALIFORNIA ROAD AND FRONT STREET, 1.7 MILES NORTHWEST ON FRONT STREET-JEFFERSON AVENUE TO THE INTERSECTION OF JEFFERSON AND WINCHESTER (HWY. 79), 2.0 MILES NORTHEAST ON WINCHESTER ROAD (HWY. 79) TO A BRIDGE OVER THE TUCALOTA CREEK AND THE SANTA GERTRUDIS CREEKFORK. IN THE SOUTHEAST WINGWALL, 6 FEET SOUTHEAST OF CORNER OF BRIDGE ABUTMENT 3 FEET EAST OF STEEL GUARDRAIL, 19 FEET NORTH OF TELEPHONE SERVICE BOX.

NOTICE

THE CONTRACTOR SHALL NOTIFY THE COUNTY (OR DISTRICT, AS APPROPRIATE) IN WRITING A MINIMUM OF TWO WEEKS BEFORE BEGINNING CONSTRUCTION, AND SHALL NOT BEGIN CONSTRUCTION BEFORE OBTAINING AUTHORIZATION TO PROCEED.

UNDERGROUND STRUCTURES

ALL UNDERGROUND UTILITIES OR STRUCTURES REPORTED BY THE OWNER OR OTHERS AND THOSE SHOWN ON THE RECORDS EXAMINED ARE INDICATED WITH THEIR APPROXIMATE LOCATION AND EXTENT. THE OWNER BY ACCEPTING THESE PLANS OR PROCEEDING WITH IMPROVEMENTS PURSUANT THERETO AGREES TO ASSUME LIABILITY AND TO HOLD UNDERSIGNED HARMLESS FOR ANY DAMAGES RESULTING FROM THE EXISTENCE OF UNDERGROUND UTILITIES OR STRUCTURES NOT REPORTED TO THE UNDERSIGNED; NOT INDICATED ON THE PUBLIC RECORDS EXAMINED; LOCATED AT VARIANCE WITH THAT REPORTED OR SHOWN ON RECORDS EXAMINED. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES OR STRUCTURES SHOWN AND ANY OTHER UTILITIES OR STRUCTURES FOUND AT THE SITE. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE OWNERS OF THE UTILITIES OR STRUCTURES CONCERNED BEFORE STARTING WORK.

UNAUTHORIZED CHANGES & USES

CAUTION: THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS.

AS BUILT

APPROVED BY: Norman L. Thomas

DATE 5-8-95

CALIFORNIA COUNCIL OF CIVIL ENGINEERS & LAND SURVEYORS

REGISTERED PROFESSIONAL ENGINEER JOHN A. BAUMGARTEN 22875 EXP. 12/31/93 CIVIL STATE OF CALIFORNIA

DESIGNED BY: E.R.S.
DRAWN BY: R.L.
CHECKED BY: CHUCK

RANPAC ENGINEERING CORP.
27447 Enterprise Circle West
Temecula, California 92390
Tel. (714) 676-7000

SUBMITTED BY: Norman Thomas
REGISTERED CIVIL ENGINEER NO. 30927
EXP. 3/31/92
DATE: 4/11/91

BENCH MARK: SEE ABOVE RIGHT

REVISIONS

REF.	DESCRIPTION	APPR	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

RECOMMENDED FOR APPROVAL BY: Frank J. Davis
PLANNING ENGINEER
DATE: 6/29/94

APPROVED BY: Kenneth S. Edwards
CHIEF ENGINEER
DATE: 7-5-94

County of Riverside

APPROVED BY:
FOR TRANS. DEPT.
RIVERSIDE COUNTY, CALIF. DATE:

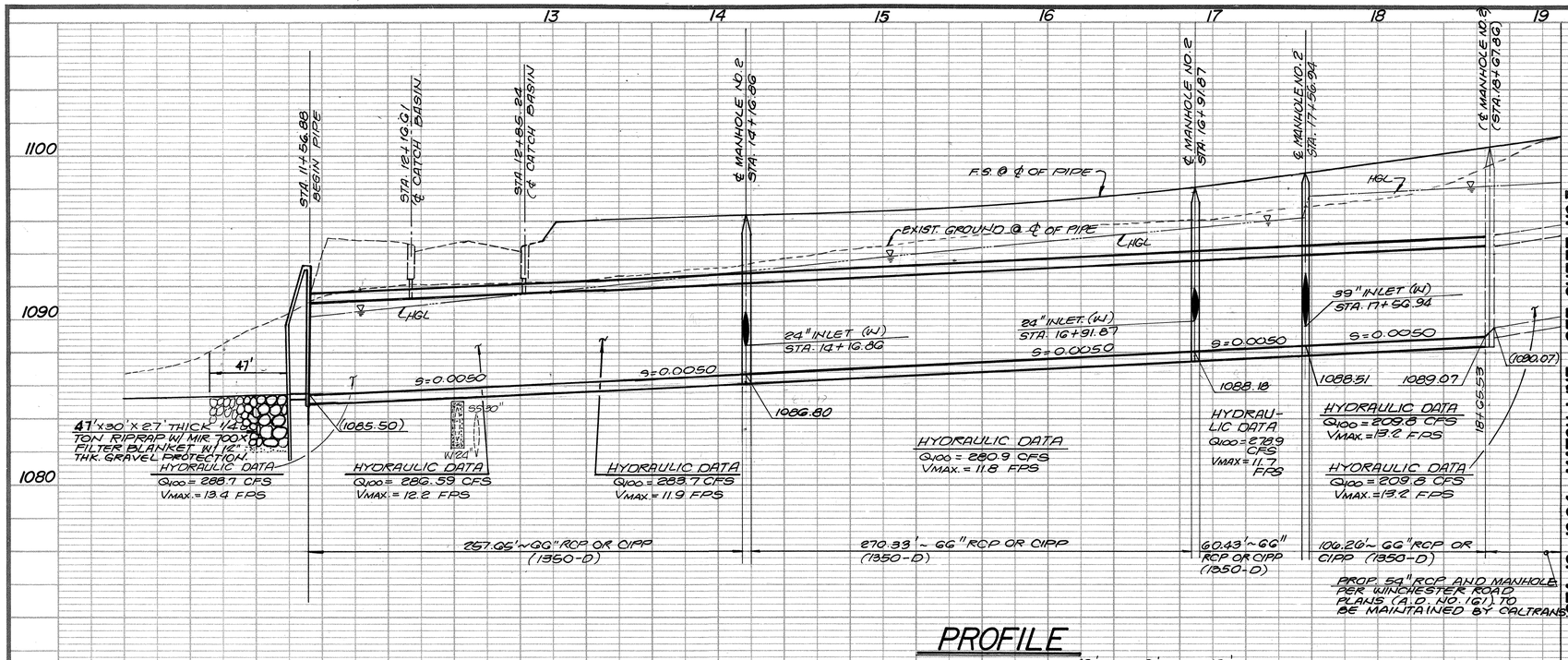
ASSESSMENT DISTRICT NO. 161

WINCHESTER RD. STORM DRAIN

TITLE SHEET

PROJECT NO. 7-0-184
DRAWING NO. 7-152
SHEET NO. 1 OF 8

135-33

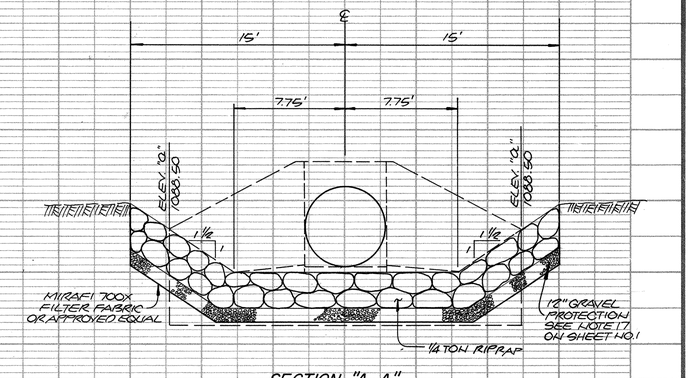


PROFILE

TO BE MAINTAINED BY RCFCD & WCD

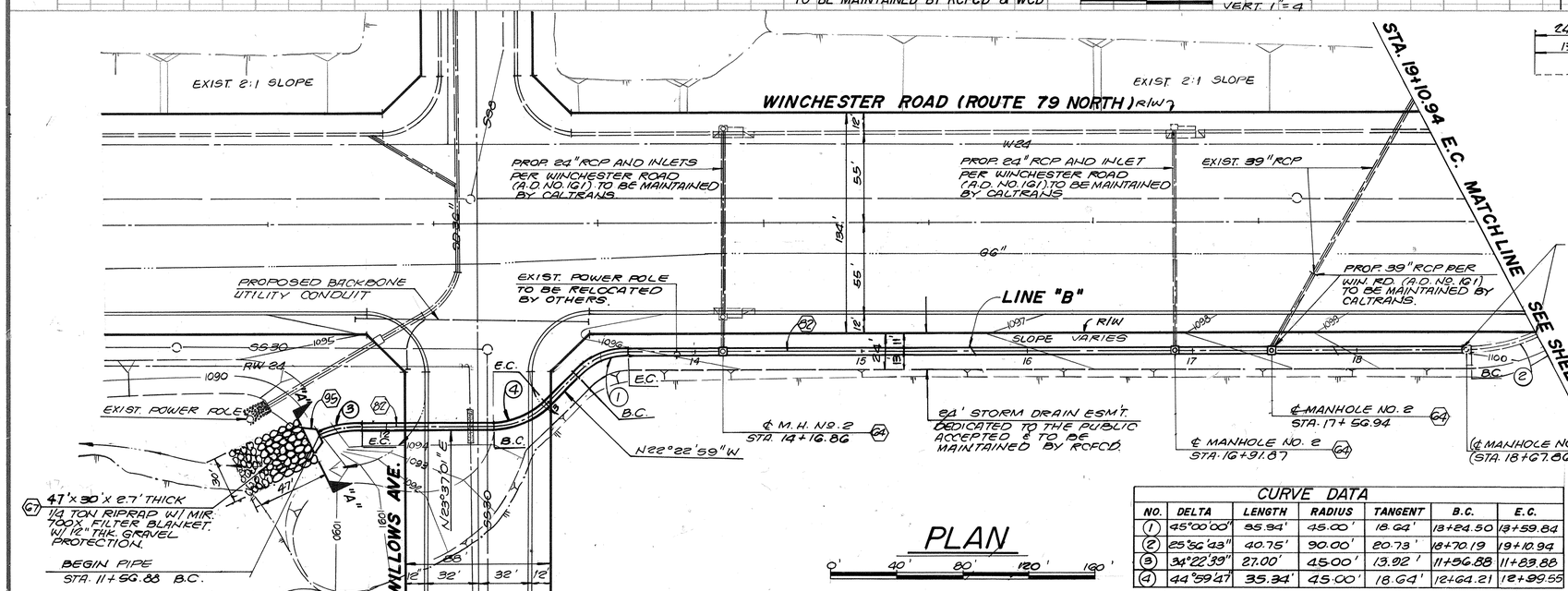
40' 0' 40'

VERT. 1" = 4'



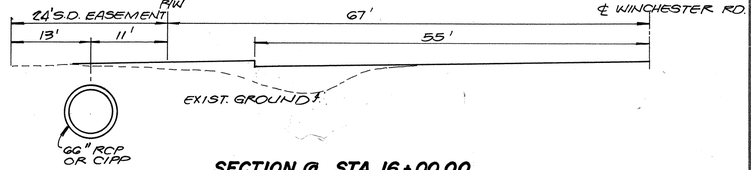
SECTION "A-A"

N.T.S.



PLAN

0' 40' 80' 120' 160'



SECTION @ STA. 16+00.00

10' 0' 10'

CURVE DATA						
NO.	DELTA	LENGTH	RADIUS	TANGENT	B.C.	E.C.
(1)	45°00'00"	85.94'	45.00'	18.64'	18+24.50	19+59.84
(2)	25°56'43"	40.75'	90.00'	20.73'	18+70.19	19+10.94
(3)	34°22'39"	27.00'	45.00'	13.92'	11+56.88	11+83.88
(4)	44°59'47"	35.34'	45.00'	18.64'	12+64.21	12+99.55

CONSTRUCTION NOTES:

(24) CONSTRUCT MANHOLE NO. 2 PER RCFCD STD. DWG. NO. MH 252.

(62) INSTALL RCP OR CIPP PER RCFCD OR COUNTY SPECIFICATION. (SIZE AND CLASS PER PLAN & PROFILE.

(67) INSTALL 30'x 30'x 2.7' THICK 1/4 TON RIPRAP

(95) CONSTRUCT HEADWALL PER CALTRANS STD. DWG. D86-B L=10' W=7.75' ELEV. "a" = 1088.50

AS BUILT

APPROVED BY: [signature]

DATE 5-8-96

REGISTERED PROFESSIONAL ENGINEER CHARLES A. COLLINS No. 34490 CIVIL STATE OF CALIFORNIA

RANPAC ENGINEERING CORP.
27447 Enterprise Circle West
Temecula, California 92390
Tel. (909) 676-7000

SUBMITTED BY: [signature]
REGISTERED CIVIL ENGINEER NO. 34490
EXP. 9/30/95
DATE: 3/21/95

BENCH MARK: SEE SHEET NO. 1

REVISIONS			
REF.	DESCRIPTION	APPR	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

RECOMMENDED FOR APPROVAL BY: [signature] PLANNING ENGINEERING DATE: 6/29/94

APPROVED BY: [signature] CHIEF ENGINEER DATE: 7-5-94

County of Riverside

APPROVED BY: [signature] FOR TRANS. DEPT. RIVERSIDE COUNTY, CALIF. DATE: 3/8/94

ASSESSMENT DISTRICT NO. 161

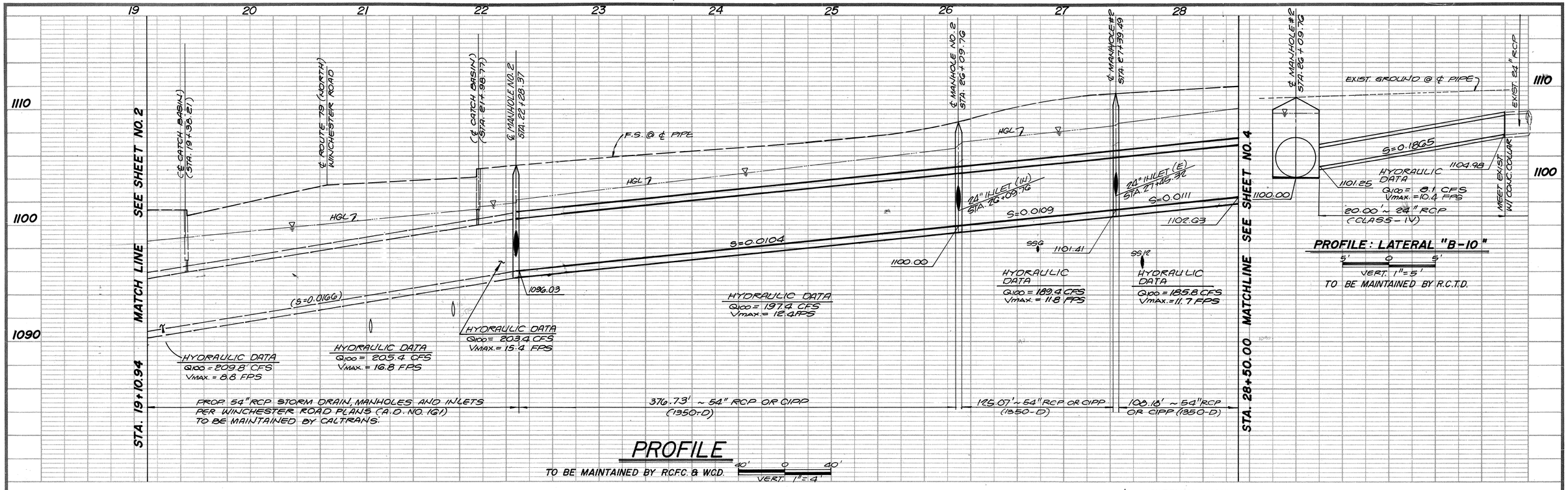
WINCHESTER ROAD STORM DRAIN

STA. 13+24.50 TO STA. 19+10.94

PROJECT NO. 7-0-184

DRAWING NO. 7-152

SHEET NO. 2 OF 8



PROFILE

TO BE MAINTAINED BY R.C.F.C. & W.C.D.

40' 0 40'

VERT. 1"=4'

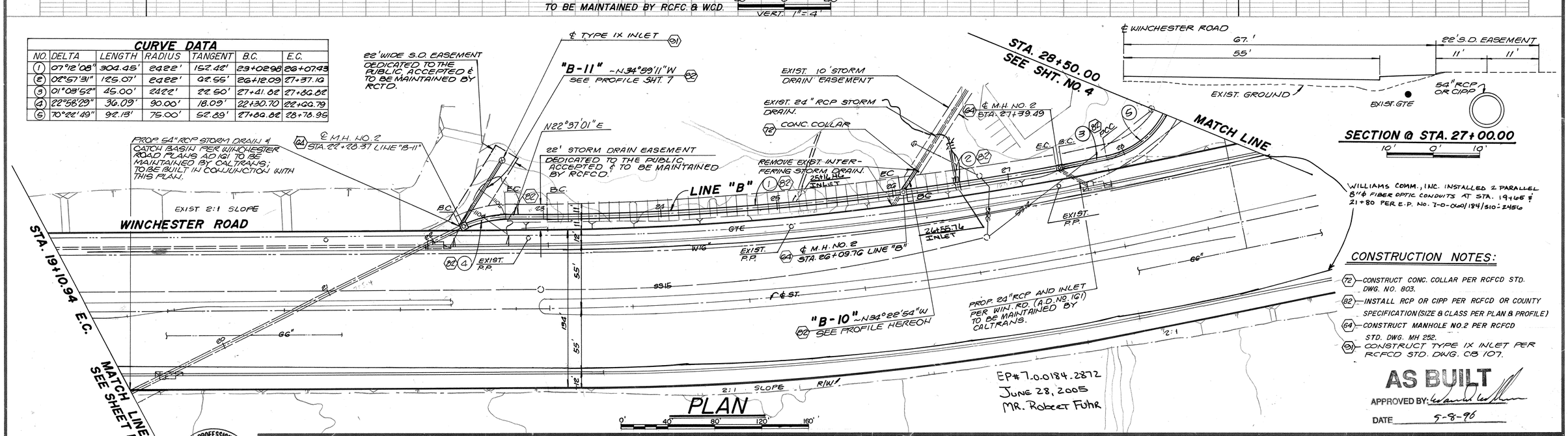
PROFILE : LATERAL "B-10"

5' 0 5'

VERT. 1"=5'

TO BE MAINTAINED BY R.C.T.D.

