PRELIMINARY HYDROLOGY STUDY

SKY CANYON RETAIL CENTER
PP26346/PM37398

Temecula, CA

Located in the County of Riverside, CA

Prepared For:

AVANT
REAL ESTATE

4490 Ayers Ave.
Vernon, CA 90058

Tel. (562) 977-8565

Prepared by:

adkan
ENGINEERS

6879 Airport Drive

Riverside, CA 92504

Tel. (951) 688-0241

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Job No. 9734

March 5, 2020

REGISTERED PROFESSIONAL ENGINEER
RICHARD DAIL REAVES
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03-05-2020

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Preliminary Hydrology Study

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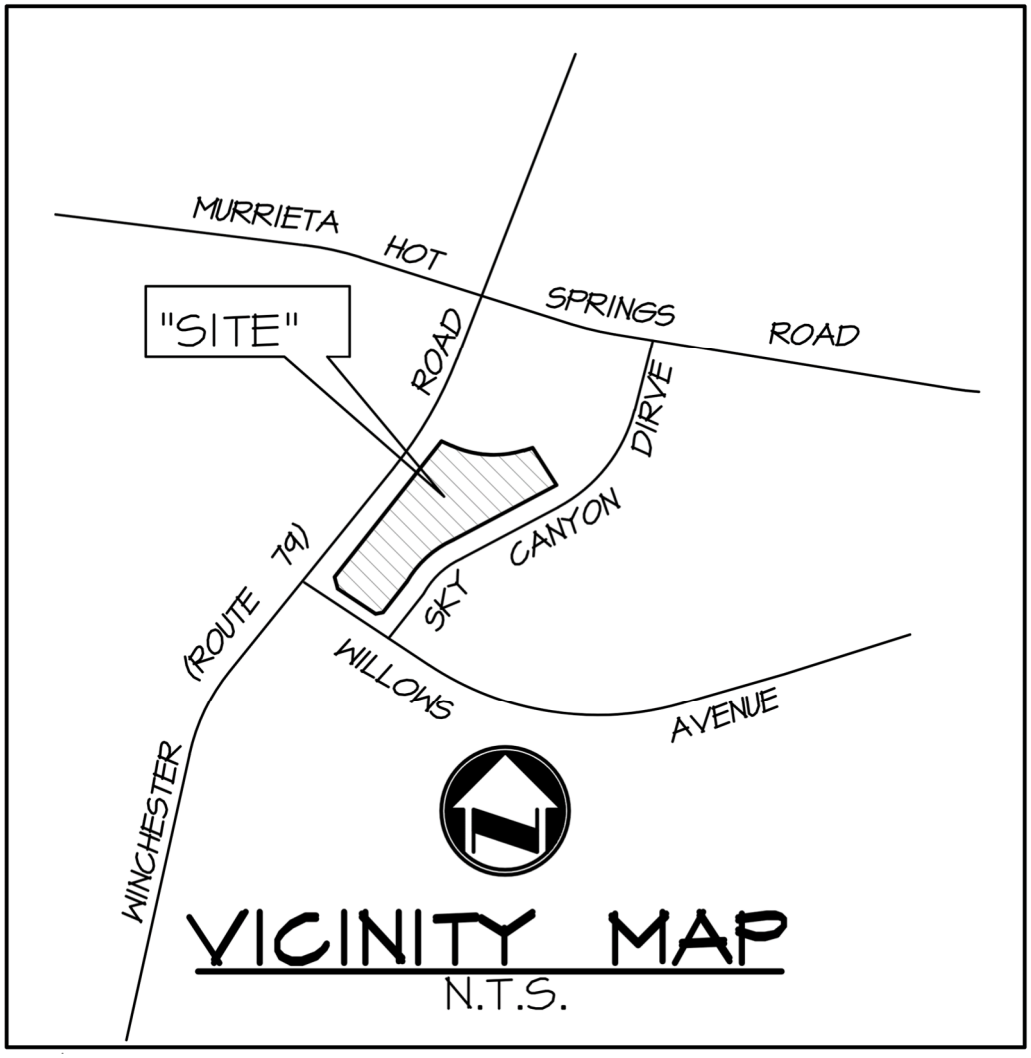
1. Vicinity Map



2. Purpose

The purpose of this study is to substantiate the design of the "Sky Canyon Retail Center" commercial development located in the City of Temecula in Riverside, CA. Adkan Engineers has prepared this Study to ensure adequate size and proper operation of drainage facilities. This report, along with the standard analysis of a typical report, outlines the specific studies and the back-up data required to analyze the hydrology of the development.

3. Project Description

The project is a proposed commercial development encompassing a gross area of 10.9 +/- acres. The site is located between Future Sky Canyon Rd, Winchester Road, north of Willows Ave, and south of an existing commercial development. The project proposes four commercial buildings and one drive-thru car-wash. Drought tolerant landscaping will be provided throughout the site.

4. Pre-Development Hydrology

The site is currently vacant with open brush and poor vegetative cover. The project site is surrounded by a residential community comprised of single-family detached homes, and a commercial development directly north. The proposed development exists as part of Specific Plan 213, Winchester Properties (SilverHawk).

The site may have been slightly graded years ago, but enough time has passed that the site now appears to be natural with sparse vegetative cover draining from north to south. As shown in the pre-developed rational hydrology map, a sliver of the eastern side of the area (1.27 acres made up of drainage areas EX1 on Pre-Developed Hydrology Map) that will be disturbed drains into the adjacent Tucalota Creek. Whereas, the majority of the site (7.83 acres made up of drainage area EX on Pre-Developed Hydrology Map) drains to a Riverside County Maintained 33" RCP Line "H" as depicted in Riverside County Flood Control and Water Conservation District (RCFC&WCD) Project No. 7-0-177, Drawing No. 7-147, sheet 6 of 10. These plans were developed and approved in August of 1992 by RCFC&WCD. This plan indicates a projected ultimate Q100 of 47 CFS.

Note that every effort was made to track down the source hydrology report for the ultimate flow rate at RCFC&WCD; however, The District was unable to locate it. As a result, in lieu of any existing hydrology studies, the discharge ultimate flow rate will be based on values shown in the approved flood control plans referenced herein from this point forward.

Going back to the ultimate Q100 flow rate of 47 CFS, this makes sense because Specific Plan 213 originally planned for the site to be multi-family high density residential. Since the original Specific Plan was approved, amendments were made to revise the use to commercial. The rational hydrology analysis done for the pre-developed condition determined a Q100 flowing to this outlet of 13 CFS.

The small sliver of the site on the east, as mentioned earlier, in the pre-developed condition drains to a Riverside County Maintained 18" RCP Line "D" as depicted in RCFC&WCD Project No. 7-0-0030-02, Drawing No. 7-169, sheet 3 of 3. These plans were developed and approved in September of 2000 by

RCFC&WCD. This plan indicates a projected ultimate Q100 of 7.3 CFS. The rational hydrology analysis done for the pre-developed condition has determined a Q100 of 2 CFS.

5. Post-Development Hydrology

The site will be graded and paved such that the surface run-off is directed to specific structural water quality BMPs that have been sized to address design capture volumes (DCV), and to address hydromodification concerns. These calculations can be found in the WQMP and are based on Riverside County's Exhibit B.7 HydroMod Spreadsheet (Temecula) v.4.xlsx. Essentially, that analysis compares the range of frequency storm events between the 10-yr and 10% of the 2-year between the pre-developed and post-developed and ensures the outflow unit hydrograph is reasonably similar to the pre-developed. It does this by requiring a retention of a certain volume and fixing orifices at specific diameters and elevations within the structural BMPs. These analyses relate to the water quality aspect of the design and therefore not shown in this report.

Instead, of concern are the analyses relating to the rational hydrology for the 10 year and 100 year frequency storm events. Flow rates resulting from these storm events are termed as overflow as it relates to structural BMPs. Since the BMPs are sized specifically for water quality and low flow HydroMod purposes, any flows exceeding this will be directed to overflow structures specifically designed to convey the Q10 and Q100 flow rates.

For the post-developed condition, when the structural water quality BMPs reach their maximum capacity, the existing drainage pattern will be maintained such that the greater western side of the site will continue to ultimately drain to the south to the existing 33" RCP Line "H". The post-developed rational hydrology for this area at outlet point has been determined to be 25 CFS. Recall, Line "H" was originally designed anticipating an ultimate flow rate of 47 CFS. Effectively, the post-developed condition will outlet a flow rate much less than the ultimate and thus no incremental increased mitigation of flow or volume will be required beyond addressing the hydromodification concern for low flows as presented in the WQMP.

The drainage pattern for the eastern side of the project has also been conserved. That is, where the pre-developed drainage pattern drained to Line "D", the post-developed conditions also drains the eastern site to Line "D". The post-developed flow rate was determined to be 3 CFS, whereas the ultimate anticipated 7 CFS. Again, the post-developed condition will outlet a flow rate much less than the ultimate and thus no incremental increased mitigation of flow or volume will be required beyond addressing the hydromodification concern for low flows as presented in the WQMP.

6. Method of Analysis

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

Storm flows were determined by the "RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM", Riverside County Flood Control & Water Conservation District 1978 Hydrology Manual, produced by Bondamin Engineering. Refer to Section 1 and Section 2, respectively, for Post-Development and Pre-Development Rational Hydrology maps.

7. Results

The summary table below shows the resulting data that includes the peak flow rates for each of the storms analyzed for the post-developed, pre-developed, and anticipated ultimate as indicated on the storm drain plans referenced herein and also provided in the appendix for reference purposes.

Table 1: Summary Table of Pre- and Post-Development

Condition	Discharge Point – Line "H"			Discharge Point- Line "D"		
	Q10, cfs	**Q100, cfs**	**Tc, min**	**Q10, cfs**	**Q100, cfs**	**Tc, min**
Pre-Developed	8.10	13.09	17.38	1.18	1.94	23.44
Post-Developed	16.84	24.97	8.59	2.13	3.20	14.79
Anticipated Ultimate	N/A	46.72	N/A	N/A	7.3	N/A

8. Hydraulics

No hydraulics analysis was done for this report given that it is preliminary. The hydraulic analyses will be provided as part of the final hydrology report.

9. FEMA

Based on the FEMA Flood Insurance Study Mapping excerpt provided in the appendix, the project site is not within the bounds of the flood plain and is in the zone designated as Zone X. No mitigation is required.

10. Conclusion

The pre- and post-development sections of this report have gone into detail describing the hydrology of both scenarios. Ultimately the proposed project would not substantially alter the existing drainage pattern of the site or area. The drainage pattern was predominantly held the same. The main differences as shown in Table 1 above, is increased runoff and decreased time of concentration for the runoff resulting from the 10-year and 100-year frequency storm events. This is expected for an improvement that increases impervious area and installs underground drainage systems. The main question as it relates to the rational hydrology analysis is whether the proposed development will increase the runoff beyond what the downstream system was originally designed for. And to answer this question, the comparison is made with what the RCFC&WCD plans indicated as being the anticipated Q100 ultimate. For both discharge points, the post-development Q100 is substantially below the anticipated ultimate Q100 flow rates. Thus, no mitigation of incremental increase of runoff is necessary.

In addition, the following statements apply to the project site:

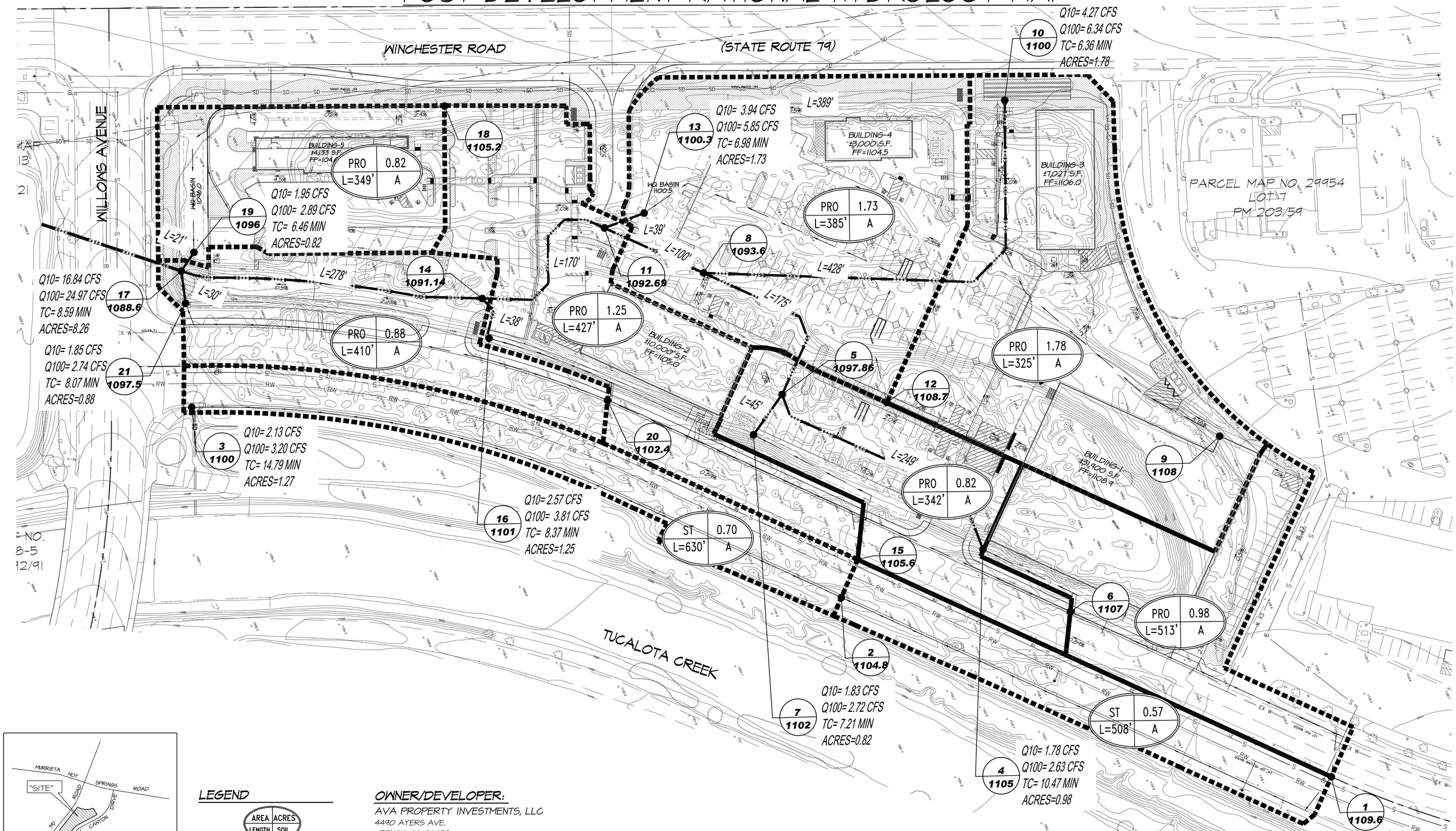
Drainage Pattern Alteration Statement: The proposed project does not substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream

or river, in a manner which would result in substantial erosion or siltation on- or off-site. The project site will continue to discharge at the same general confluence points (Line "H" and Line "D) in the proposed conditions as the existing conditions if the infiltration areas overflow.

Flooding Statement: The proposed project does not substantially alter the existing drainage pattern of the site or area including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface run off in a manner which would result in flooding on- or off-site.

Appendix A:
Post-Development Rational Hydrology Map

POST-DEVELOPMENT RATIONAL HYDROLOGY MAP



VICINITY MAP
N.T.S.

LEGEND

AREA	ACRES
LENGTH	SOIL

NODE
ELEV

WATERSHED BOUNDARY

FLOW PATH

OWNER/DEVELOPER:

AVA PROPERTY INVESTMENTS, LLC
4490 AYERS AVE.
VERNON, CA 90058
(562) 977-8565

0 40 120
20 80 160
SCALE: 1" = 40'

SKY CANYON RETAIL CENTER
POST-DEVELOPMENT
HYDROLOGY MAP
PREPARATION DATE : MARCH 2020

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

Drawing Name: U:\Projects\Avant Real Estate\9734 - Sky Canyon\Engineering\Hydrology\9734_Post Developed RationalREV.dwg

Appendix B:
Post-Development 10-Year Storm Event Rational Hydrology

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                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
        Rational Hydrology Study        Date: 03/04/20  File:pro10.out
----------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

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

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


Program License Serial Number 5006

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

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

2 year, 1 hour precipitation =  0.550(In.)
100 year, 1 hour precipitation =  1.200(In.)

Storm event year =  10.0
Calculated rainfall intensity data:
1 hour intensity =  0.817(In/Hr)
Slope of intensity duration curve = 0.5500




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station        4.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   513.000(Ft.)
Top (of initial area) elevation =  1109.600(Ft.)
Bottom (of initial area) elevation =  1107.000(Ft.)
Difference in elevation =     2.600(Ft.)
Slope =    0.00507  s(percent)=       0.51
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.476 min.
Rainfall intensity =      2.135(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.849
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)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.775(CFS)
Total initial stream area =        0.980(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.000 to Point/Station        5.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1105.000(Ft.)
Downstream point/station elevation =  1097.860(Ft.)
Pipe length  =   249.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.775(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.775(CFS)
Normal flow depth in pipe =    5.20(In.)
Flow top width inside pipe =    8.89(In.)
Critical Depth =    7.33(In.)
Pipe flow velocity =      6.71(Ft/s)
Travel time through pipe =    0.62 min.
Time of concentration (TC) =    11.09 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.000 to Point/Station        5.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      0.980(Ac.)
Runoff from this stream =      1.775(CFS)
Time of concentration =   11.09 min.
Rainfall intensity =     2.068(In/Hr)
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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        6.000 to Point/Station        7.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   342.000(Ft.)
Top (of initial area) elevation =  1107.000(Ft.)
Bottom (of initial area) elevation =  1102.000(Ft.)
Difference in elevation =     5.000(Ft.)
Slope =    0.01462  s(percent)=       1.46
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.207 min.
Rainfall intensity =      2.622(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.853
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)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.835(CFS)
Total initial stream area =        0.820(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        7.000 to Point/Station        5.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1102.000(Ft.)
Downstream point/station elevation =  1097.860(Ft.)
Pipe length  =    45.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.835(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.835(CFS)
Normal flow depth in pipe =    3.76(In.)
Flow top width inside pipe =    8.88(In.)
Critical Depth =    7.43(In.)
Pipe flow velocity =     10.47(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =     7.28 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.000 to Point/Station        5.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.820(Ac.)
Runoff from this stream =      1.835(CFS)
Time of concentration =    7.28 min.
Rainfall intensity =     2.608(In/Hr)
Summary of stream data:

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


1        1.775     11.09                 2.068
2        1.835      7.28                 2.608
Largest stream flow has longer or shorter time of concentration
Qp =      1.835 + sum of
         Qa          Tb/Ta
          1.775 *    0.656 =      1.165
Qp =      2.999

Total of 2 streams to confluence:
Flow rates before confluence point:
       1.775       1.835
Area of streams before confluence:
        0.980        0.820
Results of confluence:
Total flow rate =      2.999(CFS)
Time of concentration =     7.278 min.
Effective stream area after confluence =      1.800(Ac.)


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Process from Point/Station        5.000 to Point/Station        8.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1097.860(Ft.)
Downstream point/station elevation =  1093.600(Ft.)
Pipe length  =   175.00(Ft.)   Manning's N = 0.013
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No. of pipes = 1  Required pipe flow  =     2.999(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.999(CFS)
Normal flow depth in pipe =    6.28(In.)
Flow top width inside pipe =   11.99(In.)
Critical Depth =    8.91(In.)
Pipe flow velocity =      7.21(Ft/s)
Travel time through pipe =    0.40 min.
Time of concentration (TC) =     7.68 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        8.000 to Point/Station        8.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      1.800(Ac.)
Runoff from this stream =      2.999(CFS)
Time of concentration =    7.68 min.
Rainfall intensity =     2.532(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        9.000 to Point/Station       10.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   325.000(Ft.)
Top (of initial area) elevation =  1108.000(Ft.)
Bottom (of initial area) elevation =  1100.000(Ft.)
Difference in elevation =     8.000(Ft.)
Slope =    0.02462  s(percent)=       2.46
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.363 min.
Rainfall intensity =      2.808(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.855
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)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      4.273(CFS)
Total initial stream area =        1.780(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station       10.000 to Point/Station        8.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1100.000(Ft.)
Downstream point/station elevation =  1093.800(Ft.)
Pipe length  =   428.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.273(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     4.273(CFS)
Normal flow depth in pipe =    9.80(In.)
Flow top width inside pipe =    9.29(In.)
Critical Depth =   10.43(In.)
Pipe flow velocity =      6.22(Ft/s)
Travel time through pipe =    1.15 min.
Time of concentration (TC) =     7.51 min.


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Process from Point/Station        8.000 to Point/Station        8.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.780(Ac.)
Runoff from this stream =      4.273(CFS)
Time of concentration =    7.51 min.
Rainfall intensity =     2.564(In/Hr)
Summary of stream data:

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


1        2.999      7.68                 2.532
2        4.273      7.51                 2.564
Largest stream flow has longer or shorter time of concentration
Qp =      4.273 + sum of
          Qa          Tb/Ta
           2.999 *    0.977 =      2.931
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Qp =      7.204

Total of 2 streams to confluence:
Flow rates before confluence point:
       2.999       4.273
Area of streams before confluence:
        1.800        1.780
Results of confluence:
Total flow rate =      7.204(CFS)
Time of concentration =     7.509 min.
Effective stream area after confluence =      3.580(Ac.)


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Process from Point/Station        8.000 to Point/Station       11.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1093.600(Ft.)
Downstream point/station elevation =  1092.690(Ft.)
Pipe length  =   100.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.204(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     7.204(CFS)
Normal flow depth in pipe =   11.30(In.)
Flow top width inside pipe =   17.40(In.)
Critical Depth =   12.47(In.)
Pipe flow velocity =      6.17(Ft/s)
Travel time through pipe =    0.27 min.
Time of concentration (TC) =     7.78 min.


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Process from Point/Station       11.000 to Point/Station       11.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      3.580(Ac.)
Runoff from this stream =      7.204(CFS)
Time of concentration =    7.78 min.
Rainfall intensity =     2.514(In/Hr)


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Process from Point/Station       12.000 to Point/Station       13.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   385.000(Ft.)
Top (of initial area) elevation =  1108.700(Ft.)
Bottom (of initial area) elevation =  1100.300(Ft.)
Difference in elevation =     8.400(Ft.)
Slope =    0.02182  s(percent)=       2.18
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.975 min.
Rainfall intensity =      2.670(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.854
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)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      3.943(CFS)
Total initial stream area =        1.730(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       11.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1100.300(Ft.)
Downstream point/station elevation =  1092.690(Ft.)
Pipe length  =    39.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.943(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     3.943(CFS)
Normal flow depth in pipe =    4.71(In.)
Flow top width inside pipe =    8.99(In.)
Critical depth could not be calculated.
Pipe flow velocity =     16.86(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =     7.01 min.


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Process from Point/Station       11.000 to Point/Station       11.000
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.730(Ac.)
Runoff from this stream =      3.943(CFS)
Time of concentration =    7.01 min.
Rainfall intensity =     2.662(In/Hr)
Summary of stream data:

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


1        7.204      7.78                 2.514
2        3.943      7.01                 2.662
Largest stream flow has longer time of concentration
Qp =      7.204 + sum of
          Qb          Ia/Ib
           3.943 *    0.945 =      3.725
Qp =     10.929

Total of 2 streams to confluence:
Flow rates before confluence point:
       7.204       3.943
Area of streams before confluence:
        3.580        1.730
Results of confluence:
Total flow rate =     10.929(CFS)
Time of concentration =     7.779 min.
Effective stream area after confluence =      5.310(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station       14.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
____________________________________________________________________
Upstream point/station elevation =  1092.690(Ft.)
Downstream point/station elevation =  1091.140(Ft.)
Pipe length  =   170.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    10.929(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    10.929(CFS)
Normal flow depth in pipe =   13.22(In.)
Flow top width inside pipe =   20.28(In.)
Critical Depth =   14.78(In.)
Pipe flow velocity =      6.85(Ft/s)
Travel time through pipe =    0.41 min.
Time of concentration (TC) =     8.19 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       14.000
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      5.310(Ac.)
Runoff from this stream =     10.929(CFS)
Time of concentration =    8.19 min.
Rainfall intensity =     2.444(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.000 to Point/Station       16.000
**** INITIAL AREA EVALUATION ****
____________________________________________________________________
Initial area flow distance =   427.000(Ft.)
Top (of initial area) elevation =  1105.600(Ft.)
Bottom (of initial area) elevation =  1101.000(Ft.)
Difference in elevation =     4.600(Ft.)
Slope =    0.01077  s(percent)=       1.08
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.372 min.
Rainfall intensity =      2.415(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.851
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)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.570(CFS)
Total initial stream area =        1.250(Ac.)
Pervious area fraction = 0.100
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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       16.000 to Point/Station       14.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1101.000(Ft.)
Downstream point/station elevation =  1091.140(Ft.)
Pipe length  =    38.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.570(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     2.570(CFS)
Normal flow depth in pipe =    4.45(In.)
Flow top width inside pipe =    5.26(In.)
Critical depth could not be calculated.
Pipe flow velocity =     16.47(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =     8.41 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       14.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.250(Ac.)
Runoff from this stream =      2.570(CFS)
Time of concentration =    8.41 min.
Rainfall intensity =     2.409(In/Hr)
Summary of stream data:

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


1       10.929      8.19                 2.444
2        2.570      8.41                 2.409
Largest stream flow has longer or shorter time of concentration
Qp =     10.929 + sum of
          Qa          Tb/Ta
           2.570 *    0.974 =      2.503
Qp =     13.432

Total of 2 streams to confluence:
Flow rates before confluence point:
      10.929       2.570
Area of streams before confluence:
        5.310        1.250
Results of confluence:
Total flow rate =     13.432(CFS)
Time of concentration =     8.192 min.
Effective stream area after confluence =      6.560(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       17.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1091.140(Ft.)
Downstream point/station elevation =  1088.600(Ft.)
Pipe length  =   278.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    13.432(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    13.432(CFS)
Normal flow depth in pipe =   15.38(In.)
Flow top width inside pipe =   18.60(In.)
Critical Depth =   16.36(In.)
Pipe flow velocity =      7.11(Ft/s)
Travel time through pipe =    0.65 min.
Time of concentration (TC) =     8.84 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       17.000 to Point/Station       17.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      6.560(Ac.)
Runoff from this stream =     13.432(CFS)
Time of concentration =    8.84 min.
Rainfall intensity =     2.343(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       18.000 to Point/Station       19.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
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Initial area flow distance =   349.000(Ft.)
Top (of initial area) elevation =  1105.200(Ft.)
Bottom (of initial area) elevation =  1096.000(Ft.)
Difference in elevation =     9.200(Ft.)
Slope =    0.02636  s(percent)=       2.64
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.457 min.
Rainfall intensity =      2.785(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.855
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)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.952(CFS)
Total initial stream area =        0.820(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       19.000 to Point/Station       17.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1096.000(Ft.)
Downstream point/station elevation =  1088.600(Ft.)
Pipe length  =    21.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.952(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     1.952(CFS)
Normal flow depth in pipe =    3.30(In.)
Flow top width inside pipe =    5.97(In.)
Critical depth could not be calculated.
Pipe flow velocity =     17.63(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =     6.48 min.


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Process from Point/Station       17.000 to Point/Station       17.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.820(Ac.)
Runoff from this stream =      1.952(CFS)
Time of concentration =    6.48 min.
Rainfall intensity =     2.781(In/Hr)


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Process from Point/Station       20.000 to Point/Station       21.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   410.000(Ft.)
Top (of initial area) elevation =  1102.400(Ft.)
Bottom (of initial area) elevation =  1097.500(Ft.)
Difference in elevation =     4.900(Ft.)
Slope =    0.01195  s(percent)=       1.20
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.068 min.
Rainfall intensity =      2.464(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.852
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)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.847(CFS)
Total initial stream area =        0.880(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       21.000 to Point/Station       17.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1097.500(Ft.)
Downstream point/station elevation =  1088.600(Ft.)
Pipe length  =    30.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.847(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     1.847(CFS)
Normal flow depth in pipe =    3.36(In.)
```

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Flow top width inside pipe =    5.96(In.)
Critical depth could not be calculated.
Pipe flow velocity =     16.29(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =     8.10 min.


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Process from Point/Station       17.000 to Point/Station       17.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 3
Stream flow area =      0.880(Ac.)
Runoff from this stream =      1.847(CFS)
Time of concentration =    8.10 min.
Rainfall intensity =     2.459(In/Hr)
Summary of stream data:

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


1       13.432      8.84                 2.343
2        1.952      6.48                 2.781
3        1.847      8.10                 2.459
Largest stream flow has longer time of concentration
Qp =     13.432 + sum of
          Qb         Ia/Ib
           1.952 *    0.843 =      1.645
          Qb         Ia/Ib
           1.847 *    0.953 =      1.760
Qp =     16.837

Total of 3 streams to confluence:
Flow rates before confluence point:
      13.432       1.952       1.847
Area of streams before confluence:
        6.560        0.820        0.880
Results of confluence:
Total flow rate =     16.837(CFS)
Time of concentration =     8.844 min.
Effective stream area after confluence =      8.260(Ac.)
End of computations, total study area =            8.26 (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 =  32.0
```

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                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
        Rational Hydrology Study        Date: 03/03/20  File:st10.out
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

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

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


Program License Serial Number 5006

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

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

2 year, 1 hour precipitation =  0.550(In.)
100 year, 1 hour precipitation =  1.200(In.)

Storm event year =  10.0
Calculated rainfall intensity data:
1 hour intensity =  0.817(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 =   508.000(Ft.)
Top (of initial area) elevation =  1109.600(Ft.)
Bottom (of initial area) elevation =  1104.800(Ft.)
Difference in elevation =     4.800(Ft.)
Slope =    0.00945  s(percent)=       0.94
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.213 min.
Rainfall intensity =      2.291(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.850
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)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.110(CFS)
Total initial stream area =        0.570(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.000 to Point/Station        3.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  1104.800(Ft.)
End of street segment elevation =  1100.000(Ft.)
Length of street segment  =   630.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  32.000(Ft.)
Distance from crown to crossfall grade break  =  30.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.015
Slope from grade break to crown (v/hz)  =   0.015
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.015
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      1.666(CFS)
Depth of flow =   0.294(Ft.), Average velocity =   1.727(Ft/s)
```

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Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  10.506(Ft.)
Flow velocity =   1.73(Ft/s)
Travel time =    6.08 min.     TC =   15.29  min.
 Adding area flow to street
COMMERCIAL subarea type
Runoff Coefficient = 0.844
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)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      1.734(In/Hr) for a    10.0 year storm
Subarea runoff =      1.024(CFS) for      0.700(Ac.)
Total runoff =      2.135(CFS)       Total area =       1.270(Ac.)
Street flow at end of street =      2.135(CFS)
Half street flow at end of street =      2.135(CFS)
Depth of flow =   0.313(Ft.), Average velocity =   1.826(Ft/s)
Flow width (from curb towards crown)=  11.734(Ft.)
End of computations, total study area =            1.27 (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 =  32.0
```

Appendix C:
Post-Development 100-Year Storm Event Modified Rational Hydrology

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                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
        Rational Hydrology Study        Date: 03/04/20  File:pro.out
----------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

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

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


Program License Serial Number 5006

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

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

2 year, 1 hour precipitation =  0.550(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        4.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   513.000(Ft.)
Top (of initial area) elevation =  1109.600(Ft.)
Bottom (of initial area) elevation =  1107.000(Ft.)
Difference in elevation =     2.600(Ft.)
Slope =    0.00507  s(percent)=       0.51
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.476 min.
Rainfall intensity =      3.134(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.857
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)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.633(CFS)
Total initial stream area =        0.980(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.000 to Point/Station        5.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1105.000(Ft.)
Downstream point/station elevation =  1097.860(Ft.)
Pipe length  =   249.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.633(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     2.633(CFS)
Normal flow depth in pipe =    6.94(In.)
Flow top width inside pipe =    7.57(In.)
Critical Depth =    8.42(In.)
Pipe flow velocity =      7.21(Ft/s)
Travel time through pipe =    0.58 min.
Time of concentration (TC) =    11.05 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.000 to Point/Station        5.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      0.980(Ac.)
Runoff from this stream =      2.633(CFS)
Time of concentration =   11.05 min.
Rainfall intensity =     3.043(In/Hr)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        6.000 to Point/Station        7.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   342.000(Ft.)
Top (of initial area) elevation =  1107.000(Ft.)
Bottom (of initial area) elevation =  1102.000(Ft.)
Difference in elevation =     5.000(Ft.)
Slope =    0.01462  s(percent)=       1.46
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.207 min.
Rainfall intensity =      3.850(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.862
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)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.720(CFS)
Total initial stream area =        0.820(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        7.000 to Point/Station        5.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1102.000(Ft.)
Downstream point/station elevation =  1097.860(Ft.)
Pipe length  =    45.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.720(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     2.720(CFS)
Normal flow depth in pipe =    4.72(In.)
Flow top width inside pipe =    8.99(In.)
Critical Depth =    8.48(In.)
Pipe flow velocity =     11.59(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =     7.27 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.000 to Point/Station        5.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.820(Ac.)
Runoff from this stream =      2.720(CFS)
Time of concentration =    7.27 min.
Rainfall intensity =     3.831(In/Hr)
Summary of stream data:

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


1        2.633     11.05                 3.043
2        2.720      7.27                 3.831
Largest stream flow has longer or shorter time of concentration
Qp =      2.720 + sum of
         Qa          Tb/Ta
          2.633 *    0.658 =      1.732
Qp =      4.453

Total of 2 streams to confluence:
Flow rates before confluence point:
       2.633       2.720
Area of streams before confluence:
        0.980        0.820
Results of confluence:
Total flow rate =      4.453(CFS)
Time of concentration =     7.272 min.
Effective stream area after confluence =      1.800(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.000 to Point/Station        8.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1097.860(Ft.)
Downstream point/station elevation =  1093.600(Ft.)
Pipe length  =   175.00(Ft.)   Manning's N = 0.013
```

```
No. of pipes = 1  Required pipe flow  =     4.453(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     4.453(CFS)
Normal flow depth in pipe =    8.12(In.)
Flow top width inside pipe =   11.23(In.)
Critical Depth =   10.60(In.)
Pipe flow velocity =      7.86(Ft/s)
Travel time through pipe =    0.37 min.
Time of concentration (TC) =     7.64 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        8.000 to Point/Station        8.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      1.800(Ac.)
Runoff from this stream =      4.453(CFS)
Time of concentration =    7.64 min.
Rainfall intensity =     3.727(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        9.000 to Point/Station       10.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   325.000(Ft.)
Top (of initial area) elevation =  1108.000(Ft.)
Bottom (of initial area) elevation =  1100.000(Ft.)
Difference in elevation =     8.000(Ft.)
Slope =    0.02462  s(percent)=       2.46
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.363 min.
Rainfall intensity =      4.123(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.863
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)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      6.335(CFS)
Total initial stream area =        1.780(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       10.000 to Point/Station        8.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1100.000(Ft.)
Downstream point/station elevation =  1093.800(Ft.)
Pipe length  =   428.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.335(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     6.335(CFS)
Normal flow depth in pipe =   10.29(In.)
Flow top width inside pipe =   13.92(In.)
Critical Depth =   12.18(In.)
Pipe flow velocity =      7.06(Ft/s)
Travel time through pipe =    1.01 min.
Time of concentration (TC) =     7.37 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        8.000 to Point/Station        8.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.780(Ac.)
Runoff from this stream =      6.335(CFS)
Time of concentration =    7.37 min.
Rainfall intensity =     3.802(In/Hr)
Summary of stream data:

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


1        4.453      7.64                 3.727
2        6.335      7.37                 3.802
Largest stream flow has longer or shorter time of concentration
Qp =      6.335 + sum of
          Qa          Tb/Ta
           4.453 *    0.965 =      4.296
```

```
Qp =     10.631

Total of 2 streams to confluence:
Flow rates before confluence point:
       4.453       6.335
Area of streams before confluence:
        1.800        1.780
Results of confluence:
Total flow rate =     10.631(CFS)
Time of concentration =     7.373 min.
Effective stream area after confluence =      3.580(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        8.000 to Point/Station       11.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1093.600(Ft.)
Downstream point/station elevation =  1092.690(Ft.)
Pipe length  =   100.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    10.631(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    10.631(CFS)
Normal flow depth in pipe =   12.98(In.)
Flow top width inside pipe =   20.40(In.)
Critical Depth =   14.59(In.)
Pipe flow velocity =      6.81(Ft/s)
Travel time through pipe =    0.24 min.
Time of concentration (TC) =     7.62 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station       11.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      3.580(Ac.)
Runoff from this stream =     10.631(CFS)
Time of concentration =    7.62 min.
Rainfall intensity =     3.734(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       12.000 to Point/Station       13.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   385.000(Ft.)
Top (of initial area) elevation =  1108.700(Ft.)
Bottom (of initial area) elevation =  1100.300(Ft.)
Difference in elevation =     8.400(Ft.)
Slope =    0.02182  s(percent)=       2.18
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.975 min.
Rainfall intensity =      3.919(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.862
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)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      5.846(CFS)
Total initial stream area =        1.730(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       13.000 to Point/Station       11.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1100.300(Ft.)
Downstream point/station elevation =  1092.690(Ft.)
Pipe length  =    39.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.846(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     5.846(CFS)
Normal flow depth in pipe =    6.09(In.)
Flow top width inside pipe =    8.42(In.)
Critical depth could not be calculated.
Pipe flow velocity =     18.38(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =     7.01 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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```
Process from Point/Station       11.000 to Point/Station       11.000
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.730(Ac.)
Runoff from this stream =      5.846(CFS)
Time of concentration =    7.01 min.
Rainfall intensity =     3.908(In/Hr)
Summary of stream data:

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


1       10.631      7.62                  3.734
2        5.846      7.01                  3.908
Largest stream flow has longer time of concentration
Qp =     10.631 + sum of
          Qb          Ia/Ib
           5.846 *    0.955 =      5.585
Qp =     16.216