CURVE DATA						
NO.	DELTA	LENGTH	RADIUS	TANGENT	B.C.	E.C.
(1)	07°12'08"	304.45'	2422'	152.42'	23+02.98	26+07.43
(2)	02°57'31"	125.07'	2422'	62.55'	26+12.09	27+37.16
(3)	01°03'52"	45.00'	2422'	22.50'	27+41.66	27+86.66
(4)	22°58'29"	36.09'	90.00'	18.09'	22+30.70	22+66.79
(5)	70°22'49"	92.13'	75.00'	52.89'	27+66.66	28+78.96



PLAN

0' 40' 80' 120' 160'

CONSTRUCTION NOTES:

(72) CONSTRUCT CONC. COLLAR PER RCFCD STD. DWG. NO. 803.

(82) INSTALL RCP OR CIPP PER RCFCD OR COUNTY SPECIFICATION (SIZE & CLASS PER PLAN & PROFILE)

(64) CONSTRUCT MANHOLE NO.2 PER RCFCD STD. DWG. MH 252.

(91) CONSTRUCT TYPE IX INLET PER RCFCD STD. DWG. CB 107.

EP#7-0-0184.2872
JUNE 28, 2005
MR. ROBERT FUHR

AS BUILT

APPROVED BY:

DATE 5-8-96

REGISTERED PROFESSIONAL ENGINEER CHARLES A. COLLINS No. 34490 CIVIL STATE OF CALIFORNIA

RANPAC ENGINEERING CORP.
27447 Enterprise Circle West
Temecula, California 92390
Tel. (909) 676-7000

SUBMITTED BY:

REGISTERED CIVIL ENGINEER NO. 34490
EXP. 9/30/95

DATE: 3/31/95

BENCH MARK: SEE SHEET NO. 1

REVISIONS

REF	DESCRIPTION	APPR	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

RECOMMENDED FOR APPROVAL BY: PLANNING ENGINEERING DATE: 6/29/94

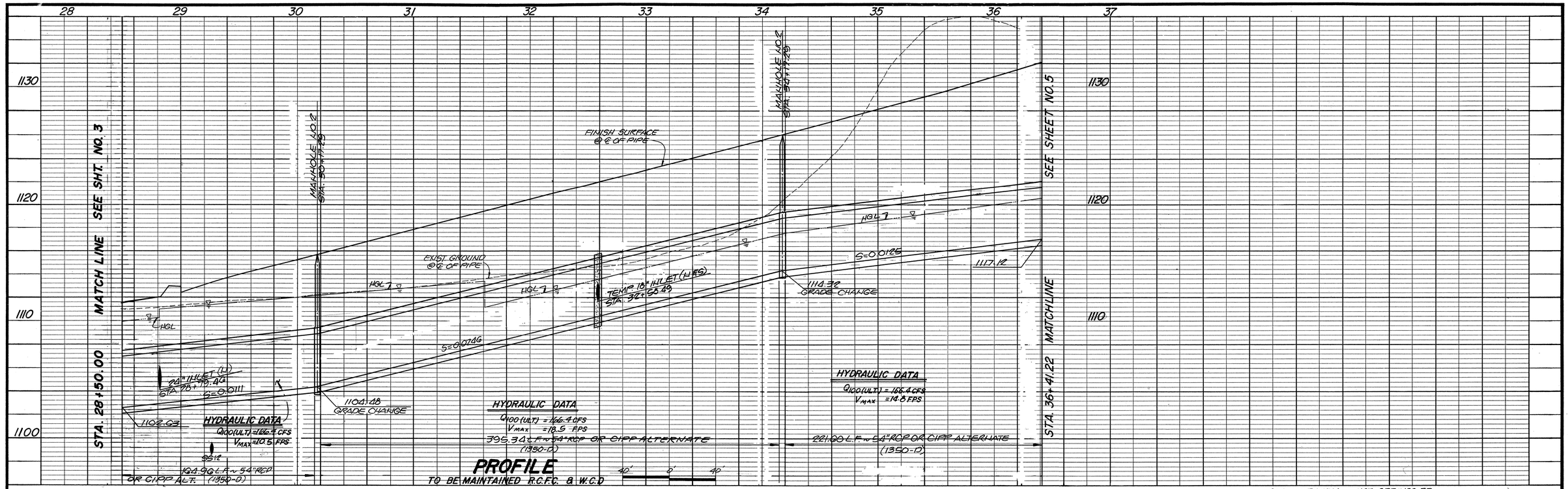
APPROVED BY: CHIEF ENGINEER DATE: 7-5-94

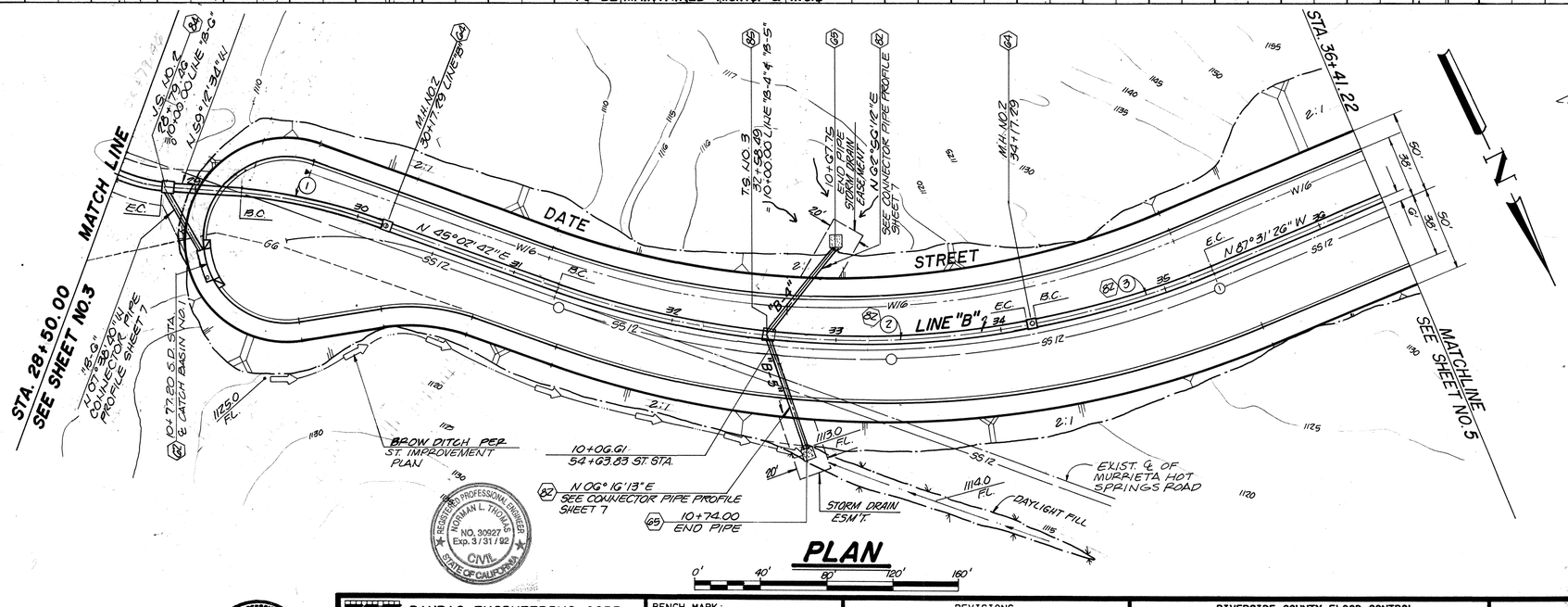
County of Riverside

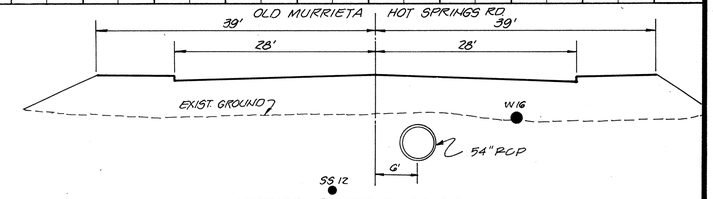
APPROVED BY: FOR TRANS. DEPT. RIVERSIDE COUNTY, CALIF. DATE: 3/8/94

ASSESSMENT DISTRICT NO.161
WINCHESTER ROAD STORM DRAIN
STA.19+10.94 TO STA.28+50.00

PROJECT NO.	7 - 0 - 184
DRAWING NO.	7 - 152
SHEET NO.	3 OF 8







SECTION @ STA. 31+00.00

10' 0' 10'

CURVE DATA						
NO.	DELTA	RADIUS	LENGTH	TANGENT	B.C.	E.C.
(1)	14°09'52"	350'	88.00'	44.23'	29+26.96	30+14.96
(2)	30°17'27"	542'	287.60'	147.25'	31+27.36	34+14.96
(3)	11°41'30"	542'	111.06'	55.72'	34+19.02	35+30.08
(4)						
(5)						
(6)						