Total of 2 streams to confluence:
Flow rates before confluence point:
      10.631       5.846
Area of streams before confluence:
        3.580        1.730
Results of confluence:
Total flow rate =     16.216(CFS)
Time of concentration =     7.618 min.
Effective stream area after confluence =      5.310(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       11.000 to Point/Station       14.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
____________________________________________________________________
Upstream point/station elevation =  1092.690(Ft.)
Downstream point/station elevation =  1091.140(Ft.)
Pipe length  =   170.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    16.216(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    16.216(CFS)
Normal flow depth in pipe =   15.52(In.)
Flow top width inside pipe =   22.95(In.)
Critical Depth =   17.42(In.)
Pipe flow velocity =      7.55(Ft/s)
Travel time through pipe =    0.38 min.
Time of concentration (TC) =     7.99 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       14.000
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      5.310(Ac.)
Runoff from this stream =     16.216(CFS)
Time of concentration =    7.99 min.
Rainfall intensity =     3.636(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.000 to Point/Station       16.000
**** INITIAL AREA EVALUATION ****
____________________________________________________________________
Initial area flow distance =   427.000(Ft.)
Top (of initial area) elevation =  1105.600(Ft.)
Bottom (of initial area) elevation =  1101.000(Ft.)
Difference in elevation =     4.600(Ft.)
Slope =    0.01077  s(percent)=       1.08
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.372 min.
Rainfall intensity =      3.545(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.860
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)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      3.811(CFS)
Total initial stream area =        1.250(Ac.)
Pervious area fraction = 0.100
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       16.000 to Point/Station       14.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1101.000(Ft.)
Downstream point/station elevation =  1091.140(Ft.)
Pipe length  =    38.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.811(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     3.811(CFS)
Normal flow depth in pipe =    4.24(In.)
Flow top width inside pipe =    8.99(In.)
Critical depth could not be calculated.
Pipe flow velocity =     18.59(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =     8.41 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       14.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.250(Ac.)
Runoff from this stream =      3.811(CFS)
Time of concentration =    8.41 min.
Rainfall intensity =     3.537(In/Hr)
Summary of stream data:

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


1       16.216      7.99                  3.636
2        3.811      8.41                  3.537
Largest stream flow has longer or shorter time of concentration
Qp =     16.216 + sum of
          Qa          Tb/Ta
           3.811 *    0.951 =      3.624
Qp =     19.840

Total of 2 streams to confluence:
Flow rates before confluence point:
      16.216       3.811
Area of streams before confluence:
        5.310        1.250
Results of confluence:
Total flow rate =     19.840(CFS)
Time of concentration =     7.993 min.
Effective stream area after confluence =      6.560(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.000 to Point/Station       17.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1091.140(Ft.)
Downstream point/station elevation =  1088.600(Ft.)
Pipe length  =   278.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    19.840(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    19.840(CFS)
Normal flow depth in pipe =   18.09(In.)
Flow top width inside pipe =   20.68(In.)
Critical Depth =   19.20(In.)
Pipe flow velocity =      7.81(Ft/s)
Travel time through pipe =    0.59 min.
Time of concentration (TC) =     8.59 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       17.000 to Point/Station       17.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      6.560(Ac.)
Runoff from this stream =     19.840(CFS)
Time of concentration =    8.59 min.
Rainfall intensity =     3.496(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       18.000 to Point/Station       19.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
```

```
Initial area flow distance =   349.000(Ft.)
Top (of initial area) elevation =  1105.200(Ft.)
Bottom (of initial area) elevation =  1096.000(Ft.)
Difference in elevation =     9.200(Ft.)
Slope =    0.02636  s(percent)=       2.64
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.457 min.
Rainfall intensity =      4.089(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.863
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)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.894(CFS)
Total initial stream area =        0.820(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       19.000 to Point/Station       17.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1096.000(Ft.)
Downstream point/station elevation =  1088.600(Ft.)
Pipe length  =    21.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.894(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     2.894(CFS)
Normal flow depth in pipe =    4.32(In.)
Flow top width inside pipe =    5.38(In.)
Critical depth could not be calculated.
Pipe flow velocity =     19.11(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =     6.48 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       17.000 to Point/Station       17.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.820(Ac.)
Runoff from this stream =      2.894(CFS)
Time of concentration =    6.48 min.
Rainfall intensity =     4.083(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       20.000 to Point/Station       21.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   410.000(Ft.)
Top (of initial area) elevation =  1102.400(Ft.)
Bottom (of initial area) elevation =  1097.500(Ft.)
Difference in elevation =     4.900(Ft.)
Slope =    0.01195  s(percent)=       1.20
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.068 min.
Rainfall intensity =      3.618(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.860
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)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.739(CFS)
Total initial stream area =        0.880(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       21.000 to Point/Station       17.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1097.500(Ft.)
Downstream point/station elevation =  1088.600(Ft.)
Pipe length  =    30.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.739(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     2.739(CFS)
Normal flow depth in pipe =    4.44(In.)
```

```
Flow top width inside pipe =    5.27(In.)
Critical depth could not be calculated.
Pipe flow velocity =     17.61(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =     8.10 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       17.000 to Point/Station       17.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 3
Stream flow area =      0.880(Ac.)
Runoff from this stream =      2.739(CFS)
Time of concentration =    8.10 min.
Rainfall intensity =     3.611(In/Hr)
Summary of stream data:

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


1       19.840      8.59                 3.496
2        2.894      6.48                 4.083
3        2.739      8.10                 3.611
Largest stream flow has longer time of concentration
Qp =     19.840 + sum of
          Qb         Ia/Ib
           2.894 *    0.856 =      2.478
          Qb         Ia/Ib
           2.739 *    0.968 =      2.652
Qp =     24.970

Total of 3 streams to confluence:
Flow rates before confluence point:
      19.840       2.894       2.739
Area of streams before confluence:
        6.560        0.820        0.880
Results of confluence:
Total flow rate =     24.970(CFS)
Time of concentration =     8.586 min.
Effective stream area after confluence =      8.260(Ac.)
End of computations, total study area =            8.26 (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 =  32.0
```

```
                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
        Rational Hydrology Study        Date: 03/03/20  File:st.out
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

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

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


Program License Serial Number 5006

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

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

2 year, 1 hour precipitation =  0.550(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 =   508.000(Ft.)
Top (of initial area) elevation =  1109.600(Ft.)
Bottom (of initial area) elevation =  1104.800(Ft.)
Difference in elevation =     4.800(Ft.)
Slope =    0.00945  s(percent)=       0.94
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.213 min.
Rainfall intensity =      3.363(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.859
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)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.646(CFS)
Total initial stream area =        0.570(Ac.)
Pervious area fraction = 0.100

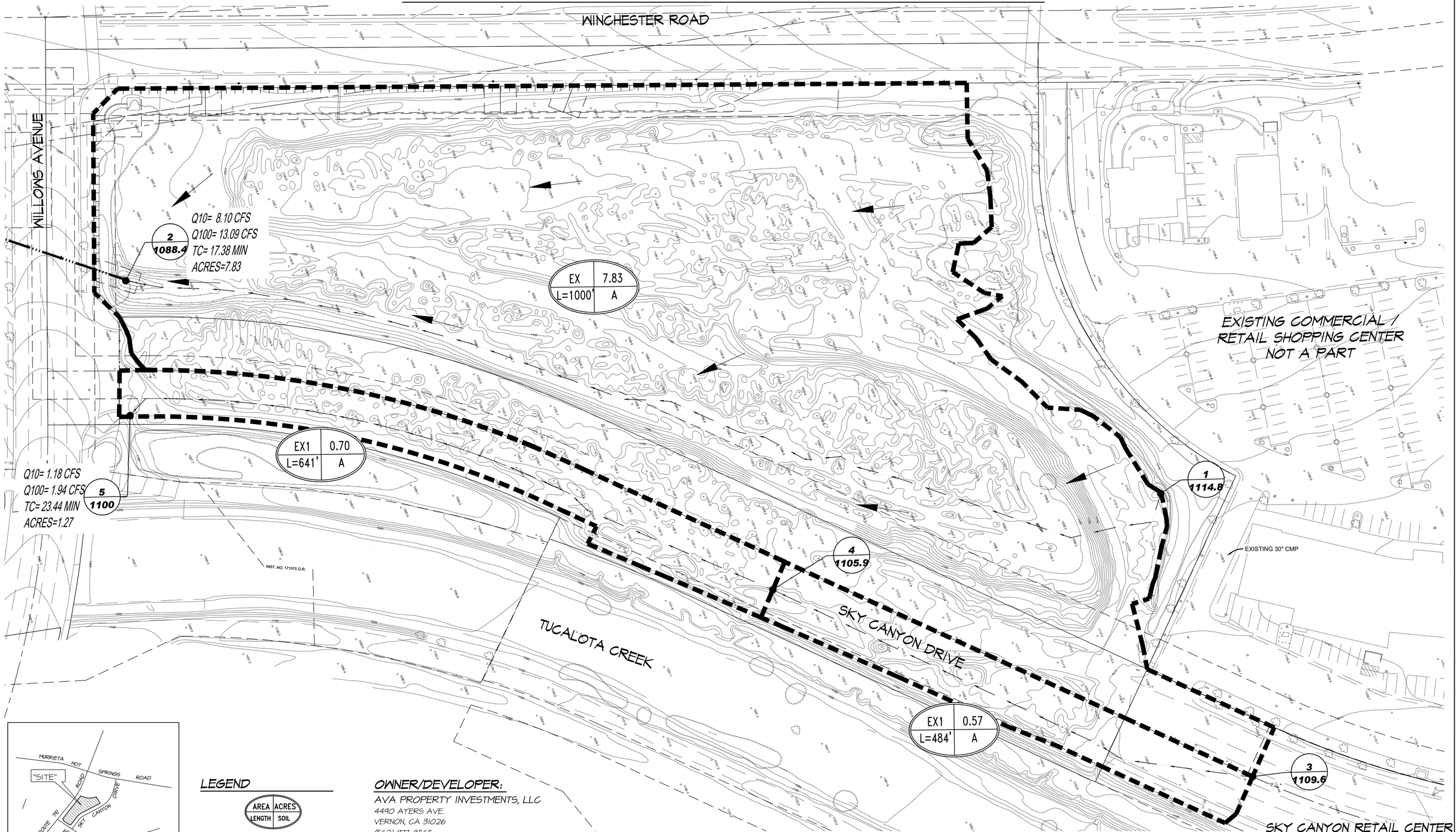

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.000 to Point/Station        3.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  1104.800(Ft.)
End of street segment elevation =  1100.000(Ft.)
Length of street segment  =   630.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  32.000(Ft.)
Distance from crown to crossfall grade break  =  30.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.015
Slope from grade break to crown (v/hz)  =   0.015
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.015
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 =      2.451(CFS)
Depth of flow =   0.324(Ft.), Average velocity =   1.884(Ft/s)
```

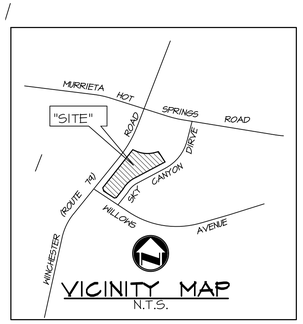
```
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  12.459(Ft.)
Flow velocity =   1.88(Ft/s)
Travel time =    5.57 min.     TC =   14.79  min.
 Adding area flow to street
COMMERCIAL subarea type
Runoff Coefficient = 0.853
Decimal fraction soil group A = 1.000
Decimal fraction 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)  =  32.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      2.593(In/Hr) for a   100.0 year storm
Subarea runoff =      1.548(CFS) for      0.700(Ac.)
Total runoff =      3.195(CFS)       Total area =       1.270(Ac.)
Street flow at end of street =      3.195(CFS)
Half street flow at end of street =      3.195(CFS)
Depth of flow =   0.346(Ft.), Average velocity =   2.004(Ft/s)
Flow width (from curb towards crown)=  13.941(Ft.)
End of computations, total study area =            1.27 (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 =  32.0
```

Appendix D:
Pre-Development Rational Hydrology Map

PRE-DEVELOPMENT RATIONAL HYDROLOGY MAP





VICINITY MAP
N.T.S.

LEGEND

AREA | ACRES
LENGTH | SOIL

NODE
ELEV

WATERSHED BOUNDARY

FLOW PATH

OWNER/DEVELOPER:

AVA PROPERTY INVESTMENTS, LLC
4490 AYERS AVE.
VERNON, CA 31026
(562) 977-8565

0 40 120
20 80 160
SCALE: 1" = 40'

SKY CANYON RETAIL CENTER
PRE-DEVELOPMENT
HYDROLOGY MAP
PREPARATION DATE : MARCH 2020

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

Appendix E:
Pre-Development 10-Year Storm Event Rational Hydrology

```
                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
        Rational Hydrology Study        Date: 03/02/20  File:ex10.out
----------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

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

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


Program License Serial Number 5006

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

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

2 year, 1 hour precipitation =  0.550(In.)
100 year, 1 hour precipitation =  1.200(In.)

Storm event year =  10.0
Calculated rainfall intensity data:
1 hour intensity =  0.817(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 =  1114.800(Ft.)
Bottom (of initial area) elevation =  1088.400(Ft.)
Difference in elevation =    26.400(Ft.)
Slope =    0.02640  s(percent)=       2.64
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   17.376 min.
Rainfall intensity =      1.616(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.640
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)  =  67.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      8.098(CFS)
Total initial stream area =        7.830(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =            7.83 (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 =  67.0
```

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                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
        Rational Hydrology Study        Date: 03/02/20  File:ex110.out
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********
 English (in-lb) Units used in input data file
------------------------------------------------------------------------
Program License Serial Number 5006
------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District 1978 hydrology manual
Storm event (year) =   10.00 Antecedent Moisture Condition = 2
2 year, 1 hour precipitation =  0.550(In.)
100 year, 1 hour precipitation =  1.200(In.)
Storm event year =  10.0
Calculated rainfall intensity data:
1 hour intensity =  0.817(In/Hr)
Slope of intensity duration curve = 0.5500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.000 to Point/Station        4.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   484.000(Ft.)
Top (of initial area) elevation =  1109.600(Ft.)
Bottom (of initial area) elevation =  1105.900(Ft.)
Difference in elevation =     3.700(Ft.)
Slope =    0.00764  s(percent)=       0.76
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   16.655 min.
Rainfall intensity =      1.654(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.644
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)  =  67.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      0.607(CFS)
Total initial stream area =        0.570(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.000 to Point/Station        5.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of natural channel elevation =   1105.900(Ft.)
End of natural channel elevation =   1100.000(Ft.)
Length of natural channel  =   641.000(Ft.)
Estimated mean flow rate at midpoint of channel =      0.980(CFS)
Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.43(Ft/s)
Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0092
Corrected/adjusted channel slope =  0.0092
Travel time =    7.45 min.     TC =   24.11  min.
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.605
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)  =  67.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.350(In/Hr) for a    10.0 year storm
Subarea runoff =      0.572(CFS) for      0.700(Ac.)
Total runoff =      1.179(CFS)       Total area =       1.270(Ac.)
End of computations, total study area =            1.27 (Ac.)
The following figures maybe used for a unit hydrograph study of the same area.
Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  67.0
```

Appendix F:
Pre-Development 100-Year Storm Event Rational Hydrology

```
                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
        Rational Hydrology Study        Date: 03/02/20  File:ex.out
----------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

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

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


Program License Serial Number 5006

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

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

2 year, 1 hour precipitation =  0.550(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 =  1114.800(Ft.)
Bottom (of initial area) elevation =  1088.400(Ft.)
Difference in elevation =    26.400(Ft.)
Slope =    0.02640  s(percent)=       2.64
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   17.376 min.
Rainfall intensity =      2.372(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.705
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)  =  67.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =     13.094(CFS)
Total initial stream area =        7.830(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =            7.83 (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 =  67.0
```

```
                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
        Rational Hydrology Study        Date: 03/02/20  File:ex1.out
----------------------------------------------------------------------
 *********   Hydrology Study Control Information **********
 English (in-lb) Units used in input data file
----------------------------------------------------------------------
Program License Serial Number 5006
----------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District 1978 hydrology manual
Storm event (year) =  100.00 Antecedent Moisture Condition = 2
2 year, 1 hour precipitation =  0.550(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        3.000 to Point/Station        4.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   484.000(Ft.)
Top (of initial area) elevation =  1109.600(Ft.)
Bottom (of initial area) elevation =  1105.900(Ft.)
Difference in elevation =     3.700(Ft.)
Slope =    0.00764  s(percent)=       0.76
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   16.655 min.
Rainfall intensity =      2.428(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.708
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)  =  67.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      0.981(CFS)
Total initial stream area =        0.570(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.000 to Point/Station        5.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of natural channel elevation =   1105.900(Ft.)
End of natural channel elevation =   1100.000(Ft.)
Length of natural channel  =   641.000(Ft.)
Estimated mean flow rate at midpoint of channel =      1.583(CFS)
Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.57(Ft/s)
Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.0092
Corrected/adjusted channel slope =  0.0092
Travel time =    6.79 min.     TC =   23.44  min.
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.679
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)  =  67.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.012(In/Hr) for a   100.0 year storm
Subarea runoff =      0.956(CFS) for      0.700(Ac.)
Total runoff =      1.936(CFS)       Total area =       1.270(Ac.)
End of computations, total study area =            1.27 (Ac.)
The following figures maybe used for a unit hydrograph study of the same area.
Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  67.0
```

Appendix G: Plates

Caltrans

Caltrans Water Quality Planning Tool

The Water Quality Planning Tool was created to help planners and designers comply with environmental permits. It uses a map interface to find information based on a project's location. **This application is being updated for digital accessibility and will continue to function while updates are in progress.**

Layers

- ☐ 303(d) List and TMDLs 2014-2016 (Legend)
- ☐ Areas of Special Biological Significance
- ☐ Arid and Semi-Arid Regions
- ☐ Caltrans Districts
- ☐ Caltrans Facilities
- ☐ Caltrans Tier 1 Monitoring Sites
- ☐ Calwater Watersheds
- ☐ Coastal Zone
- ☐ Counties
- ○ Geologic Map (Legend)
- ☐ High Risk Receiving Watersheds
- ☐ Monthly Precipitation
- ☐ MS4 Areas
- ☐ Post Miles
- ☐ Rainfall Distribution
- ☐ RWQCB Boundaries
- ○ USGS Topo Maps
- ☐ Watershed Boundary Dataset

Risk Level Determination

- ☐ Erosivity Index
- ☐ K Factor
- ☐ R Factor (calculations)
- ○ LS Factor
- ☑ Soil Details

Compliance Storm Events

- ○ 5-yr 24-hr North
- ○ 10-yr 24-hr North
- ○ 5-yr 24-hr South
- ○ 10-yr 24-hr South

Distance and Area

☐ Measure Clear

Feet: 0

Acres: 0

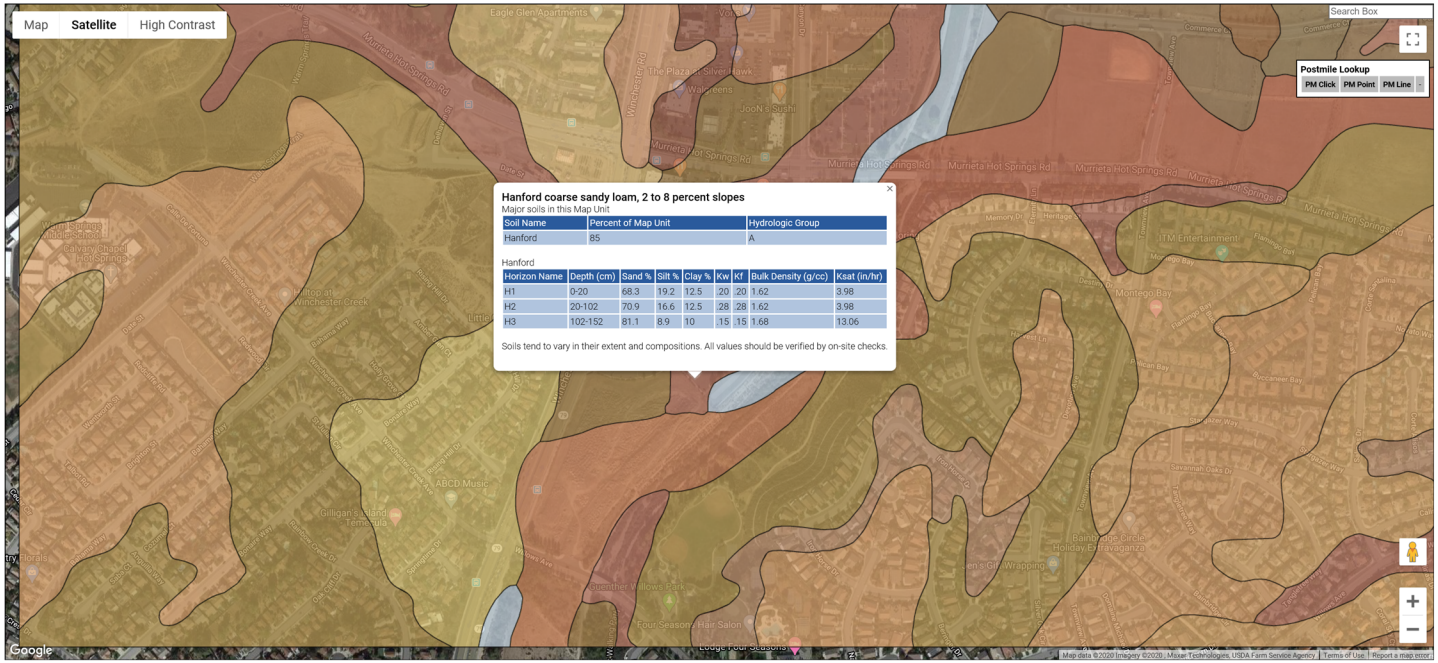
Postmile Lookup

☑ Show postmile lookup

Information

Hover over a layer name for a description.
Additional information, tables, coordinates, and links are below the map.

Help



Watershed Information

CALWATER WATERSHED

Hydrologic Unit	SANTA MARGARITA	Hydrologic Area	Auld	Hydrologic Sub-Area #	902.42
Hydrologic Sub-Area Name	Gertrudis	Planning Watershed	4902420000	HSA Area (acres)	20731
Latitude, Longitude	33.5502, -117.139				

RUNOFF INDEX NUMBERS OF HYDROLOGIC SOIL-COVER COMPLEXES FOR PERVIOUS AREAS-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group A	B	C	D
NATURAL COVERS -					
Barren (Rockland, eroded and graded land)		78	86	91	93
Chaparrel, Broadleaf (Manzonita, ceanothus and scrub oak)	Poor	53	70	80	85
	Fair	40	63	75	81
	Good	31	57	71	78
Chaparrel, Narrowleaf (Chamise and redshank)	Poor	71	82	88	91
	Fair	55	72	81	86
Grass, Annual or Perennial	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Meadows or Cienegas (Areas with seasonally high water table, principal vegetation is sod forming grass)	Poor	63	77	85	88
	Fair	51	70	80	84
	Good	30	58	72	78
Open Brush (Soft wood shrubs - buckwheat, sage, etc.)	Poor	62	76	84	88
	Fair	46	66	77	83
	Good	41	63	75	81
Woodland (Coniferous or broadleaf trees predominate. Canopy density is at least 50 percent)	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	28	55	70	77
Woodland, Grass (Coniferous or broadleaf trees with canopy density from 20 to 50 percent)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
URBAN COVERS -					
Residential or Commercial Landscaping (Lawn, shrubs, etc.)	Good	32	56	69	75
Turf (Irrigated and mowed grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
AGRICULTURAL COVERS -					
Fallow (Land plowed but not tilled or seeded)		76	85	90	92

RCFC & WCD
HYDROLOGY MANUAL

RUNOFF INDEX NUMBERS FOR PERVIOUS AREA

ACTUAL IMPERVIOUS COVER

Land Use (1)	Range-Percent	Recommended Value For Average Conditions-Percent(2)
Natural or Agriculture	0 - 10	0
Single Family Residential: (3)		
40,000 S. F. (1 Acre) Lots	10 - 25	20
20,000 S. F. (½ Acre) Lots	30 - 45	40
7,200 - 10,000 S. F. Lots	45 - 55	50
Multiple Family Residential:		
Condominiums	45 - 70	65
Apartments	65 - 90	80
Mobile Home Park	60 - 85	75
Commercial, Downtown Business or Industrial	80 -100	90

Notes:

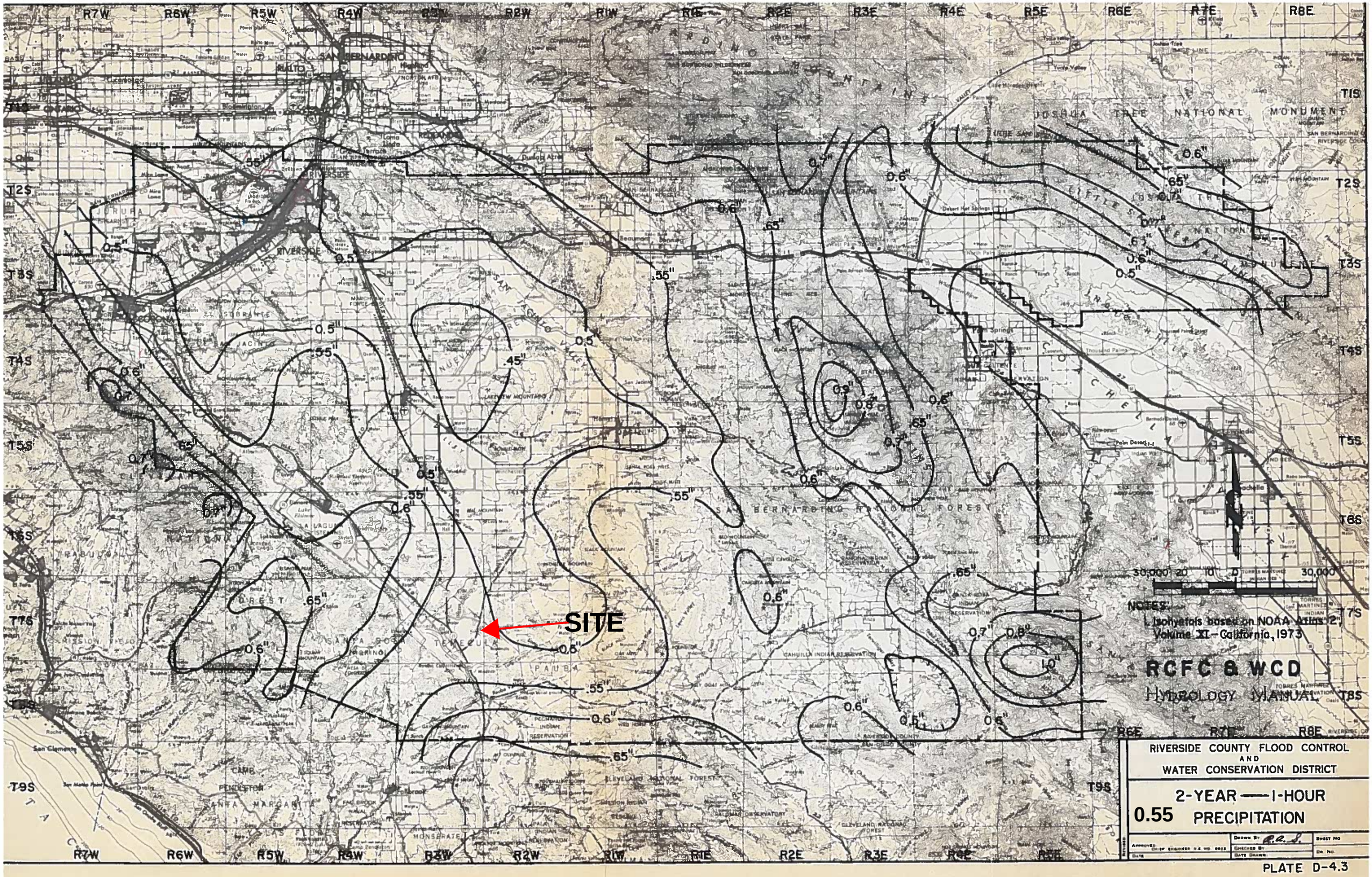
1. Land use should be based on ultimate development of the watershed. Long range master plans for the County and incorporated cities should be reviewed to insure reasonable land use assumptions.

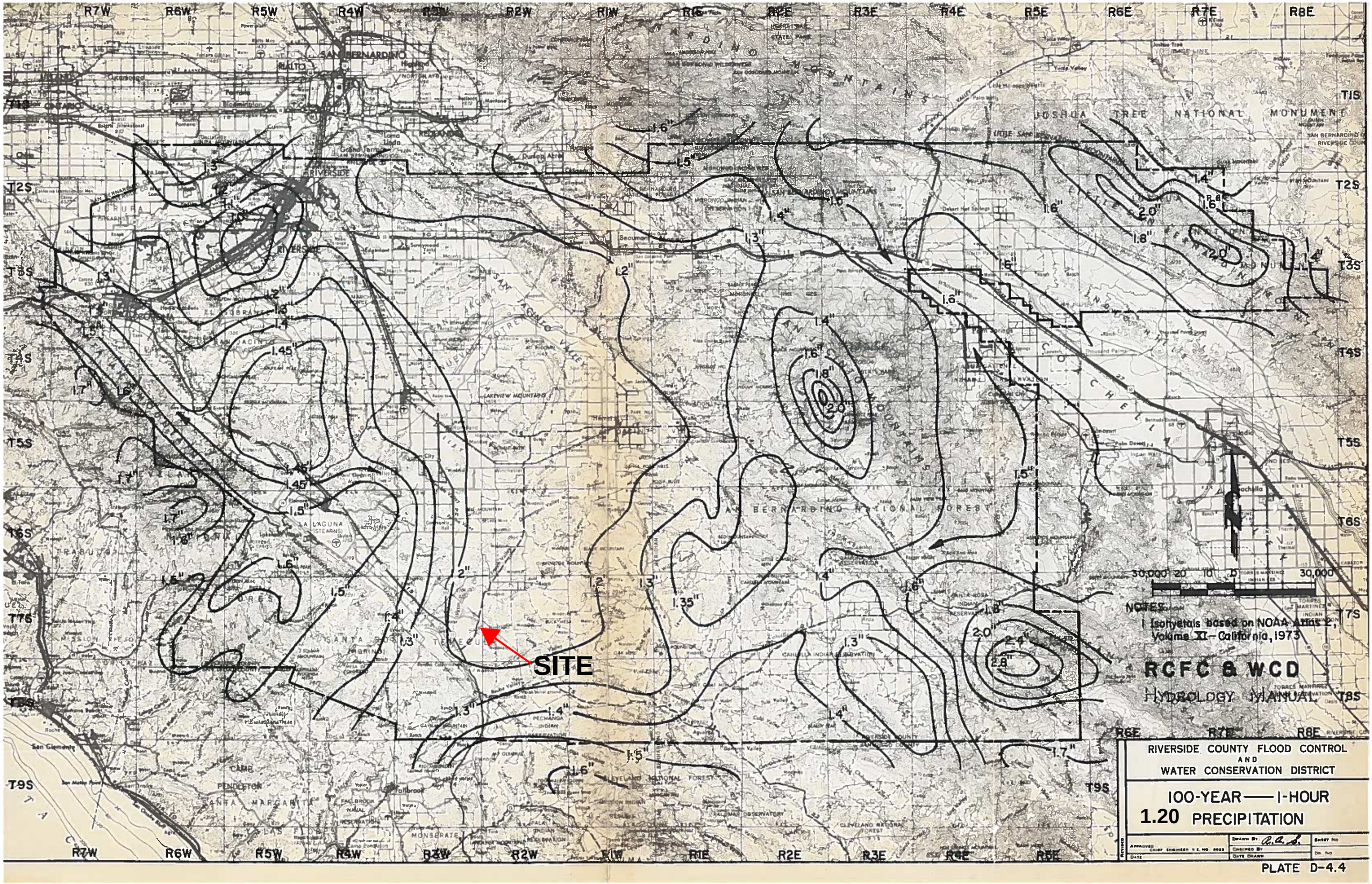
2. Recommended values are based on average conditions which may not apply to a particular study area. The percentage impervious may vary greatly even on comparable sized lots due to differences in dwelling size, improvements, etc. Landscape practices should also be considered as it is common in some areas to use ornamental gravels underlain by impervious plastic materials in place of lawns and shrubs. A field investigation of a study area should always be made, and a review of aerial photos, where available may assist in estimating the percentage of impervious cover in developed areas.

3. For typical horse ranch subdivisions increase impervious area 5 percent over the values recommended in the table above.

RCFC & WCD
HYDROLOGY MANUAL

IMPERVIOUS COVER FOR DEVELOPED AREAS


SITE
NOTES:
1. Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
2-YEAR — 1-HOUR
0.55 PRECIPITATION
PLATE D-4.3


SITE
NOTES
1. Isohyetals based on NOAA Atlas 2, Volume XI – California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
100-YEAR — 1-HOUR
1.20 PRECIPITATION
PLATE D-4.4


SITE
.45
.50
.55
.58
.60
.65
SAN BERNARDINO
RIALTO
RIVERSIDE
JOSHUA TREE NATIONAL MONUMENT
SAN BERNARDINO NATIONAL FOREST
CLEVELAND NATIONAL FOREST
30,000 20 10 0 30,000
NOTES:
1. Slope of Intensity-Duration Curve based on District analysis of automatic recording rain gage records.
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
SLOPE OF
INTENSITY DURATION
0.55 CURVE

PLATE D-4.6

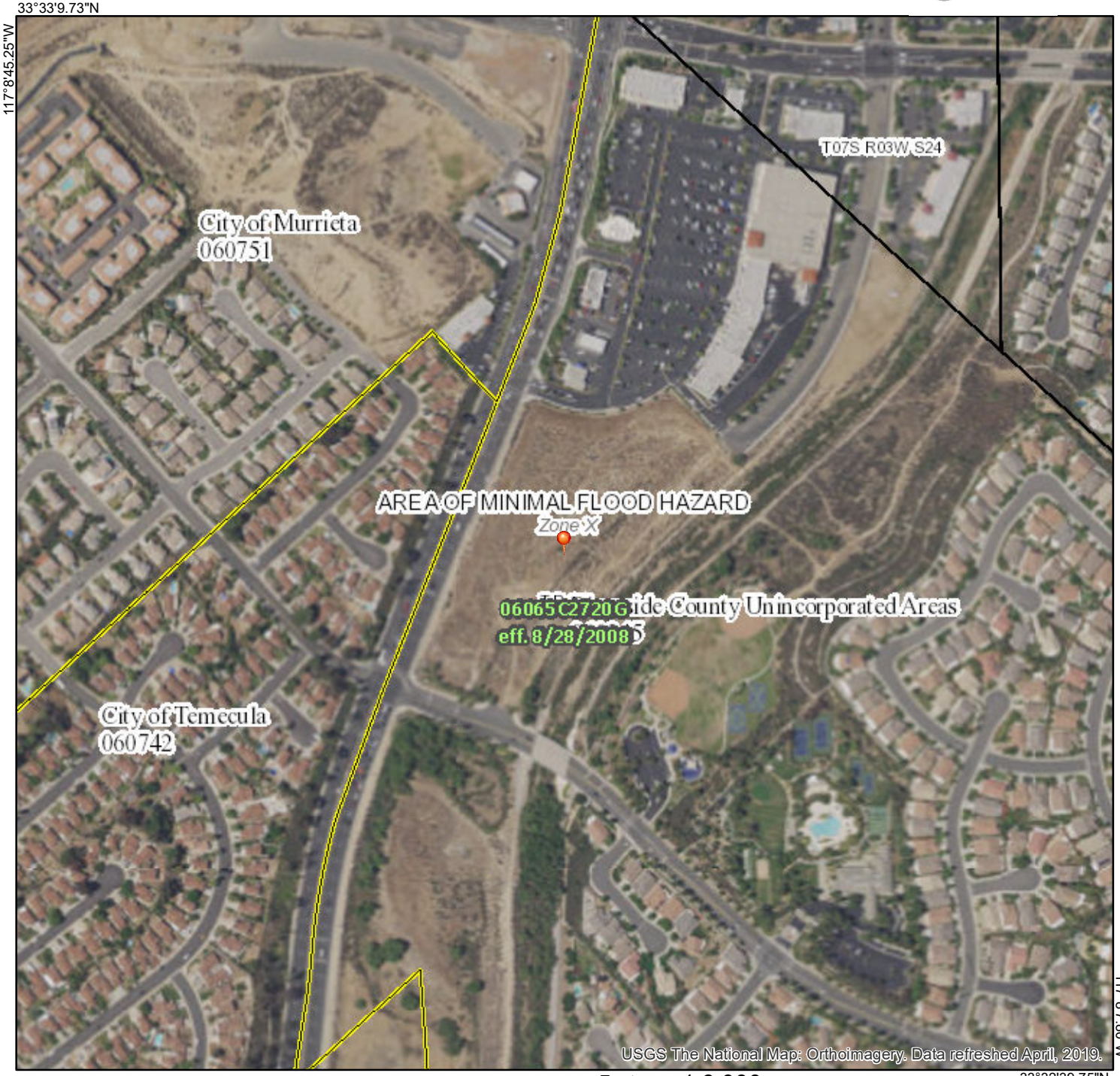
Appendix H: FEMA Firmette

National Flood Hazard Layer FIRMette

FEMA

33°33'9.73"N

117°8'45.25"W



117°8'7.80"W

33°32'39.75"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS

- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD

- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS

- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES

- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES

- B 20.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- 8 Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS

- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

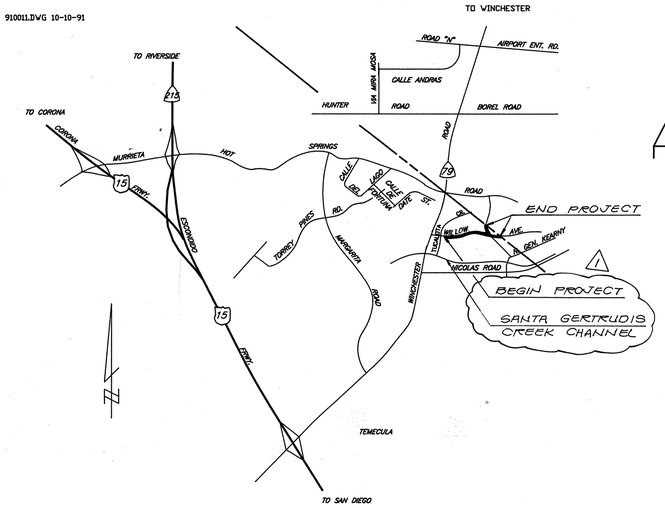
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 3/3/2020 at 7:48:46 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Appendix I: Riverside County Flood Control & Water Conservation District Reference Plans