CONSTRUCTION NOTES

(62)— CONSTRUCT CATCH BASIN NO.1 LOCAL DEPRESSION NO.2 CASE "C" PER RCFCD STD. DWG. NO. CB. 100 & LD 201 (W=21' & V=8.29')
(64)— CONSTRUCT MANHOLE NO.2 PER RCFCD STD. DWG. M.H.252
(65)— CONSTRUCT TEMPORARY INLET APRON SEE DETAIL ON SHEET NO. 8
(82)— INSTALL REINFORCED CONCRETE PIPE PER RCFCD OR COUNTY SPECIFICATIONS:
(84)— CONSTRUCT JUNCTION STRUCTURE NO.2 PER RCFCD ST . J.S.227 SEE DET. ON SHEET NO.8
(85)— CONSTRUCT TRANSITION STRUCTURE NO.3 PER RCFCD STD. DWG. NO. TS 303

AS BUILT
APPROVED BY:
DATE 5-8-96

REGISTERED PROFESSIONAL ENGINEER NORMAN L. THOMAS NO. 30927 Exp. 3/31/92 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER ROBERT DAUGHERTY 22875 CIVIL STATE OF CALIFORNIA

RANPAC ENGINEERING CORP.
27447 Enterprise Circle West
Temecula, California 92390
Tel. (714) 676-7000

SUBMITTED BY: Norman Thomas
REGISTERED CIVIL ENGINEER NO. 30927 EXP. 3/31/92
DATE: 4/11/91

BENCH MARK: SEE SHEET NO. 1

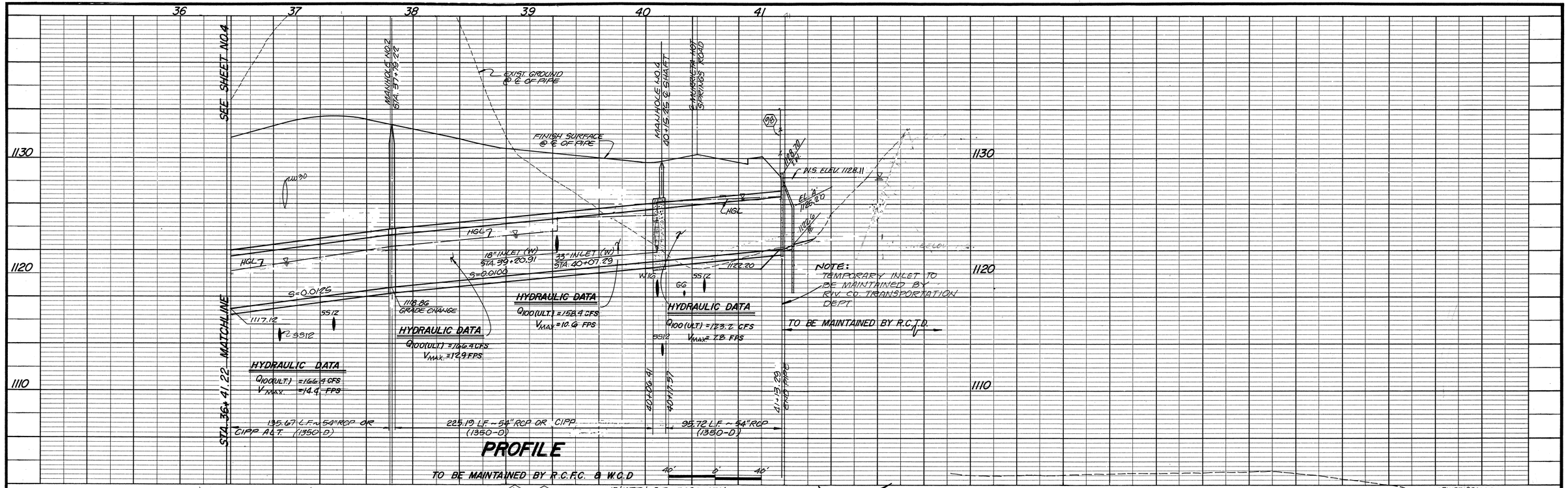
REVISIONS			
REF.	DESCRIPTION	APPR	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: Frank A. Kleist, PLANNING ENGINEERING
DATE: 6/29/94
APPROVED BY: Kenneth A. Edwards, CHIEF ENGINEER
DATE: 7-5-94

County of Riverside
APPROVED BY: Robert F. Haerr Jr.
FOR TRANS. DEPT. RIVERSIDE COUNTY, CALIF. DATE: 4/26/91

ASSESSMENT DISTRICT NO. 161
WINCHESTER RD. STORM DRAIN
STA. 28+50.00 TO STA. 36+41.22
(DATE STREET)

PROJECT NO. 7-0-184
DRAWING NO. 7-152
SHEET NO. 4 OF 8



CURVE DATA					
NO.	DELTA	RADIUS	LENGTH	TANGENT	B.C.	E.C.
(1)	98°23'47"	79.00'	135.67'	91.52'	36+41.22	37+76.89
(2)	19°10'52"	556'	186.13'	93.95	37+81.55	39+67.68

CONSTRUCTION NOTES

(61) CONSTRUCT MOD. CATCH BASIN NO. 1 LOCAL DEPRESSION NO. 2 CASE "C" PER RCFCD STD. DWG. NO. CB. 100 & LD 201

(64) CONSTRUCT MANHOLE NO. 2 PER RCFCD STD. DWG. M.H.252

(82) INSTALL REINFORCED CONCRETE PIPE PER RCFCD OR COUNTY SPECIFICATIONS:

(84) CONSTRUCT JUNCTION STRUCTURE NO. 4 PER RCFCD STD. J.S. 229

(85) CONSTRUCT MANHOLE NO.4 PER RCFCD STD. M.H. 254 (SEE DET. ON SHT. 8)

(90) CONSTRUCT PIPE CULVERT HEADWALL PER CALTRANS STD. PLANS D-86-B (W=5.5', L=7', ELEV "A" = 1125.20

(98) CONSTRUCT FENCE PER RCFCD & WCD STD. DWG. NO. M 801. (6' HIGH)

(91) CONSTRUCT TYPE IX INLET PER R.C.F.C.D. STD. DWG. CB-107.

~~(99) INSTALL 14' CHAIN LINK DOUBLE GATE PER RCFCD & WCD STD. DWG. NO. 801.~~

~~(92) CONST. 3" THK GANITE SLOPE PROTECTION (AIR PLACED) WITH 6" x 6", 10/10 GAGE W.W.F. REINFORCEMENT~~

AS BUILT

APPROVED BY: Edward D. Williams

DATE 5-8-96

REGISTERED PROFESSIONAL ENGINEER NORMAN L. THOMAS NO. 30927 Exp. 3/31/92 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER ELBERT E. DAWSON 22875 EXP. 12/31/93 CIVIL STATE OF CALIFORNIA

RANPAC ENGINEERING CORP.
27447 Enterprise Circle West
Temecula, California 92390
Tel. (714) 676-7000

SUBMITTED BY: Norman Thomas
REGISTERED CIVIL ENGINEER NO 30927 EXP. 3/31/92
DATE: 4/11/91

BENCH MARK: SEE SHEET NO.1

REVISIONS			
REF.	DESCRIPTION	APPR	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

RECOMMENDED FOR APPROVAL BY: Frank J. Varni, PLANNING ENGINEERING, DATE: 6/29/94

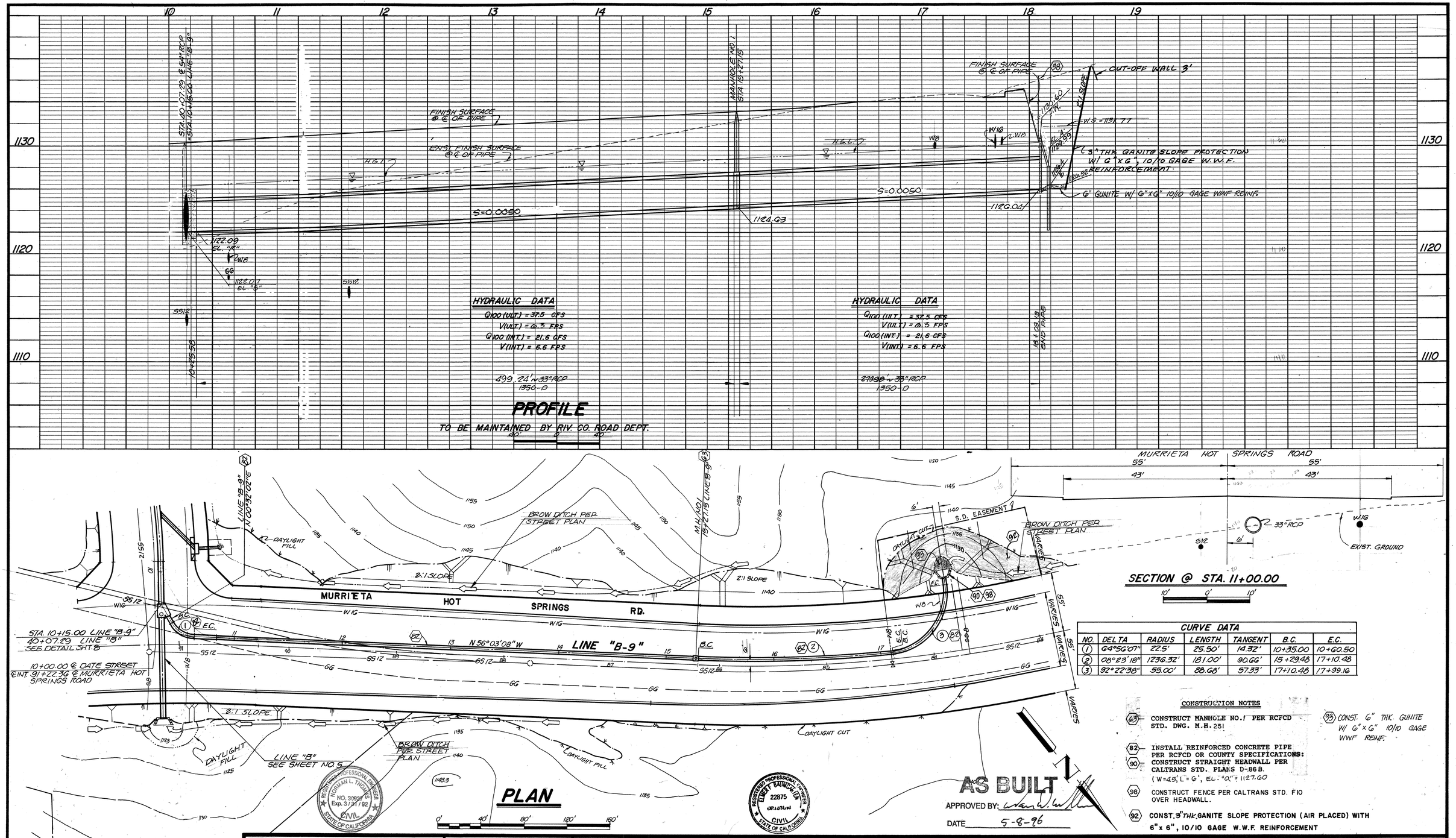
APPROVED BY: Kenneth B. Edwards, CHIEF ENGINEER, DATE: 7-5-94

County of Riverside

APPROVED BY: James F. Ballenger, FOR TRANS. DEPT. RIVERSIDE COUNTY, CALIF. DATE: 4/26/91

ASSESSMENT DISTRICT NO. 161
WINCHESTER RD. STORM DRAIN
STA. 36+23.93 TO STA. 40+96.00
(DELHAVEN ST.)

PROJECT NO. 7-0-184
DRAWING NO. 7-152
SHEET NO. 5 OF 8



CURVE DATA						
NO.	DELTA	RADIUS	LENGTH	TANGENT	B.C.	E.C.
(1)	64°56'07"	22.5'	25.50'	14.32'	10+35.00	10+60.50
(2)	08°23'18"	1236.32'	181.00'	90.66'	15+29.48	17+10.48
(3)	92°22'38"	55.00'	88.68'	57.33'	17+10.48	17+99.16

CONSTRUCTION NOTES

(63) CONSTRUCT MANHOLE NO. 1 PER RCFCD STD. DWG. M.H. 251

(82) INSTALL REINFORCED CONCRETE PIPE PER RCFCD OR COUNTY SPECIFICATIONS:

(90) CONSTRUCT STRAIGHT HEADWALL PER CALTRANS STD. PLANS D-86B. (W=4.5', L=6', EL. "A" = 1127.60

(98) CONSTRUCT FENCE PER CALTRANS STD. F10 OVER HEADWALL.

(92) CONST. 3" THK. GUNITE W/ 6"x6" 10/10 GAGE WWF REINF.

(92) CONST. 6" THK. GUNITE W/ 6"x6" 10/10 GAGE WWF REINF.

(92) CONST. 3" THK. GANITE SLOPE PROTECTION (AIR PLACED) WITH 6"x6", 10/10 GAGE W.W.F. REINFORCEMENT

REGISTERED PROFESSIONAL ENGINEER NORMAN L. THOMAS NO. 30927 Exp. 3/31/92 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER ELBERT BATMAN JR. 22875 Exp. 12/31/91 CIVIL STATE OF CALIFORNIA

RANPAC ENGINEERING CORP.
27447 Enterprise Circle West
Temecula, California 92390
Tel. (714) 676-7000

SUBMITTED BY:
REGISTERED CIVIL ENGINEER NO. 30927
EXP. 3/31/92
DATE: 4/11/91

BENCH MARK: SEE SHEET NO. 1

REVISIONS			
REF.	DESCRIPTION	APPR	DATE

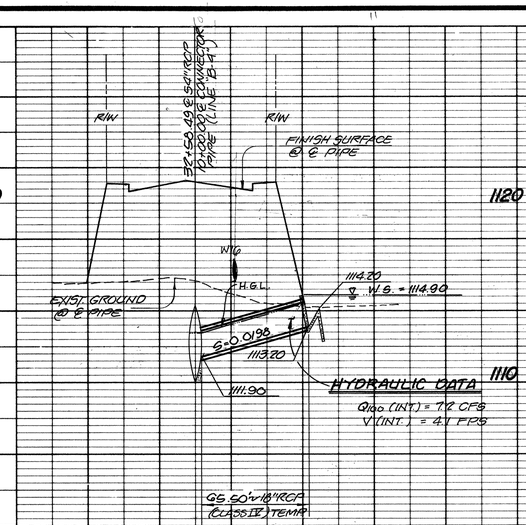
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: PLANNING ENGINEERING DATE:
APPROVED BY: CHIEF ENGINEER DATE:

County of Riverside
APPROVED BY: FOR TRANS. DEPT.
RIVERSIDE COUNTY, CALIF. DATE: 4/26/91

ASSESSMENT DISTRICT NO. 161
STORM DRAIN PLANS
WINCHESTER RD. STORM DRAIN
STA. 10+00.00 TO STA. 18+21.13
(MURRIETA HOT SPRINGS ROAD)

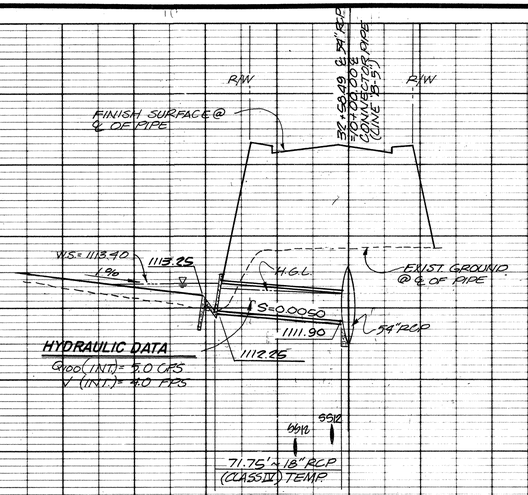
PROJECT NO. 7-0-184
DRAWING NO. 7-152
SHEET NO. 6 OF 8

109897



STA. 32+58.49
PROFILE : LATERAL (B-4)
PLAN VIEW SEE SHEET NO. 4

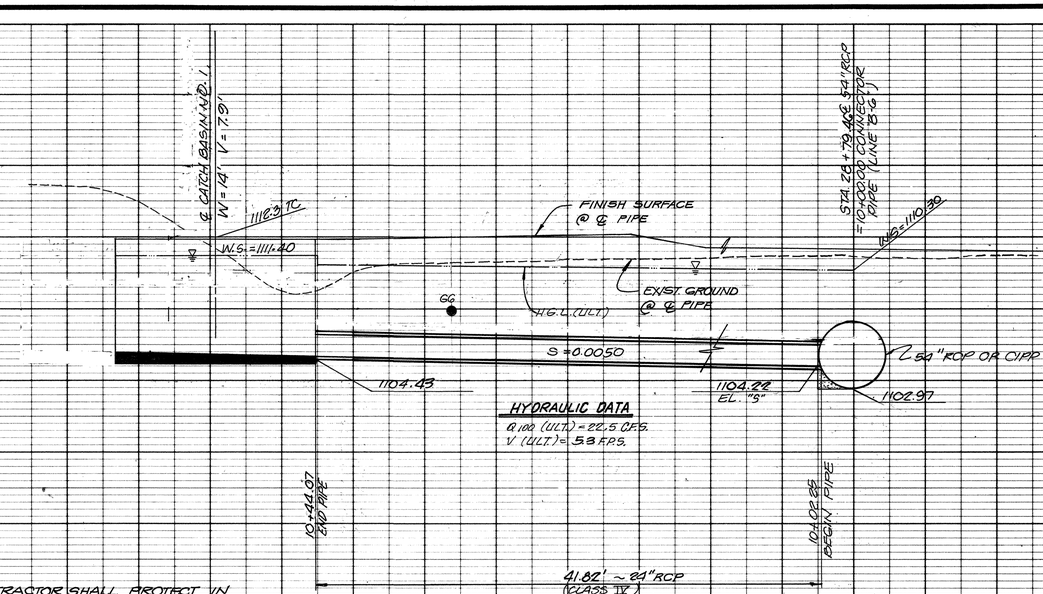
TO BE MAINTAINED BY RIV. COUNTY TRANSPORTATION DEPT.



STA. 32+58.49
PROFILE : LATERAL (B-5)
PLAN VIEW SEE SHEET NO. 4

TO BE MAINTAINED BY RIV. COUNTY TRANSPORTATION DEPT.