910011.DWG 10-10-91

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

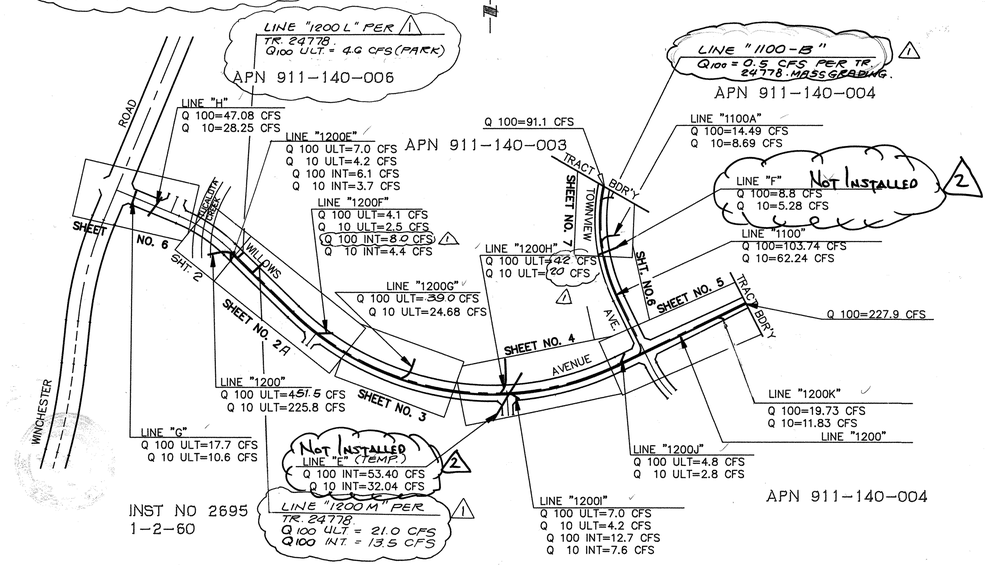


VICINITY MAP
NOT TO SCALE

ADDITIONAL NOTES FOR CAST-IN-PLACE PIPE CONSTRUCTION

1. JUNCTION STRUCTURES SHOWN ON THE PLANS ARE FOR RCP. THE FF. SUBSTITUTIONS SHALL BE MADE FOR J.S. FOR USE OF CIPP.
   ~~A) A J.S. NO. 4 (JS 229) SHALL BE REPLACED W/ EITHER A J.S. NO. 2 (JS 227) OR A T.S. NO. 3 (TS 303)~~
   B) A. J.S. NO. 2 (JS 227) SHALL BE REPLACED W/ A T.S. NO. 3. (TS 303)
2. ~~STANDARD DWG. NO. JS 227 (J.S. NO. 2) WHEN USED W/ CIPP SHALL BE MODIFIED TO INCLUDE CONCRETE BACKFILL 1' (T.) OVER THE CIPP.~~
3. AT THE END OF ALL POURS AND AT THE END OF EA. WORKING DAY, THE CONTRACTOR SHALL INSTALL # 4 DOWELS 24" LONG, 12" INTO THE LAST POUR AT 12 INCH CENTERS AROUND CIRCUMFERENCE OF CIPP.

SCALE 1"=400'



INDEX MAP

0' 400' 800' 1200' 1600'

SCALE: 1" = 400'

INDEX

R.C.F.C. & W.C.D. STD. DRAWINGS

CH326	CONC. CHANNEL CUT-OFF WALL & WEEPHOLES
CB100	CATCH BASIN NO. 1
LD201	LOCAL DEPRESSION NO. 2
MH252	MANHOLE NO. 2
M803	CONCRETE PIPE COLLAR
M816	CONCRETE BULKHEAD
JS227	JUNCTION STRUCTURE NO. 2
JS229	JUNCTION STRUCTURE NO. 4
TS303	TRANSITION STRUCTURE NO. 3
MH 254	MANHOLE NO. 4
M801	CHAIN LINK & FENCE

J.S. 231 ..... JUNCTION STRUCTURE NO. 6.

CALTRANS STD. DRAWINGS

D86–B	PIPE CULVERT HEADWALL
D94	PRECAST CONCRETE FLARED END

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, TO A BRIDGE OVER THE TUCALOTA CREEK AND THE SANTA GERTRUDIS CREEK FORK. 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: Richard Valdez
DATE 1-13-03

CALIFORNIA COUNCIL OF CIVIL ENGINEERS & LAND SURVEYORS

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. 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.
3. ALL STATIONING REFERS TO CENTERLINE OF CONSTRUCTION UNLESS OTHERWISE NOTED.
4. STATIONING FOR LATERALS AND CONNECTOR PIPE REFER TO THE CENTERLINE–CENTERLINE INTERSECTION STATION.
5. FORTY–EIGHT HOURS BEFORE EXCAVATION, CALL UNDERGROUND ALERT 1–800–422–4133.
6. ALL ELEVATIONS SHOWN ARE IN FEET AND DICIMALS THEREOF BASED ON U.S.C., & G.S. DATUM.
7. ALL CROSS SECTIONS ARE TAKEN LOOKING DOWNSTREAM.
8. ELEVATIONS OF UTILITIES ARE APPROXIMATE UNLESS OTHERWISE NOTED.
9. 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.
10. PIPE CONNECTED TO THE MAINLINE PIPE SHALL CONFORM TO JUNCTION STRUCTURE NO. 4 (JS 229) UNLESS OTHERWISE NOTED.
11. 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 FCFC & WCD STD. DWG. M815.
12. BH–1 INDICATES SOIL BORING LOCATIONS BASED ON THE SOILS REPORT DATED: _____. LOCATIONS SHOWN ARE APPROXIMATE.
13. "V" IS THE DEPTH OF INLET OF CATCH BASINS MEASURED FROM THE TOP OF CURB TO INVERT OF CONNECTOR PIPE.
14. CATCH BASINS SHALL BE LOCATED SO THAT LOCAL DEPRESSION SHALL BEGIN AT EXISTING CURB RETURN JOINT, UNLESS OTHERWISE SPECIFIED.
15. 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.

REGISTERED PROFESSIONAL ENGINEER RICHARD L. VALDEZ No. 48060 Exp. 12-31-03 CIVIL STATE OF CALIFORNIA

R.C.F.C. & W.C.D. NOTE:

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

84" R.C.P. OR 84" CIPP	FROM STA. 35+22.43	TO STA. 35+98.93 AS SHOWN ON SHT. 5
84" R.C.P. OR 84" CIPP	FROM STA. 8+80.00	TO STA. 35+13.25 AS SHOWN ON SHT. 2–5
66" R.C.P. OR 66" CIPP	FROM STA. 36+13.32	TO STA. 38+22.67 AS SHOWN ON SHT. 5
60" R.C.P. OR 60" CIPP	FROM STA. 38+27.33	TO STA 42+64.01 AS SHOWN ON SHT. 5
54" R.C.P. OR 54" CIPP	FROM STA. 10+13.50	TO STA 18+47.67 AS SHOWN ON SHT. 6–7
48" R.C.P. OR 48" CIPP	FROM STA. 18+52.33	TO STA. 20+35.64 AS SHOWN ON SHT. 7

ALL MANHOLES AND OTHER STRUCTURES REQUIRED TO COMPLETE THE CONSTRUCTION OF THE ABOVE MENTIONED MAINLINE PIPE EXCEPT CATCH BASINS AND CONNECTOR PIPES.

R.C.T.D. NOTE:

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

33" R.C.P. LINE "H" FROM STA. 10+00.70 TO STA. 11+31.50 AS SHOWN ON SHT. 6
30" R.C.P. LINE "1200G" FROM STA. 10+13.12 TO STA. 10+62.65 AS SHOWN ON SHT. 3
30" R.C.P. LINE "1200H" FROM STA. 10+12.00 TO STA. 10+63.03 AS SHOWN ON SHT. 4
24" R.C.P. LINE "G" FROM STA. 10+00.00 TO STA. 10+84.50 AS SHOWN ON SHT. 6
18" R.C.P. LINE "1200E" FROM STA. 10+03.25 TO STA. 10+36.82
18" R.C.P. LINE "1200F" FROM STA. 10+04.60 TO STA. 10+54.91
18" R.C.P. LINE "1200I" FROM STA. 10+04.16 TO STA. 10+41.90
18" R.C.P. LINE "1200K" FROM STA. 10+02.50 TO STA. 10+46.76
18" R.C.P. LINE "1100A" FROM STA. 10+04.50 TO STA. 10+52.10
} AS SHOWN ON SHEETS 2,4,5,&7
33" R.C.P. LINE "E" FROM STA 10+00.00 TO STA 13+14.00 AS SHOWN ON SHT. 4
18" R.C.P. LINE "F" FROM STA 10+00.00 TO STA 12+12.08 AS SHOWN ON SHT. 7
18" R.C.P. LINE "1200J" FROM STA. 10+00.00 TO STA. 10+53.89 AS SHOWN ON SHT. 5

REGISTERED PROFESSIONAL ENGINEER RICHARD L. VALDEZ No. 48060 Exp. 12-31-03 CIVIL STATE OF CALIFORNIA

REV. BY VSL ENGINEERING

RICHARD VALDEZ 12-10-99
RICHARD VALDEZ DATE
RCE 48060 EXP. 12-31-03

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

RANPAC ENGINEERING CORP.
27447 ENTERPRISE CIRCLE WEST
TEMECULA, CALIFORNIA 92390
TELEPHONE (714) 676-7000

SUBMITTED BY: Norman Thomas
REGISTERED CIVIL ENGINEER NO. 30927 EXP. 3/31/92
DATE: 10-11-91

BENCHMARK: SEE ABOVE RIGHT

REVISIONS

REF.	DESCRIPTION	APPR	DATE
1	ADDED LINES "L", "M", "1100B" & CIPP NOTES		2-8-00
2	AS-BUILT NOTES BY VSL ENGINEERING - RVALDEZ		1-13-03

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

RECOMMENDED FOR APPROVAL BY: Frank A. Davis
PLANNING ENGINEER
DATE: 8/6/92

APPROVED BY: Kenneth L. Schwendeman
CHIEF ENGINEER
DATE: 8-8-92

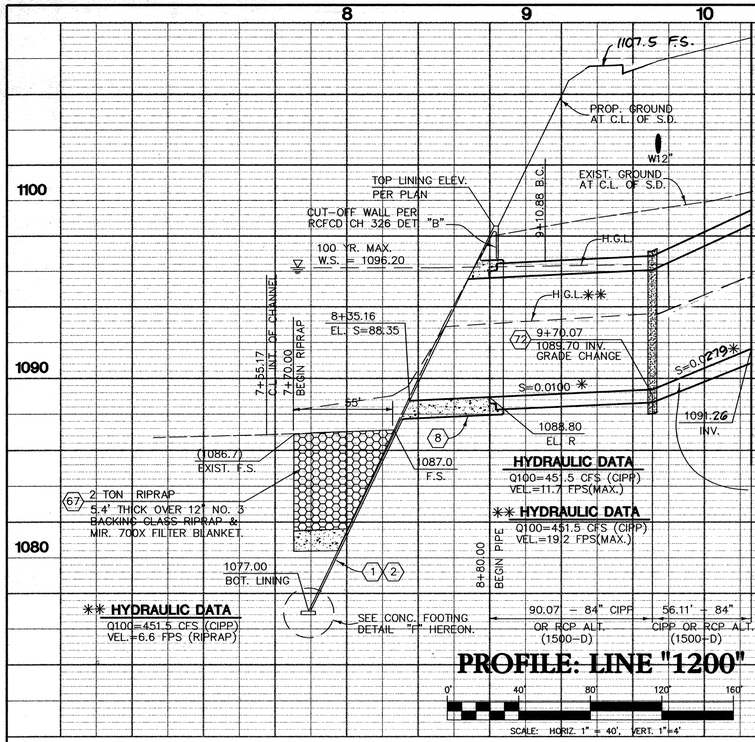
County of Riverside
APPROVED BY: F. J. Garten
FOR TRANS. DEPT.
RIVERSIDE COUNTY, CA
DATE: 1/27/92

TR. 24778 (FORMERLY F.D. 161)
SANTA GERTRUDIS VALLEY
WILLOWS AVE. & TOWNVIEW AVE.
STAGE II STORM DRAIN
TITLE SHEET
LINE "1200" & LINE "1100"

PROJECT NO. 7-0-177
DRAWING NO. 7-147
SHEET NO. 1 OF 10

DESIGNED BY ROLAND F. | DRAWN BY GREG L. | CHECKED BY

JN. 135-37/75

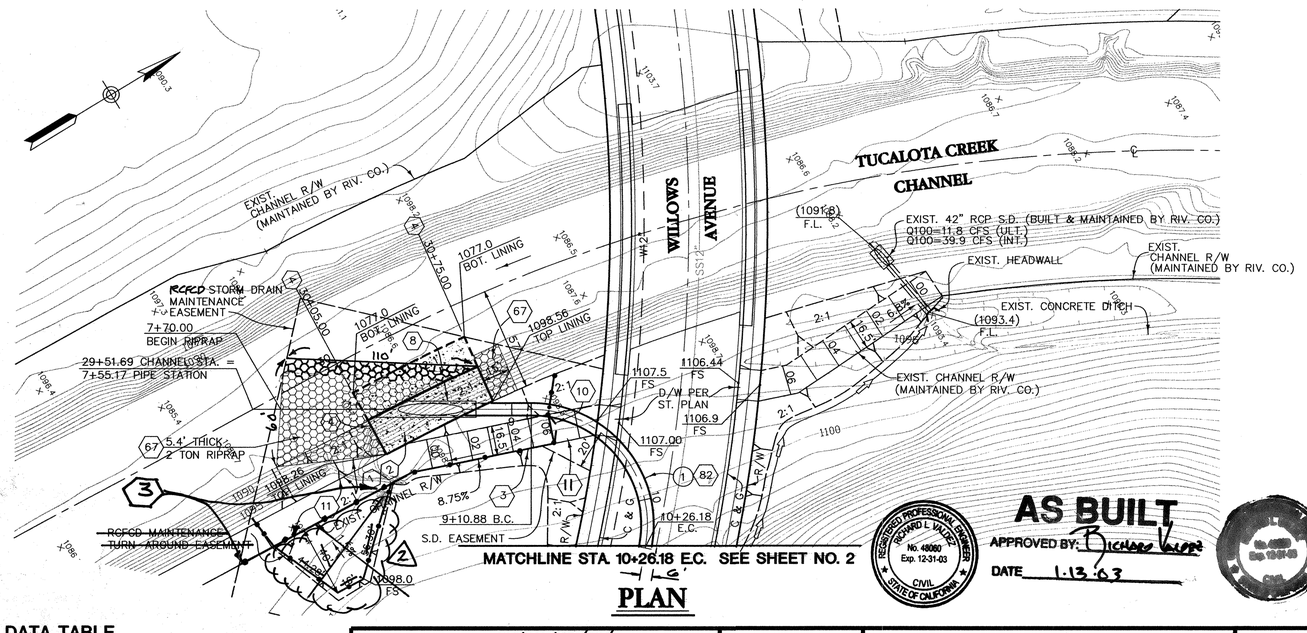


PROFILE: LINE "1200"

✳ CIPP NOTE:
FOR VELOCITIES GREATER THAN 20 FPS AND LESS THAN 30 FPS INVERT THICKNESS SHALL BE INCREASED 2" OVER LOWER 120 DEG. OF THE PIPE W/ F'C GREATER THAN 4000 PSI. FOR VEL. GREATER THAN 30 FPS 2" THICKENED INV. SHALL BE CONSTRUCTED W/ F'C GREATER THAN 5000 PSI.

✳✳ HYDRAULIC DATA BASED ON MIN. FLOW AT TUCALOTA CHANNEL.

MATCHLINE STA. 10+26.18 E.C. SEE SHEET NO. 2

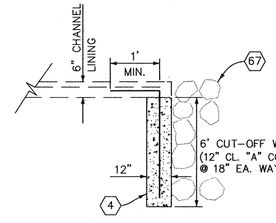


MATCHLINE STA. 10+26.18 E.C. SEE SHEET NO. 2

PLAN

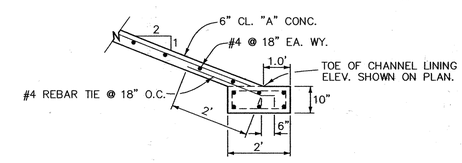
REGISTERED PROFESSIONAL ENGINEER RICHARD L. VALDEZ No. 48060 Exp. 12-31-03 CIVIL STATE OF CALIFORNIA

AS BUILT
APPROVED BY: Richard Valdez
DATE 1.13.03



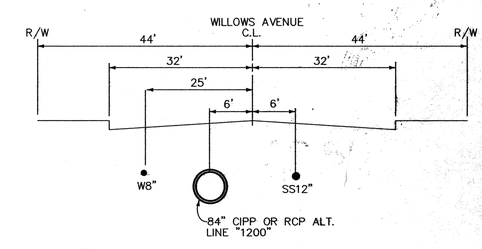
CUT-OFF WALL DETAIL 4

N.T.S.



CONC. FOOTING DET. "F"

(NTS)



SECTION AT STA. 10+26.18

(SECTION A-A) 0' 10' 20' 30' 40'
SCALE: 1" = 10'

CONSTRUCTION NOTES:

1. CONST. 6" CL. "A" CONC. W/ #4 @ 18" EA. WAY. (CONST. TOP OF LINING CUT-OFF WALL PER RCFCD CH326 DETAIL "B".)
2. CONST. 3" WEEPHOLES PER RCFCD DWG. NO. CH 326 (10' O.C. TYP.)
3. CONST. 6' HIGH CHAIN LINK FENCE PER RCFCD DWG. NO. M-801.
4. CONSTRUCT CUT-OFF WALL PER DETAIL HEREON.
8. CONST. JUNCTION STRUCTURE NO. 6 PER RCFCD DWG. NO. JS 231. D=84", L=124.83', C=79.99', EL. R= 88.80', EL. S= 88.35 & A=30°00'00"
10. CONST. CHAIN LINK GATE (14' DOUBLE GATES) PER RCFCD STD. M-801.
11. CONST. COMPACTED (ROLLED) 3" SLAG PAVING.
67. INSTALL 2 TON RIPRAP OVER 12" FILTER BLANKET MATERIAL. SEE DET. ON SHT. 8.
72. CONSTRUCT CONCRETE COLLAR PER RCFCD STD. 803.
82. CONSTRUCT CIPP OR RCP ALT.

TRACT NO. 24778

DATA TABLE

No.	DELTA/BEARING	RADIUS	LENGTH	TANGENT
(1)	101°37'53"	65.00'	115.30'	79.74'

0' 40' 80' 120' 160'
SCALE: 1" = 40'

VSL engineering, land planning & surveying
40935 COUNTY CENTER DR., SUITE "D", TEMECULA, CA. 92591
TEL. (909) 676-3709
FAX (909) 676-2709

SUBMITTED BY: Richard L. Valdez
DATE: 12-10-99 REGISTERED CIVIL ENGINEER NO. 48060 Expires 12-31-03

BENCHMARK:
SEE SHEET NO. 1

REVISIONS				
1	ADDED THIS SHEET. REV. S.D. LINE "1200" & TUCALOTA CHANNEL TOPO.	SRT		2-8-00
	REV. PIPE SLOPE.			
2	REMOVE TEMP. TURNAROUND			10-30-01
	INSTALL FENCE	RV	SRT	10-30-01
3	AS-BUILT NOTES RV			1-13-03
REF.	DESCRIPTION	APPR.	APPR.	DATE

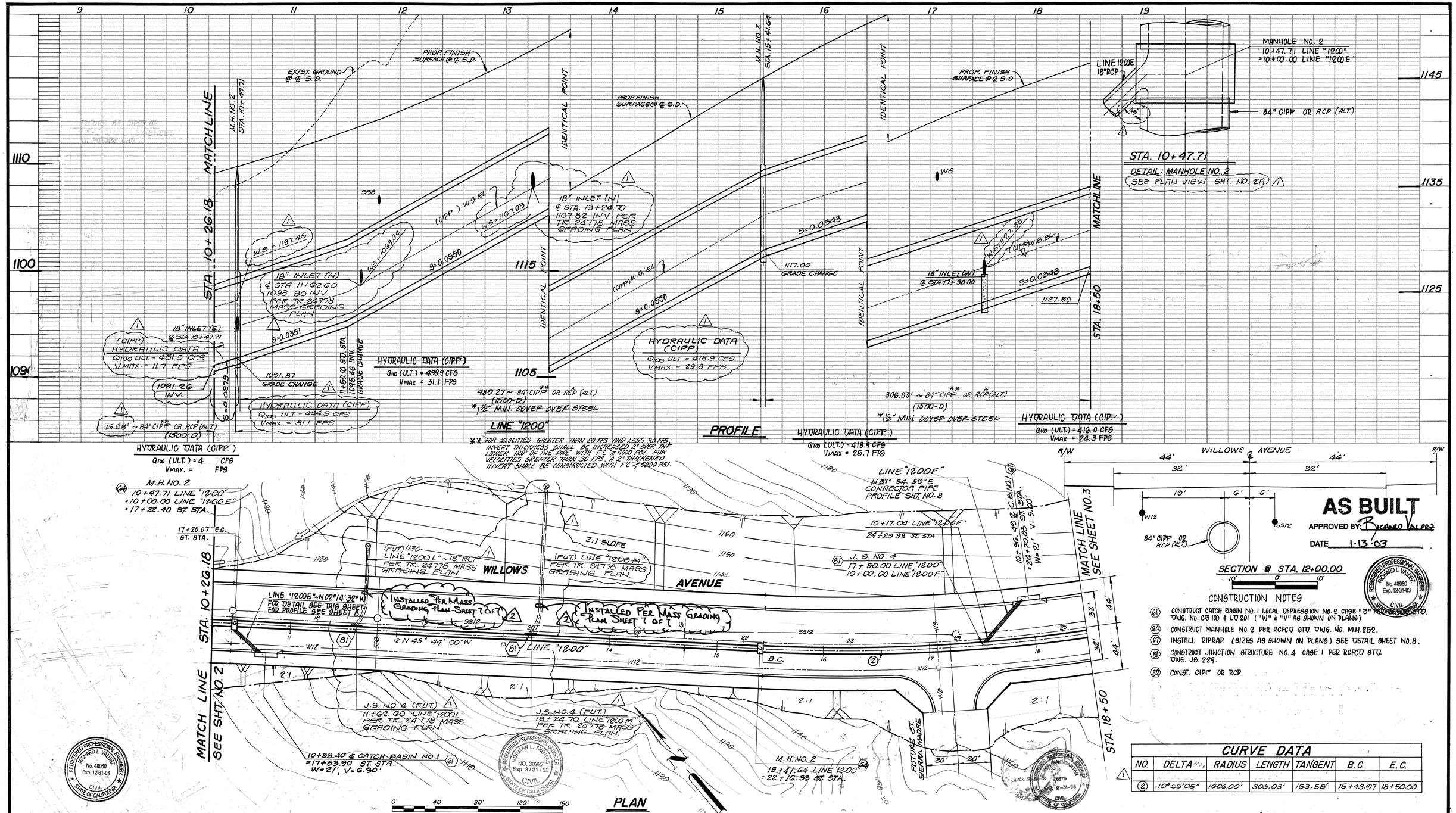
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: Stuart McKillop for PLANNING ENGINEER DATE: 2-8-00
APPROVED BY: David Bryan CHIEF ENGINEER DATE: 2/9/00

County of Riverside
APPROVED BY: Robert Filbin FOR TRANSPORTATION DEPARTMENT RIVERSIDE COUNTY, CALIF. DATE: 1/3/00

(FORMERLY A.D. NO. 161)
SANTA GERTRUDIS VALLEY
WILLOWS AVE. STORM DRAIN
STAGE II

PROJECT NO. 7-0-177
DRAWING NO. 7-147
SHEET NO. 2 OF 10

storm_WILLOW.dwg 11-17-99 3:17:26 pm EST



CONSTRUCTION NOTES

(61) CONSTRUCT CATCH BASIN NO. 1 LOCAL DEPRESSION NO. 2 CASE "3" PER RCFCD STD. DWG. NO. CB 100 & LD 201 ("W" & "V" AS SHOWN ON PLANS)

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

(87) INSTALL RIPRAP (SIZES AS SHOWN ON PLANS) SEE DETAIL SHEET NO. 8.

(81) CONSTRUCT JUNCTION STRUCTURE NO. 4 CASE 1 PER RCFCD STD. DWG. JS. 229.

(82) CONST. CIPP OR RCP

CURVE DATA

NO.	DELTA	RADIUS	LENGTH	TANGENT	B.C.	E.C.
(2)	10°55'05"	1606.00'	306.03'	153.58'	15+43.97	18+50.00

△1 REVISIONS BY VSL ENGINEERING

Richard L. Valdez 12-10-99
RICHARD VALDEZ DATE
RCE 48060 EXP. 12-31-03

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: 2/12/00

BENCH MARK: SEE SHEET 1

REVISIONS			
△1	REV. LINE "1200" & TUCALOTA CHANNEL. ADDED LINE "1200 L" & "1200 M"	SEM	2-8-00
△2	AS-BUILT NOTES	RV	1-13-03
REF.	DESCRIPTION	APPR	DATE

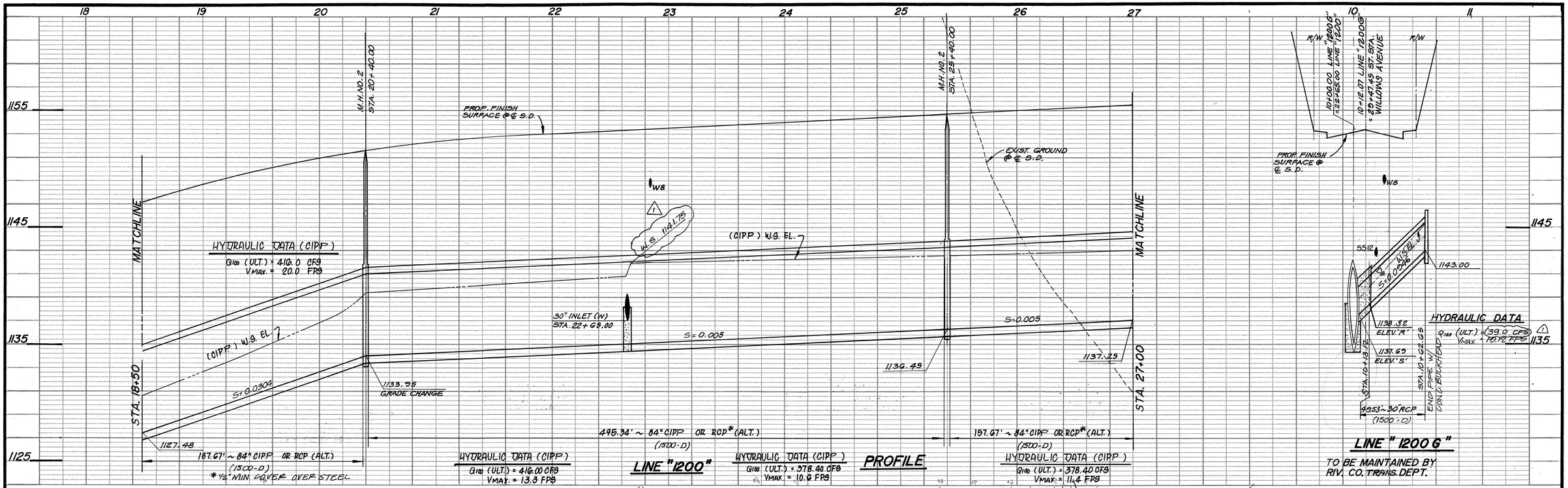
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: Frank J. Lewis, PLANNING ENGINEER, DATE: 8/6/92
APPROVED BY: Kenneth L. Edwards, CHIEF ENGINEER, DATE: 8-8-92

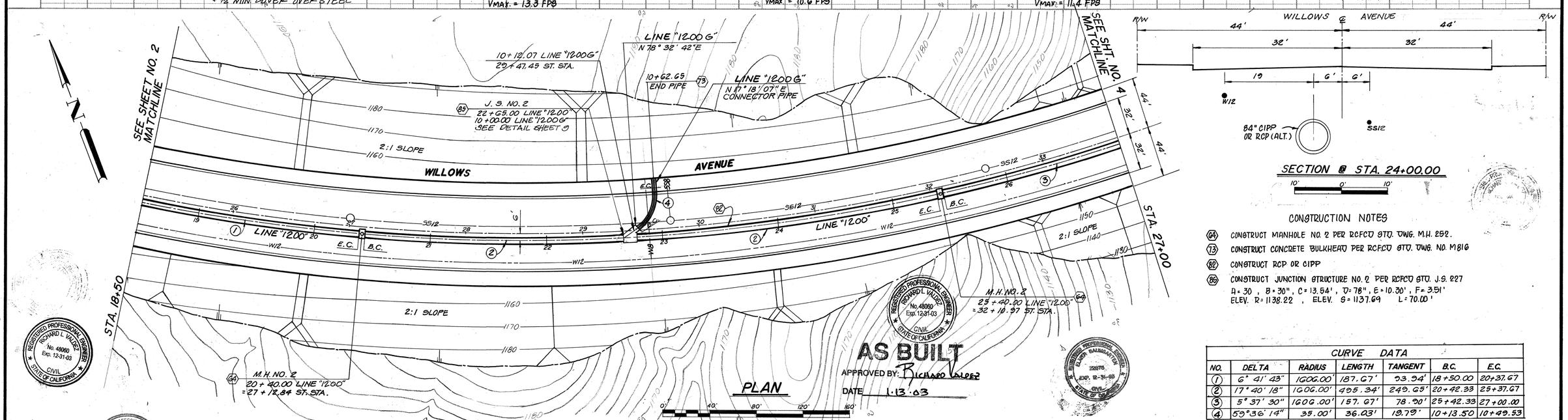
County of Riverside
APPROVED BY: Elmer F. Baumgartner
FOR TRANS. DEPT. RIVERSIDE COUNTY, CALIF. DATE: 4/27/92

△1
TR. 24778 (FORMERLY A.D. NO. 161)
SANTA GERTRUDIS VALLEY
WILLOWS AVENUE STORM DRAINS
STAGE II

PROJECT NO. 7-0-177
DRAWING NO. 7-147
SHEET NO. (2A) OF 10.

JN 135-37 / 75





CONSTRUCTION NOTES

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

(73) CONSTRUCT CONCRETE BULKHEAD PER RCFCD STD. DWG. NO. M816

(82) CONSTRUCT RCP OR CIPP

(86) CONSTRUCT JUNCTION STRUCTURE NO. 2 PER RCFCD STD. J.S. 227
A = 30 , B = 30", C = 13.54', D = 78", E = 10.30', F = 3.51'
ELEV. R = 1138.22 , ELEV. S = 1137.69 L = 70.00'

AS BUILT
APPROVED BY: Richard Valdez
DATE 1-13-03

CURVE DATA						
NO.	DELTA	RADIUS	LENGTH	TANGENT	B.C.	E.C.
1	6° 41' 43"	1600.00'	187.67'	93.94'	18+50.00	20+37.67
2	17° 40' 18"	1600.00'	495.34'	249.65'	20+42.33	25+37.67
3	5° 37' 30"	1600.00'	157.67'	78.90'	25+42.33	27+00.00
4	59° 36' 14"	35.00'	36.03'	19.79'	10+13.50	10+49.53

REGISTERED PROFESSIONAL ENGINEER RICHARD L. VALDEZ No. 48060 Exp. 12-31-03 CIVIL STATE OF CALIFORNIA

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

REGISTERED PROFESSIONAL ENGINEER GLADY BALMAIN JR. 22878 Exp. 12-31-93 CIVIL STATE OF CALIFORNIA

1 REV. BY VSL ENGINEERING

Richard Valdez 12-10-99
RICHARD VALDEZ DATE
RCE 48060 EXP. 12-31-03

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: 2/12/90

BENCH MARK:
SEE SHEET 1

REVISIONS			
1	ADDED W.S. EL. LINE "1200 G" & REV. Q100.	SGH	2-5-00
2	As-Built Notes RV		1-13-03
REF.	DESCRIPTION	APPR	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

RECOMMENDED FOR APPROVAL BY: Frank A. Beard
PLANNING ENGINEER
DATE: 8/6/92

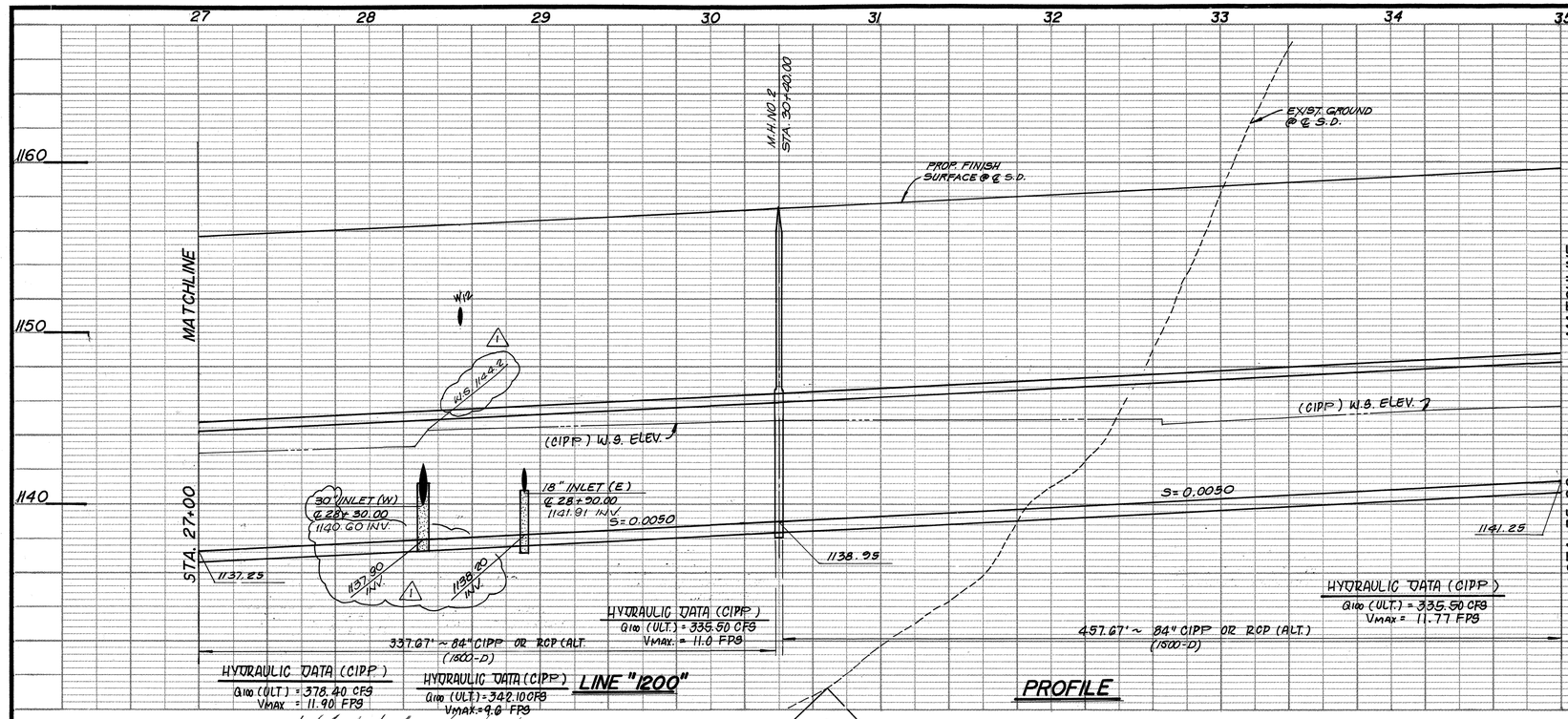
APPROVED BY: Kenneth L. Edwards
CHIEF ENGINEER
DATE: 8-8-92

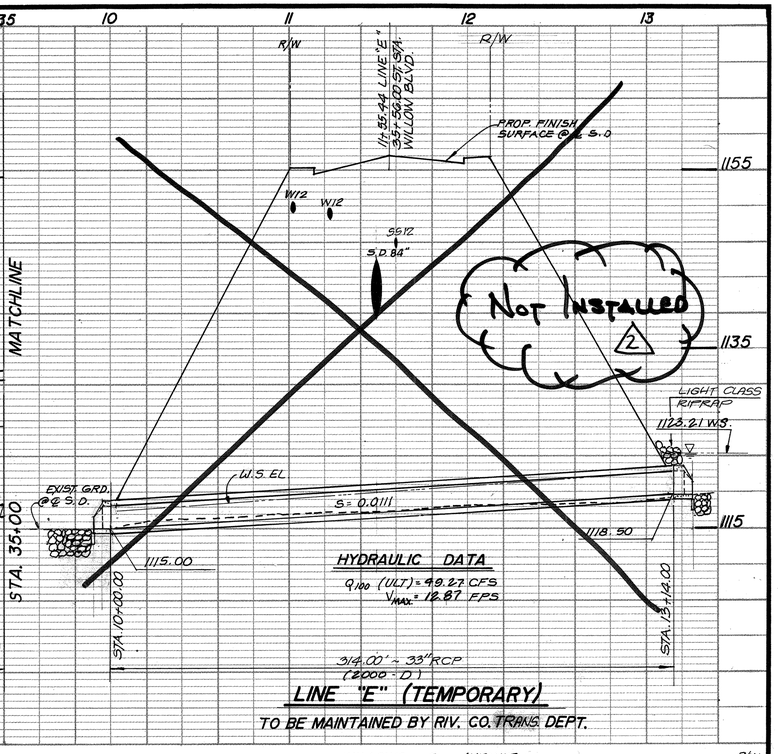
County of Riverside
APPROVED BY: Peter F. Eisenmann
FOR TRANS. DEPT.
RIVERSIDE COUNTY, CALIF. DATE: 11/27/92