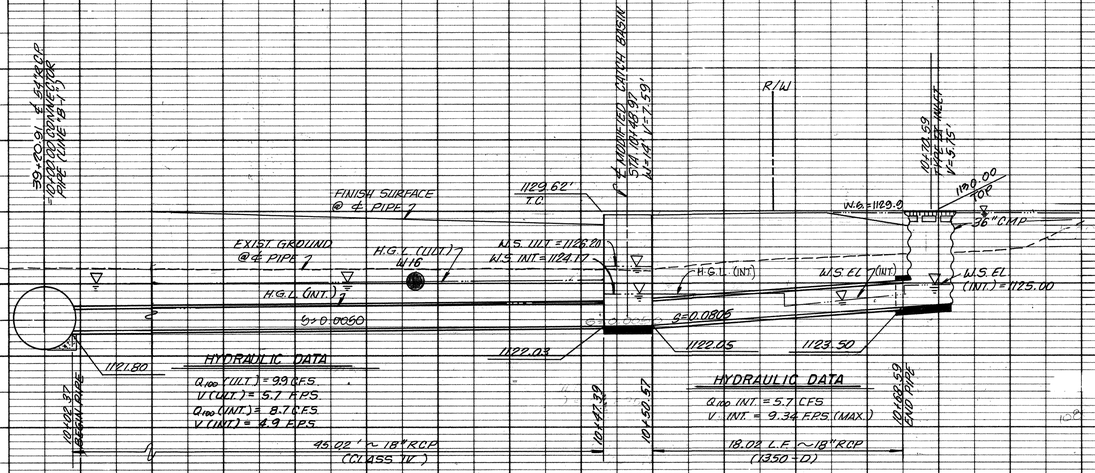
NOTE: CONTRACTOR SHALL PROTECT IN PLACE ALL UTILITIES CROSSING OR PARALLELING THE STORM DRAIN, UNLESS OTHERWISE NOTED



41.82' ~ 24"RCP (CLASS IV)

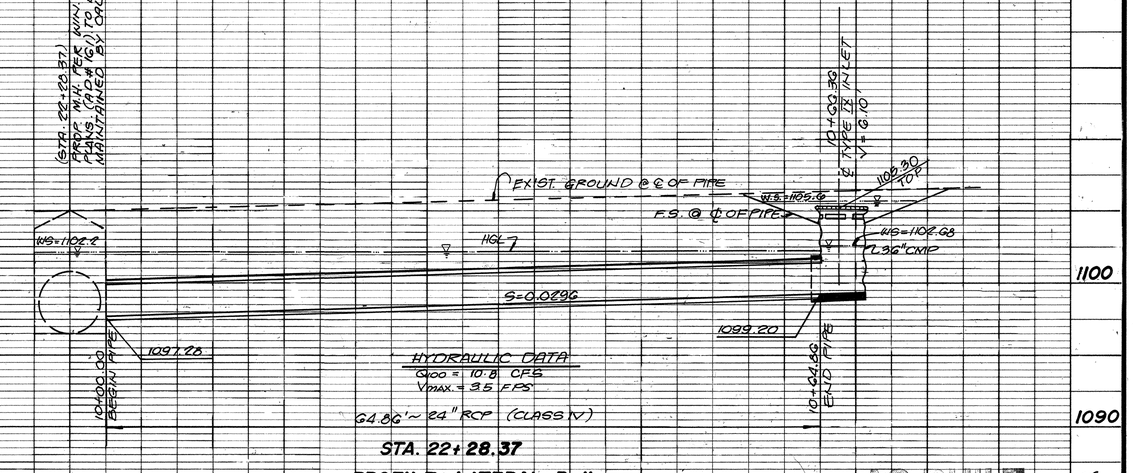
STA. 28+79.46
PROFILE : LATERAL (B-6)
PLAN VIEW SEE SHEET NO. 4

TO BE MAINTAINED BY RIV. COUNTY TRANSPORTATION DEPT.



STA. 39+20.91
PROFILE : LATERAL (B-1)
PLAN VIEW SEE SHEET NO. 5

TO BE MAINTAINED BY RIV. COUNTY TRANSPORTATION DEPT.



HYDRAULIC DATA
Q100 = 10.8 CFS
Vmax. = 9.5 FPS

64.36'~ 24" RCP (CLASS IV)

STA. 22+28.37
PROFILE : LATERAL B-11
PLAN VIEW SEE SHT. NO. 3

TO BE MAINTAINED BY RIV. COUNTY TRANS. DEPT.

AS BUILT
APPROVED BY:
DATE 5-8-96

ROBERT BAUMGARTNER, 22875, REGISTERED PROFESSIONAL ENGINEER, CIVIL, STATE OF CALIFORNIA, EXP. 6/31/92

NORMAN L. THOMAS, NO. 30927, Exp. 3/31/92, REGISTERED PROFESSIONAL ENGINEER, CIVIL, STATE OF CALIFORNIA

RANPAC ENGINEERING CORP.
27447 Enterprise Circle West
Temecula, California 92390
Tel: (714) 676-7000

SUBMITTED BY:
REGISTERED CIVIL ENGINEER NO. 30927
EXP. 3/31/92
DATE: 4/11/91

BENCH MARK:
SEE SHEET NO. 1

REVISIONS

REF.	DESCRIPTION	APPR	DATE

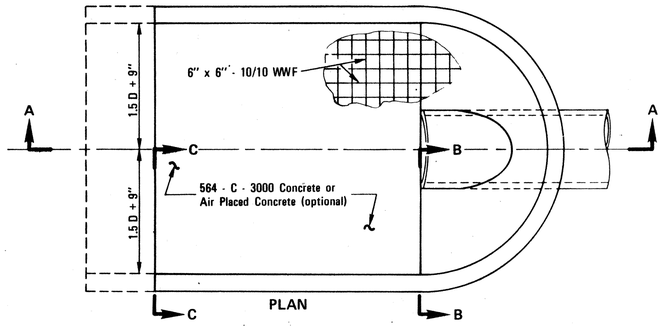
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: PLANNING ENGINEERING
DATE:
APPROVED BY: CHIEF ENGINEER
DATE:

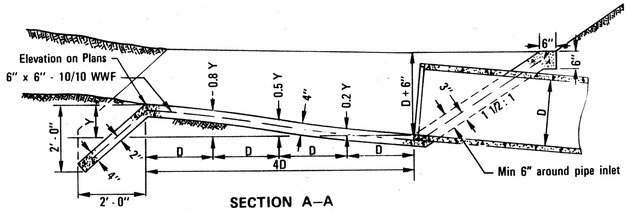
County of Riverside
APPROVED BY:
FOR TRANS. DEPT.
RIVERSIDE COUNTY, CALIF. DATE: 4/21/91

ASSESSMENT DISTRICT NO. 161
WINCHESTER RD. STORM DRAIN
CONNECTOR PIPE PROFILES

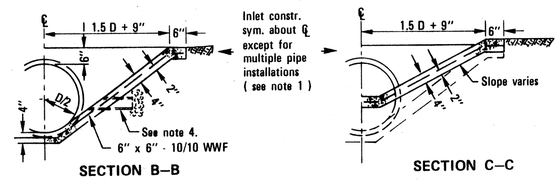
PROJECT NO. 7-0-184
DRAWING NO. 7-152
SHEET NO. 7 OF 8

135-33





SECTION A–A



SECTION B–B

Inlet constr. sym. about ℄ except for multiple pipe installations (see note 1)

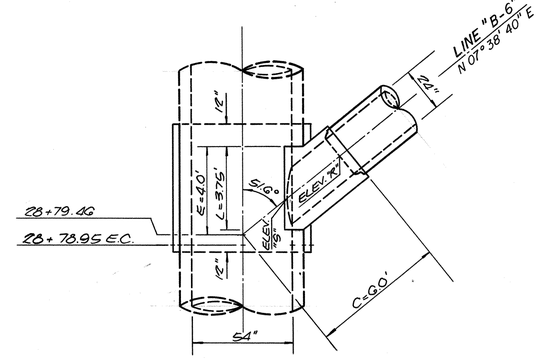
SECTION C–C

NOTES

1. When more than one pipe is used the profile view shown shall hold for the distance across all pipe openings. Sections A-A and B-B shall be from the outermost pipe. The distance between pipes shall be D/2 for round and Span/3 for arch pipe. (12" minimum)
2. Culvert shall be cut off even with apron surface when required by the Agency.
3. Use Inlet Apron only where a flared end section can not be utilized.
4. Place weep holes when required by the Agency.

DETAIL : TEMPORARY INLET APRON

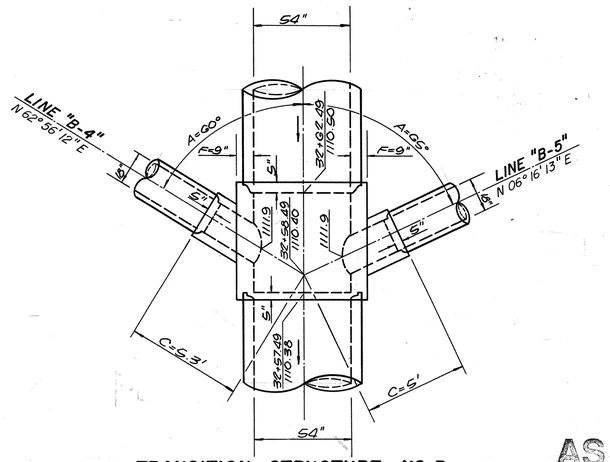
NO SCALE



DATA:
A = 51.6°; C = 6.0'; E = 4.0'; G = 1.90'
B = 24" ; D = 54"; F = 2.35'; L = 3.75'
ELEV. "R" = 1104.23 ELEV. "S" = 1104.22

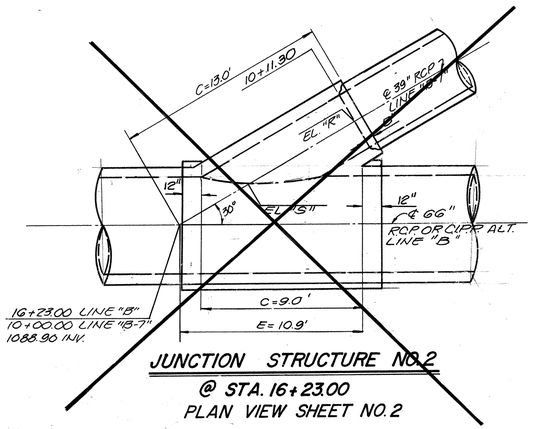
JUNCTION STRUCTURE NO. 2

STA. 28+79.46
PLAN VIEW SHEET NO. 4



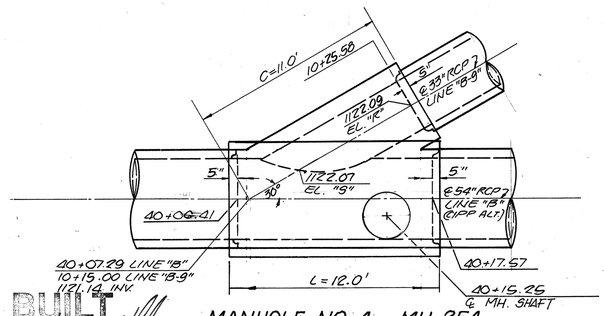
TRANSITION STRUCTURE NO. 3

STA. 32+58.49
PLAN VIEW SHEET NO. 4



JUNCTION STRUCTURE NO. 2

@ STA. 16+23.00
PLAN VIEW SHEET NO. 2



AS BUILT

APPROVED BY: [signature]

DATE 5-8-96

MANHOLE NO. 4 MH 254

STA. 40+07.29
PLAN VIEW SHEET NO. 5

REGISTERED PROFESSIONAL ENGINEER NORMAN L. THOMAS NO. 30027 Exp. 3/31/92 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER C. KENT BAUGHMAN 22875 12/31/92 CIVIL STATE OF CALIFORNIA

RANPAC ENGINEERING CORP. 27447 Enterprise Circle West Temecula, California 92390 Tel. (714) 676-7000 SUBMITTED BY: [signature] REGISTERED CIVIL ENGINEER NO. 30027 EXP. 3/31/92 DATE: 11/11/91	BENCH MARK: SEE SHT. NO. 1	REVISIONS REF. / DESCRIPTION / APPR / DATE	RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT RECOMMENDED FOR APPROVAL BY: [signature] PLANNING ENGINEER DATE: 6/29/94 APPROVED BY: [signature] CHIEF ENGINEER DATE: 7-5-94
County of Riverside APPROVED BY: [signature] FOR TRANS. DEPT. RIVERSIDE COUNTY, CALIF. DATE: 4/26/91	ASSESSMENT DISTRICT NO. 161 WINCHESTER ROAD STORM DRAIN DETAIL SHEET	PROJECT NO. 7-0-184 DRAWING NO. 7-152 SHEET NO. 8 OF 8	

135-33

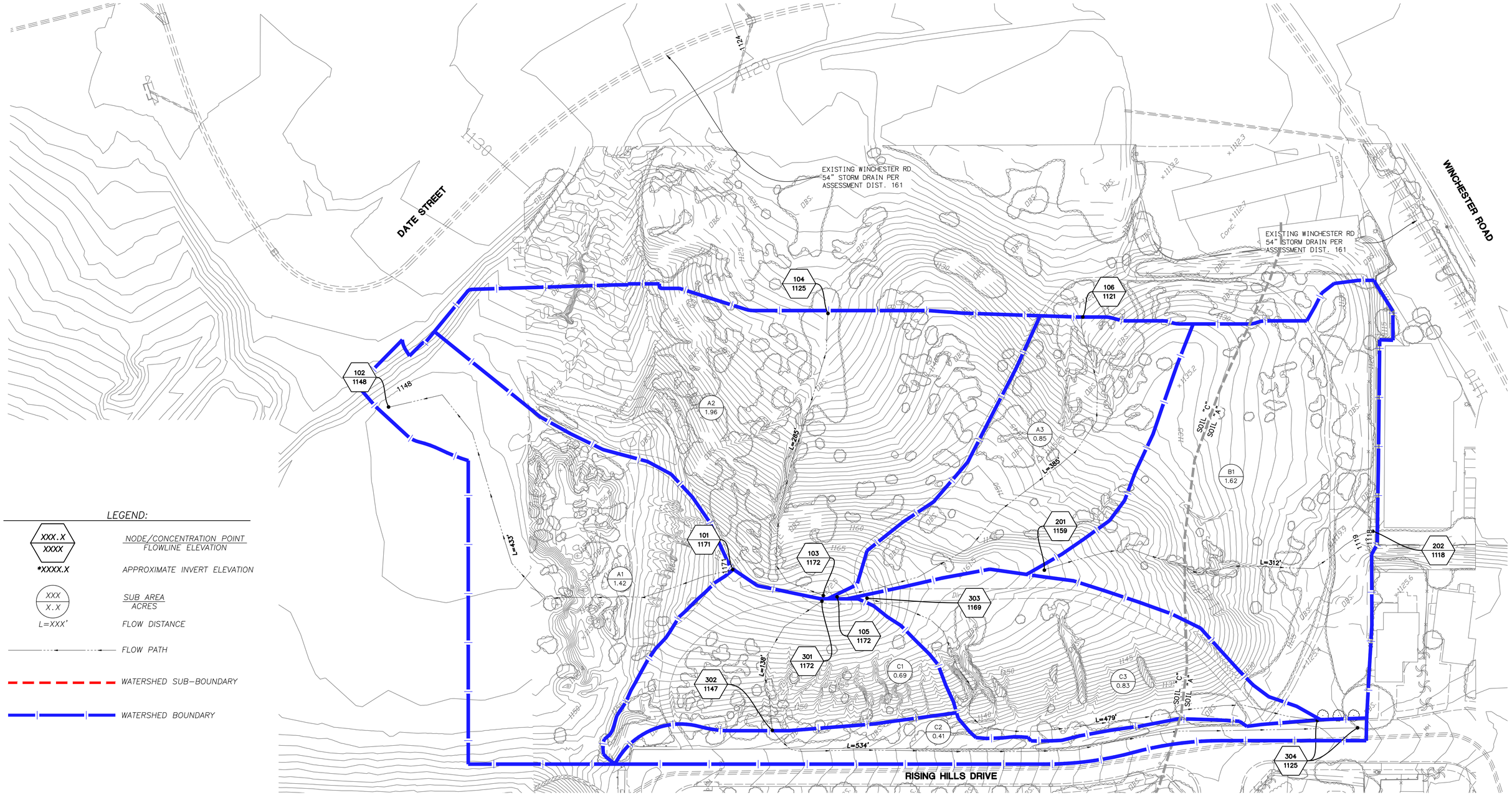
EXHIBITS

EXHIBIT A: PRE-PROJECT CONDITION RATIONAL METHOD HYDROLOGY MAP

DP-2018-1761, ZC-2018-1763, GP-2018-1762

IN THE CITY OF MURRIETA, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

POST-PROJECT HYDROLOGY MAP



LEGEND:

XXX.X / XXXX	NODE/CONCENTRATION POINT / FLOWLINE ELEVATION
*XXXX.X	APPROXIMATE INVERT ELEVATION
XXX / X.X	SUB AREA / ACRES
L=XXX'	FLOW DISTANCE
	FLOW PATH
	WATERSHED SUB-BOUNDARY
	WATERSHED BOUNDARY

GRAPHIC SCALE
40' 0 20' 40' 80'
1" = 40'

EXHIBIT A

DP-2018-1761

PRE-PROJECT HYDROLOGY MAP

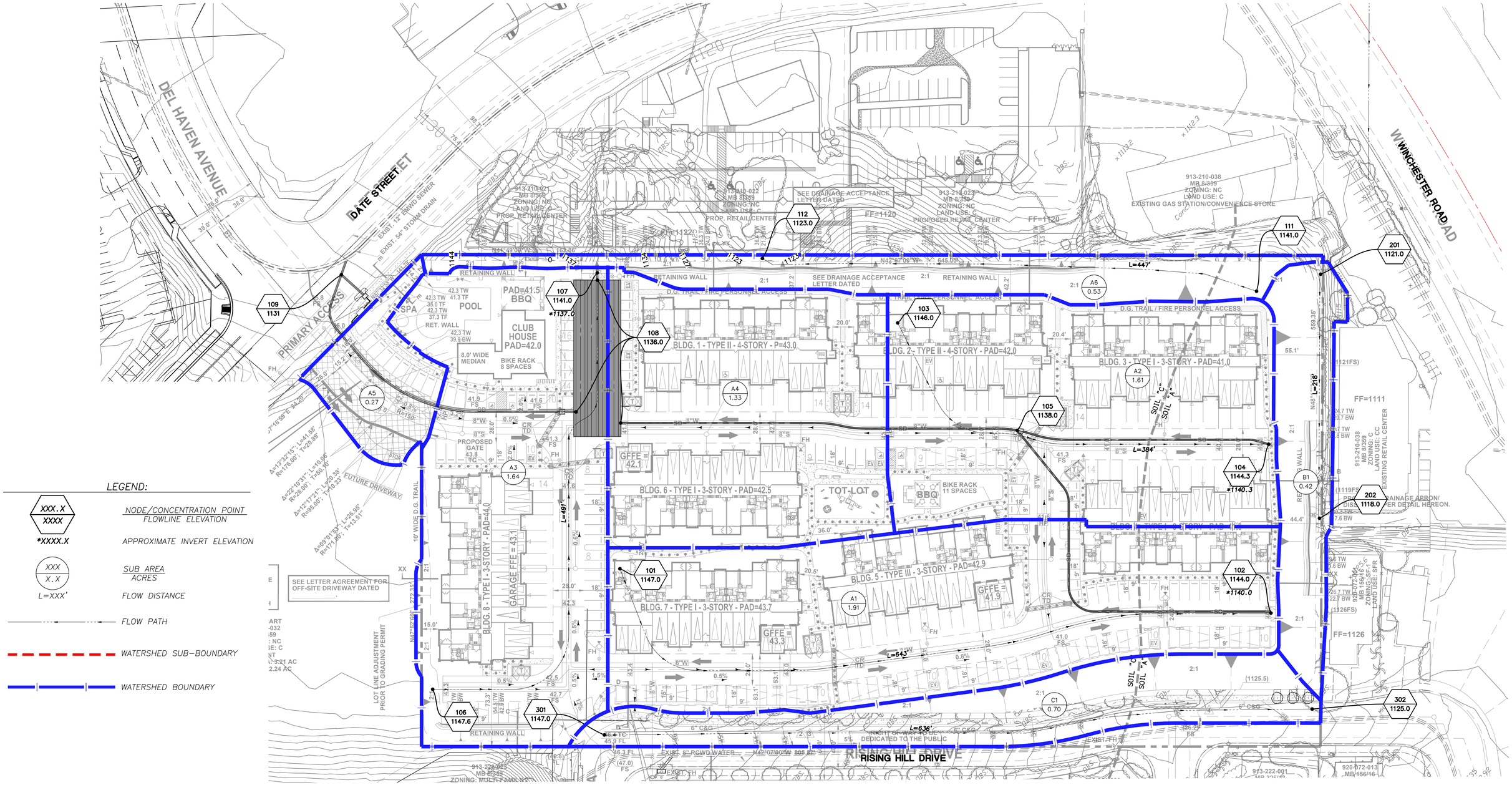
JLC Engineering & Consulting, Inc.
41660 IVY STREET, SUITE A
MURRIETA, CA 92562
PH. 951.304.9552 FAX 951.304.3568