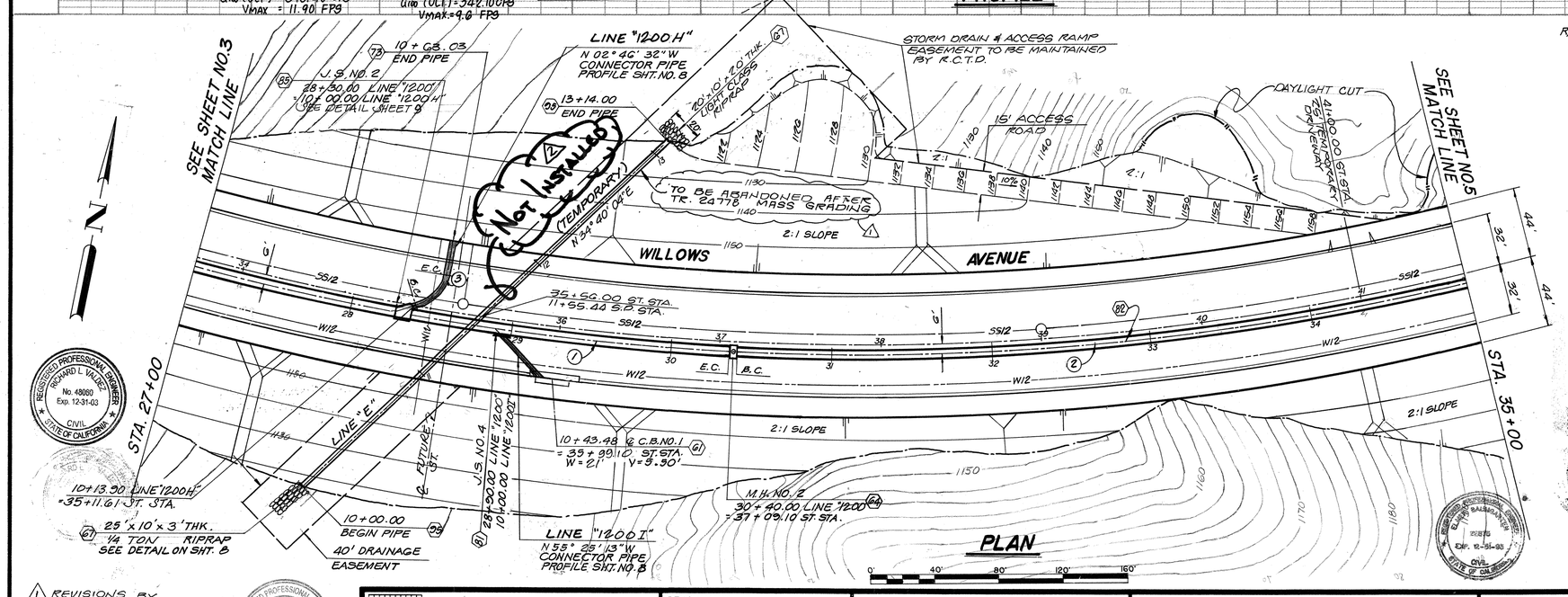
TRACT NO. 24778
(FORMERLY F.D. NO. 161)
SANTA GERTRUDIS VALLEY
WILLOWS AVENUE STORM DRAINS
STAGE II

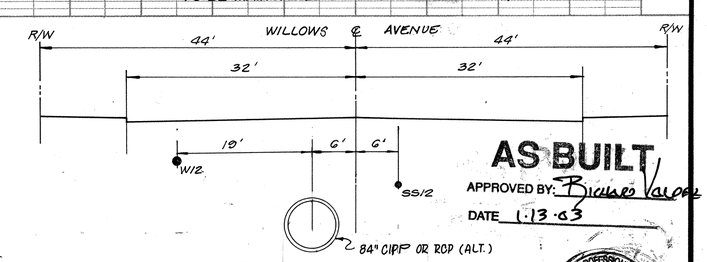
PROJECT NO. 7-0-177
DRAWING NO. 7-147.
SHEET NO. 3 OF 10

JN 135-37/75









AS BUILT
APPROVED BY: Richard Valdez
DATE 1-13-03

CONSTRUCTION NOTES

(61) CONSTRUCT CATCH BASIN NO. 1 LOCAL DEPRESSION NO. 2 CASE "B" PER RCFCD STD. DWG. AND LD 201 ("W" & "V" AS SHOWN ON PLANS)
(64) CONSTRUCT MANHOLE NO. 2 PER RCFCD STD. DWG. MH 252
(67) INSTALL RIPRAP (SIZES AS SHOWN ON PLANS) SEE DETAIL SHEET 8:
(79) CONSTRUCT CONCRETE BULKHEAD PER RCFCD STD. DWG. NO. M816.
(81) CONSTRUCT JUNCTION STRUCTURE NO. 4 CASE 1 PER RCFCD STD. DWG. JS 229
(92) CONSTRUCT RCP OR CIPP
(95) CONSTRUCT JUNCTION STRUCTURE NO. 2 PER RCFCD STD. JS 227
A=30", B=30", C=12.42", D=84", E=9.44', F=3.26', G=4.1', L=6.34'
ELEV. R=1141.08 , ELEV. S=1140.6
(99) CONSTRUCT PRECAST CONCRETE FLARED END SECTION TYPE "A" PER CALTRANS STD. PLANS D94.
A=3" B=3½ D=5.0 E=5.6

CURVE DATA

NO.	DELTA	RADIUS	LENGTH	TANGENT	B.C.	E.C.
1	12° 02' 48"	1600.00'	337.67'	169.46'	27+00.00	30+37.67
2	16° 19' 40"	1600.00'	457.67'	230.40'	30+42.33	35+00.00
3	64°24' 02"	25.00'	28.10'	15.74'	10+13.72	10+41.82

1 REVISIONS BY VSL ENGINEERING

Richard Valdez 12-10-99
RICHARD VALDEZ DATE
RCE 48060 EXP. 12-31-03

REGISTERED PROFESSIONAL ENGINEER RICHARD L. VALDEZ No. 48060 Exp. 12-31-03 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER NORMAN L. THOMAS NO. 30927 Exp. 3/31/92 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: 2/12/00

BENCH MARK: SEE SHEET 1

REVISIONS

REF.	DESCRIPTION	APPR	DATE
1	ADDED S.D. INV. EL. REV. S.D. "1200H" TO 30" RCP. ADDED NOTE. REV. J.S. NO. 2 CONST. NOTE VALUES.	SBM	2-8-00
2	AS-BUILT NOTES	RV	1-13-03

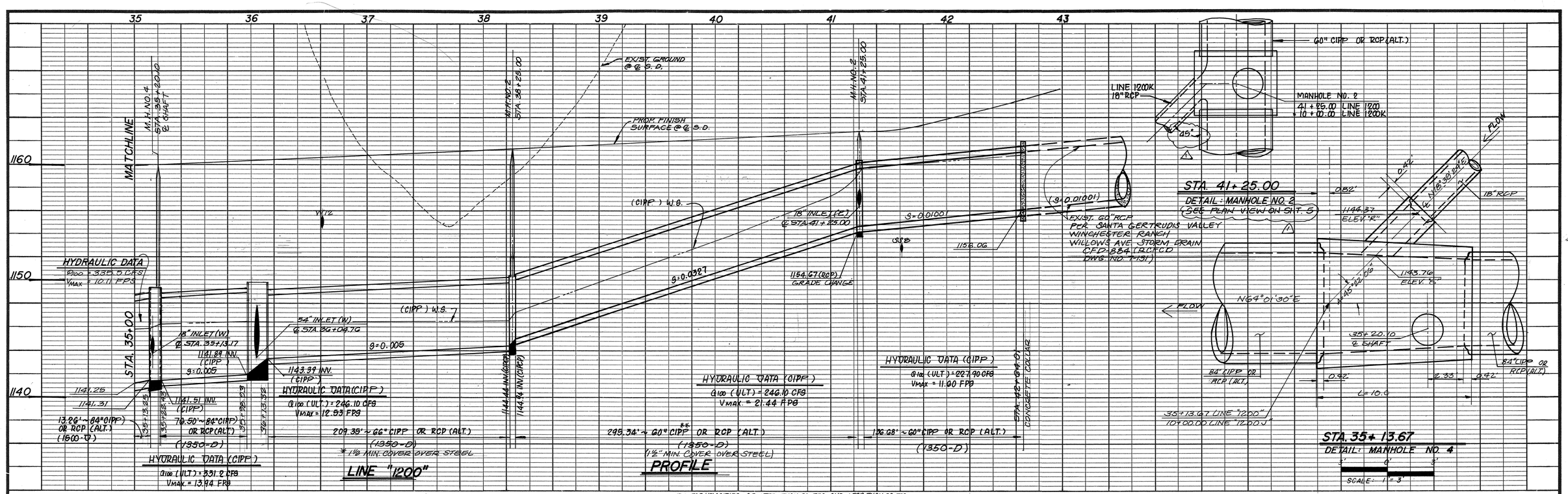
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: Frank J. Davis, PLANNING ENGINEER, DATE: 8/6/92
APPROVED BY: Kenneth L. Schneider, CHIEF ENGINEER, DATE: 8-8-92

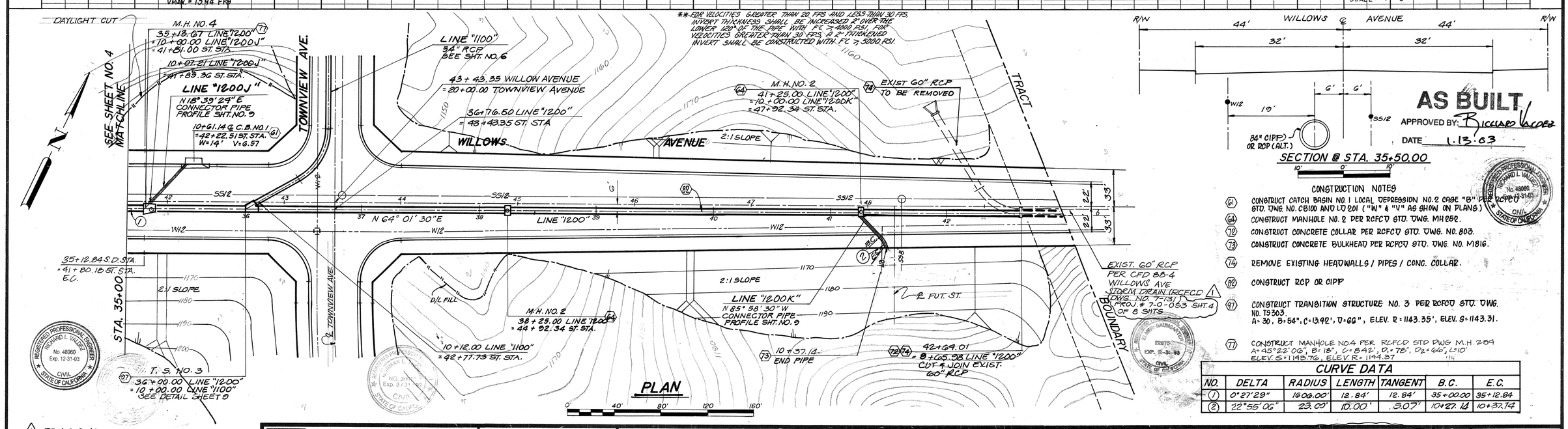
County of Riverside
APPROVED BY: Thomas F. Cullingworth
FOR TRANS. DEPT.
RIVERSIDE COUNTY, CALIF. DATE: 4/27/92

1 TR. NO. 24778 (FORMERLY A.D. NO. 161)
SANTA GERTRUDIS VALLEY
WILLOW AVENUE STORM DRAINS
STAGE II

PROJECT NO. 7-0-177
DRAWING NO. 7-147
SHEET NO. 4 OF 10

JN 136-37175





AS BUILT
APPROVED BY: Richard Valdez
DATE 1.13.03

SECTION @ STA. 35+50.00

CONSTRUCTION NOTES

(61) CONSTRUCT CATCH BASIN NO. 1 LOCAL DEPRESSION NO. 2 CASE "B" PER RCFCD STD. DWG. NO. CB100 AND LD 201 ("W" & "V" AS SHOWN ON PLANS)

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

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

(73) CONSTRUCT CONCRETE BULKHEAD PER RCFCD STD. DWG. NO. M816.

(74) REMOVE EXISTING HEADWALLS / PIPES / CONC. COLLAR.

(82) CONSTRUCT RCP OR CIPP

(97) CONSTRUCT TRANSITION STRUCTURE NO. 3 PER RCFCD STD. DWG. NO. T9303.
A=30, B=54", C=13.92', D=66", ELEV. R=1143.35', ELEV. S=1143.31.

(77) CONSTRUCT MANHOLE NO. 4 PER RCFCD STD DWG M.H. 254
A=45°22'06", B=18", C=8.42', D1=78", D2=66', L=10'
ELEV. S=1143.76, ELEV. R=1144.37

CURVE DATA

NO.	DELTA	RADIUS	LENGTH	TANGENT	B.C.	E.C.
1	0°27'29"	1600.00'	12.84'	12.84'	35+00.00	35+12.84
2	22°56'06"	25.00'	10.00'	5.07'	10+27.14	10+37.14

1 REVISIONS BY VSL ENGINEERING

Richard Valdez 12-10-99
RICHARD VALDEZ DATE
RCE 48060 EXP. 12-31-03

REGISTERED PROFESSIONAL ENGINEER RICHARD L. VALDEZ No. 48060 Exp. 12-31-03 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: 2/12/00

BENCH MARK: SEE SHEET 1

REVISIONS

REF.	DESCRIPTION	APPR	DATE
1	ADDED REF. PROJ. NUMBER & NOTES.	SEM	2-8-00
2	AS-BUILT NOTES RV		1-13-03

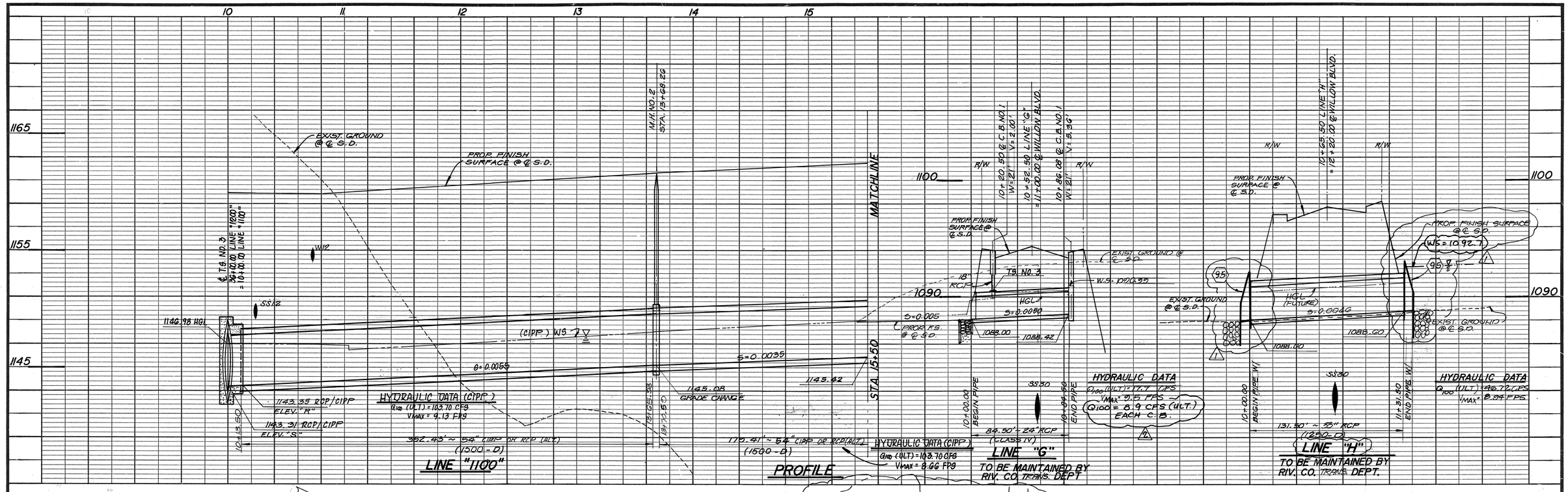
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: Frank J. Davis, PLANNING ENGINEER, DATE: 8/6/92
APPROVED BY: Kenneth L. Edwards, CHIEF ENGINEER, DATE: 8-8-92

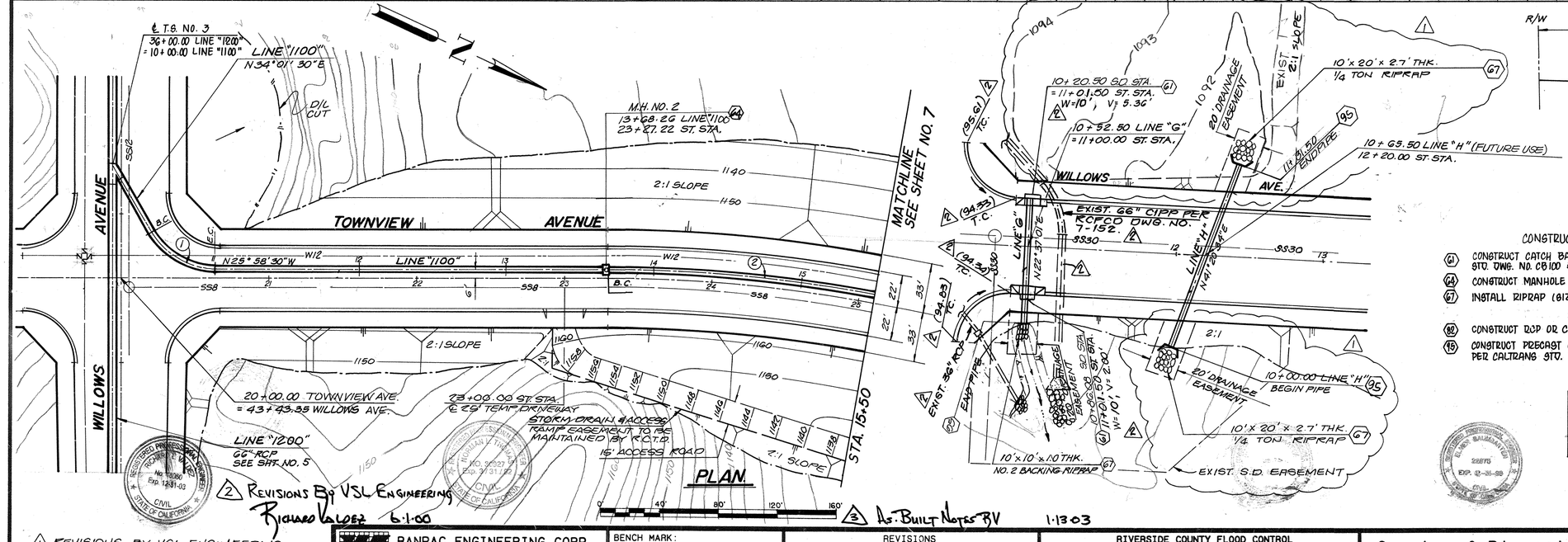
County of Riverside
APPROVED BY: Robert T. Cunningham
FOR TRANS. DEPT. RIVERSIDE COUNTY, CALIF. DATE: 4/07/92

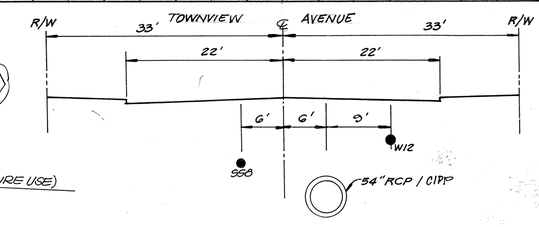
TR. NO. 24778 (FORMERLY A.D. NO. 161) 1
SANTA GERTRUDIS VALLEY
WILLOWS AVENUE STORM DRAINS
STAGE II

PROJECT NO. 7-0-177
DRAWING NO. 7-147
SHEET NO. 5 OF 10

JN 135-37/75







SECTION @ STA. 12+00.00

10' 0' 10'

CONSTRUCTION NOTES

(61) CONSTRUCT CATCH BASIN NO. 1 LOCAL DEPRESSION NO. 2 CASE "B" PER RCFCD STD. DWG. NO. CB100 & LD201 ("W" & "V" AS SHOWN ON PLANS)

(64) CONSTRUCT MANHOLE NO. 2 PER RCFCD STD. DWG. MH202.