EXHIBIT B: POST-PROJECT CONDITION RATIONAL METHOD HYDROLOGY MAP

DP-2018-1761, ZC-2018-1763, GP-2018-1762

IN THE CITY OF MURRIETA, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

POST-PROJECT HYDROLOGY MAP



LEGEND:

- XXX.X / XXXX — NODE/CONCENTRATION POINT / FLOWLINE ELEVATION
- *XXXX.X — APPROXIMATE INVERT ELEVATION
- XXX / X.X — SUB AREA / ACRES
- L=XXX' — FLOW DISTANCE
- FLOW PATH
- WATERSHED SUB-BOUNDARY
- WATERSHED BOUNDARY

GRAPHIC SCALE
40' 0 20' 40' 80'
1" = 40'

JLC Engineering & Consulting, Inc.
41660 IVY STREET, SUITE A
MURRIETA, CA 92562
PH. 951.304.9552 FAX 951.304.3568

EXHIBIT B

DP-2018-1761,

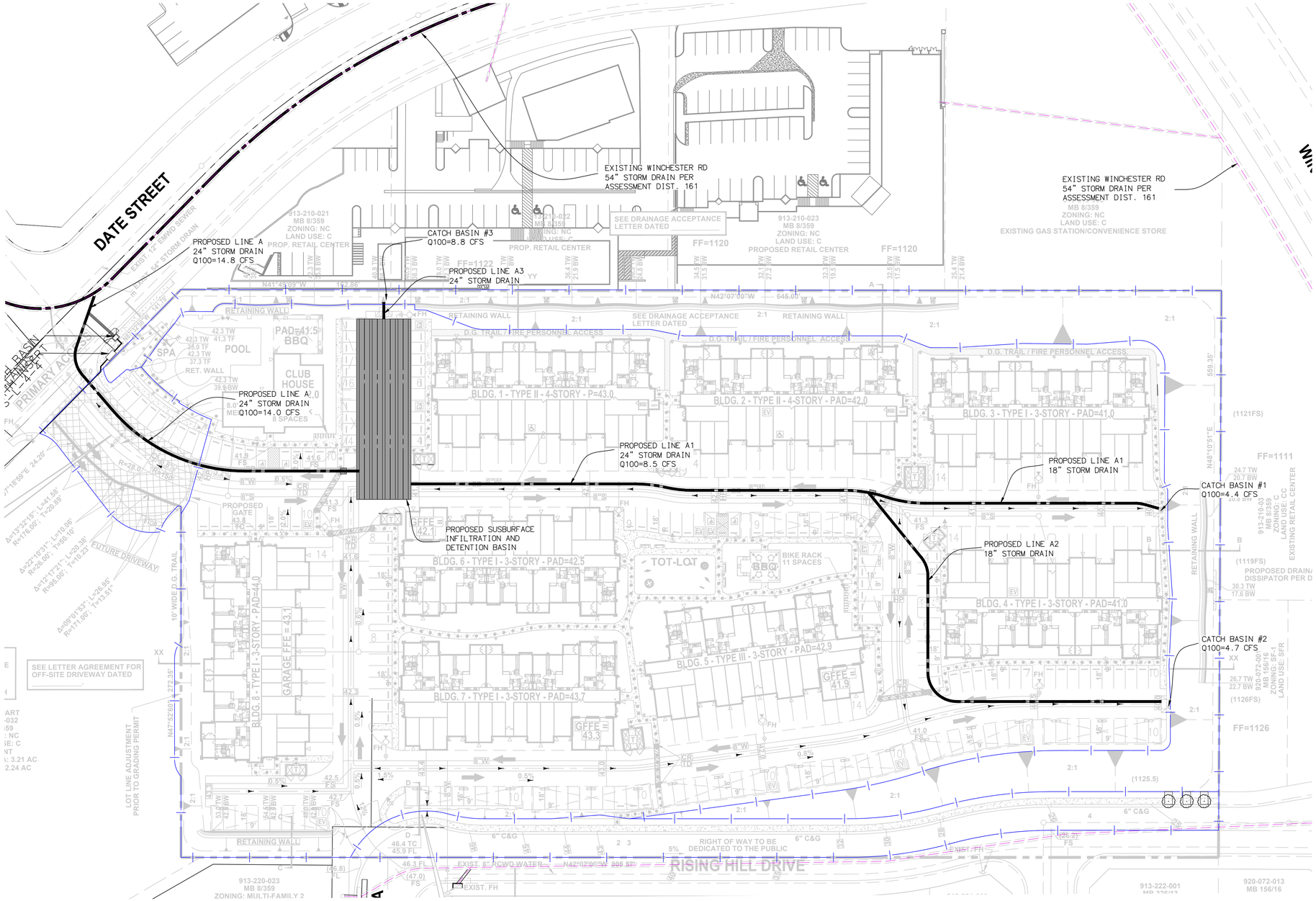
POST-PROJECT HYDROLOGY MAP

EXHIBIT C: DRAINAGE FACILITIES MAP

MURRIETA APARTMENTS

IN THE CITY OF MURRIETA, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

DRAINAGE FACILITIES MAP



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PH. 951.304.9552 FAX 951.304.3568

EXHIBIT "C"

MURRIETA APARTMENTS

DRAINAGE FACILITIES MAP

Drawing Name: O:\24.16.18\Engineering\Hydrology_Plan\Exhibits\24.16.17-Drainage Facilities Map.dwg
Last Opened: Aug 21, 2019 - 9:55am by jcarver

EXHIBIT D: NRCS HYDROLOGIC SOILS MAP

EXHIBIT C
NRCS SOILS MAP

Map Scale: 1:3,930 if printed on D landscape (34" x 22") sheet.

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

EXHIBIT E: RCFC&WCD RAINFALL MAPS

2 YEAR, 1 HOUR

ADOBE SPRINGS
RAINFALL VALUE = 0.50

PROJECT SITE

JLC Engineering & Consulting, Inc.

41660 IVY STREET, SUITE A
MURRIETA, CA 92562
PH. 951.304.9552 FAX 951.304.3568

Isohyetals based on NOAA Atlas 2
Volume XI - California, 1973

RCFC & WCD

RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

2-YEAR — 1-HOUR
PRECIPITATION

APPROVED CHIEF ENGINEER R.E. NO. 8882
DATE
DRAWN BY R.A.S.
PLATE D-4.3
SHEET NO
DR NO

100 YEAR, 1 HOUR

ADOBE SPRINGS
RAINFALL VALUE = 1.2

PROJECT SITE

JLC Engineering & Consulting, Inc.

41660 IVY STREET, SUITE A
MURRIETA, CA 92562
PH. 951.304.9552 FAX 951.304.3568

Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973

RCFC & WCD
HYDROLOGY MANUAL

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

100-YEAR — 1-HOUR PRECIPITATION

APPROVED: CHIEF ENGINEER R.E. NO. 6822 DATE
DRAWN BY: A.A.S.
PLATE D-4.4
SHEET NO
DR NO
REVISED

SLOPE INTENSITY CURVE

ADOBE SPRINGS
SLOPE INTENSITY = 0.55

PROJECT SITE

JLC Engineering & Consulting, Inc.

41660 IVY STREET, SUITE A
MURRIETA, CA 92562
PH. 951.304.9552 FAX 951.304.3568

RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

SLOPE OF INTENSITY DURATION CURVE

Drawn By E.A.S. | Sheet No

Approved ____ Chief Engineer R.E. No. 8828 | Plate D-4.6 | Dr. No

Date

Revised:

Slope of Intensity - Duration Curve based on district analysis of automatic recording rain gage records