(67) INSTALL RIPRAP (SIZES AS SHOWN ON PLANS) SEE DETAIL SHEET 8.

(82) CONSTRUCT RCP OR CIPP

(95) CONSTRUCT PRECAST CONCRETE FLARED END SECTION TYPE "A" PER CALTRANS STD. PLANS D94.

REGISTERED PROFESSIONAL ENGINEER RICHARD L. VALDEZ No. 48060 Exp. 12-31-03 CIVIL STATE OF CALIFORNIA

AS BUILT

APPROVED BY: Richard Valdez

DATE 1.13.03

CURVE DATA						
NO.	DELTA	RADIUS	LENGTH	TANGENT	B.C.	E.C.
(1)	60°00'00"	50.00'	52.36'	28.87'	10+51.97	11+04.33
(2)	10°13'00"	1006.00'	179.41'	89.94'	13+70.59	15+50.00

REGISTERED PROFESSIONAL ENGINEER RICHARD L. VALDEZ No. 48060 Exp. 12-31-03 CIVIL STATE OF CALIFORNIA

REGISTERED CIVIL ENGINEER No. 30927 EXP. 3/31/92

(2) REVISIONS BY VSL ENGINEERING
RICHARD VALDEZ 6-1-00

(3) AS-BUILT NOTES BY 1-13-03

(1) REVISIONS BY VSL ENGINEERING
RICHARD VALDEZ 12-10-99
RICHARD VALDEZ RCE 48060 DATE EXP. 12-31-03

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: 2/12/00

BENCH MARK:
SEE SHEET 1

REVISIONS

REF.	DESCRIPTION	APPR	DATE
(1)	REMOVE CONC. BULKHEAD & ADDED HEADWALL (LINE "H") & S.D. EASEMENT. REV. GRADING. DELETE CONST. NOTE NO. 73.	SGM	12-8-00
(2)	REV. C.B. SIZE SHOWN EXIST. 66" SD.	SGM	6-5-00

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

RECOMMENDED FOR APPROVAL BY: Frank J. Prantl, PLANNING ENGINEER, DATE: 8/6/92

APPROVED BY: Kenneth L. Edwards, CHIEF ENGINEER, DATE: 8-8-92

County of Riverside

APPROVED BY: Elmer L. Baumgartner, FOR TRANS. DEPT. RIVERSIDE COUNTY, CALIF. DATE: 4/8/92

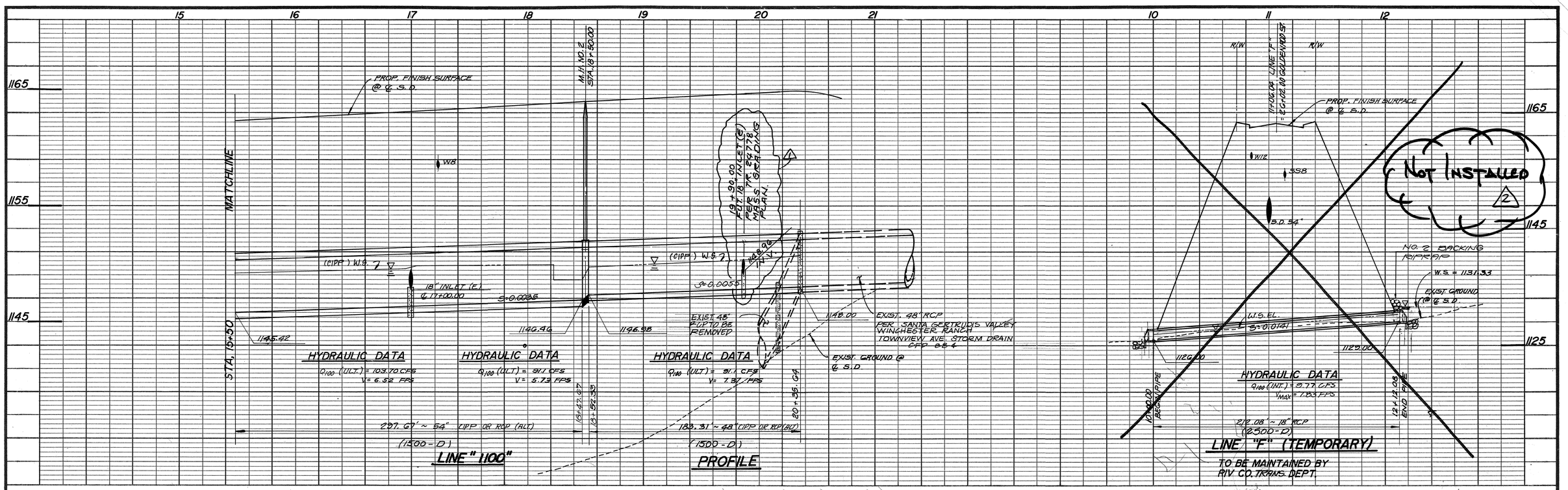
TR. NO. 24778
(FORMERLY A.D. NO. 161)
SANTA GERTRUDIS VALLEY
WILLOWS AVENUE & TOWNVIEW AVENUE STORM DRAIN
STAGE II

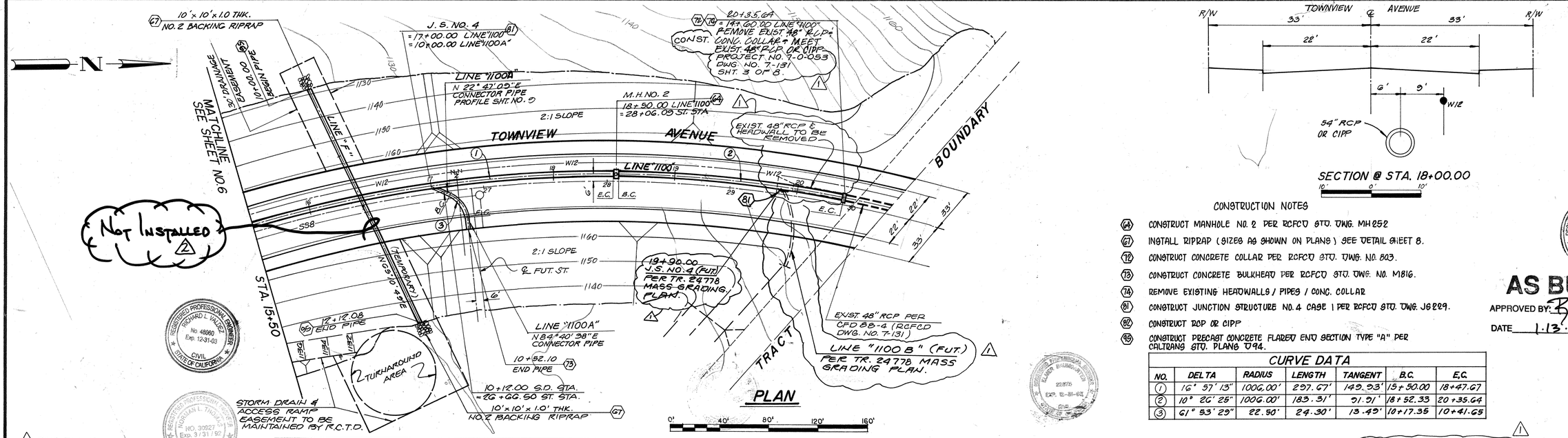
PROJECT NO. 7-0-177

DRAWING NO. 7-147

SHEET NO. 6 OF 10

JN 135-37 / 75





SECTION @ STA. 18+00.00

10' 0' 10'

CONSTRUCTION NOTES

(64) CONSTRUCT MANHOLE NO. 2 PER RCFCD STD. DWG. MH252

(67) INSTALL RIPRAP (SIZES AS SHOWN ON PLANS) SEE DETAIL SHEET 8.

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

(73) CONSTRUCT CONCRETE BULKHEAD PER RCFCD STD. DWG. NO. M816.

(74) REMOVE EXISTING HEADWALLS / PIPES / CONC. COLLAR

(81) CONSTRUCT JUNCTION STRUCTURE NO. 4 CASE 1 PER RCFCD STD. DWG. J6229.

(82) CONSTRUCT RCP OR CIPP

(96) CONSTRUCT PRECAST CONCRETE FLARED END SECTION TYPE "A" PER CALTRANS STD. PLANS D94.

CURVE DATA

NO.	DELTA	RADIUS	LENGTH	TANGENT	B.C.	E.C.
1	16° 57' 13"	1006.00'	297.67'	149.93'	15+50.00	18+47.67
2	10° 26' 25"	1006.00'	183.31'	91.91'	18+52.33	20+35.64
3	61° 53' 29"	22.50'	24.30'	13.49'	10+17.35	10+41.65

AS BUILT

APPROVED BY: Richard Valdez

DATE 1-13-03

REGISTERED PROFESSIONAL ENGINEER RICHARD L. VALDEZ No. 48060 Exp. 12-31-03 CIVIL STATE OF CALIFORNIA

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

1 REV. BY VSL ENGINEERING

Richard Valdez 12-10-99
RICHARD VALDEZ DATE
RCE 48060 EXP. 12-31-03

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: 2/12/00

BENCH MARK: SEE SHEET 1

REVISIONS

REF.	DESCRIPTION	APPR	DATE
1	ADDED EXIST. S.D. & FUT. LINE "1100B" S.D.	SEM	2-8-00
2	AS-BUILT NOTES	RV	1-13-03

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

RECOMMENDED FOR APPROVAL BY: Frank J. Peairs, PLANNING ENGINEER, DATE: 8/6/92

APPROVED BY: Kenneth L. Edwards, CHIEF ENGINEER, DATE: 8-8-92

County of Riverside

APPROVED BY: Peter J. Gallegos, FOR TRANS. DEPT. RIVERSIDE COUNTY, CALIF. DATE: 4/27/92

TR. NO. 24778 (FORMERLY P.D. NO. 161)

SANTA GERTRUDIS VALLEY TOWNVIEW AVENUE STORM DRAINS; STAGE II

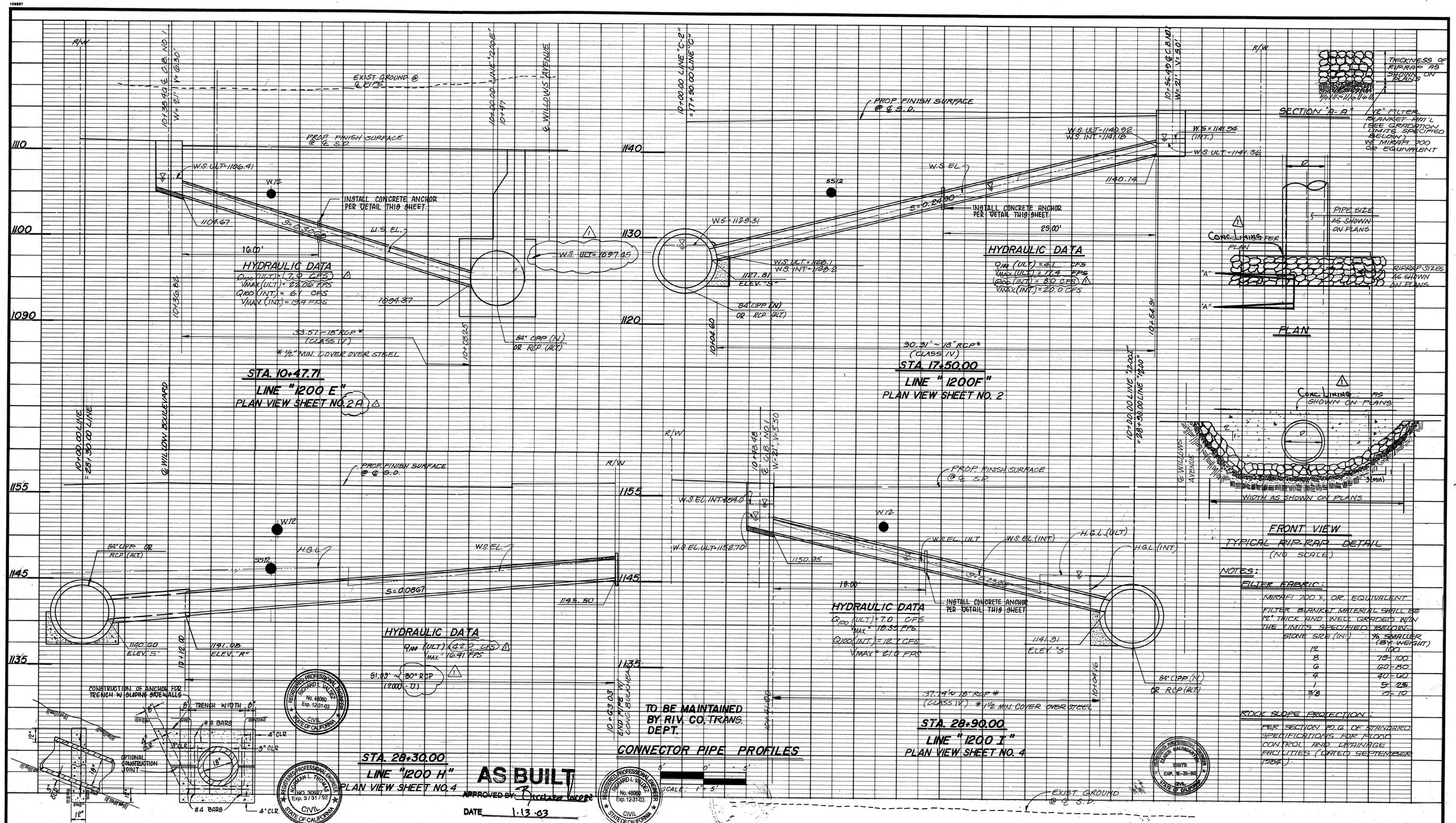
PROJECT NO. 7-0-177

DRAWING NO. 7-147

SHEET NO. 7 OF 10

JN 135-37 / 75

108897



AS BUILT
APPROVED BY: Richard Valdez
DATE 1-13-03

REGISTERED PROFESSIONAL ENGINEER RICHARD L. VALDEZ No. 48060 Exp. 12-31-03 CIVIL STATE OF CALIFORNIA

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

REGISTERED PROFESSIONAL ENGINEER RICHARD L. VALDEZ No. 48060 Exp. 12-31-03 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER 22875 EXP. 12-31-92 CIVIL STATE OF CALIFORNIA

CONCRETE PIPE SLOPE ANCHOR
N.T.S.

1 REV. BY VSL ENGINEERING
RICHARD VALDEZ 12-10-99
RICHARD VALDEZ DATE
RCE # 48060 EXP. 12-31-03

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: 2/12/00

BENCH MARK:
SEE SHEET 1

REVISIONS			
1	REV. LINE "1200"E H.G.L. & LINE "1200 H" SIZE. REV. Q's - EL MINATE HEADWALL AT PIPE OUTLET	SEM	2-8-00
2	AS BUILT NOTES	RV	1-13-03
REF.	DESCRIPTION	APPR	DATE

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

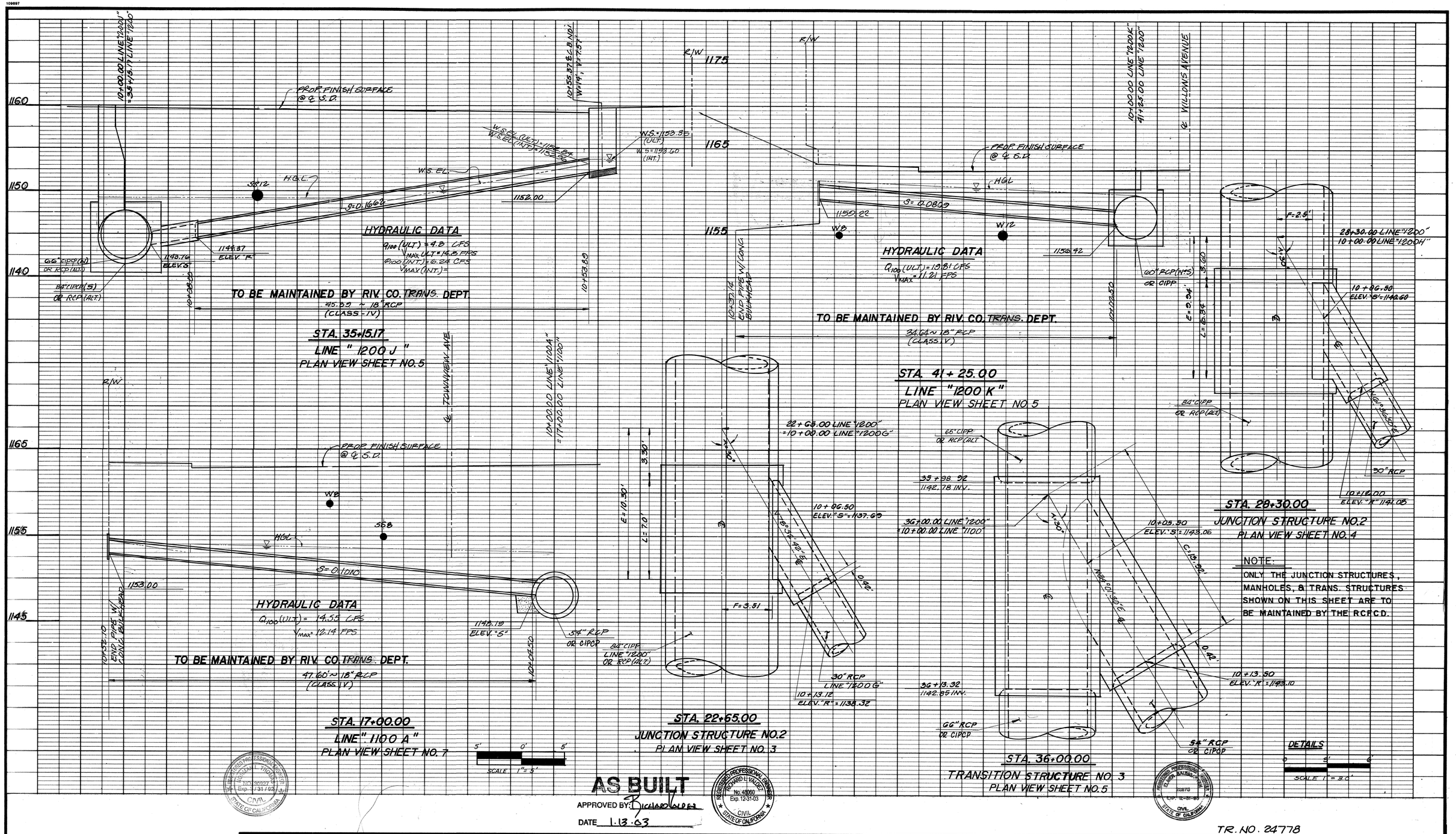
County of Riverside
APPROVED BY: Peter F. Eisenmann
FOR TRANS. DEPT.
RIVERSIDE COUNTY, CALIF. DATE: 4/27/92

1
TR. NO. 24778
(FORMERLY H.D. NO. 161)
SANTA GERTRUDIS VALLEY
WILLOWS AVENUE
CONNECTOR PIPE PROFILES
STAGE II

PROJECT NO. 7-0-177
DRAWING NO. 7-147
SHEET NO. 8 OF 10

JN 135-37 / 79

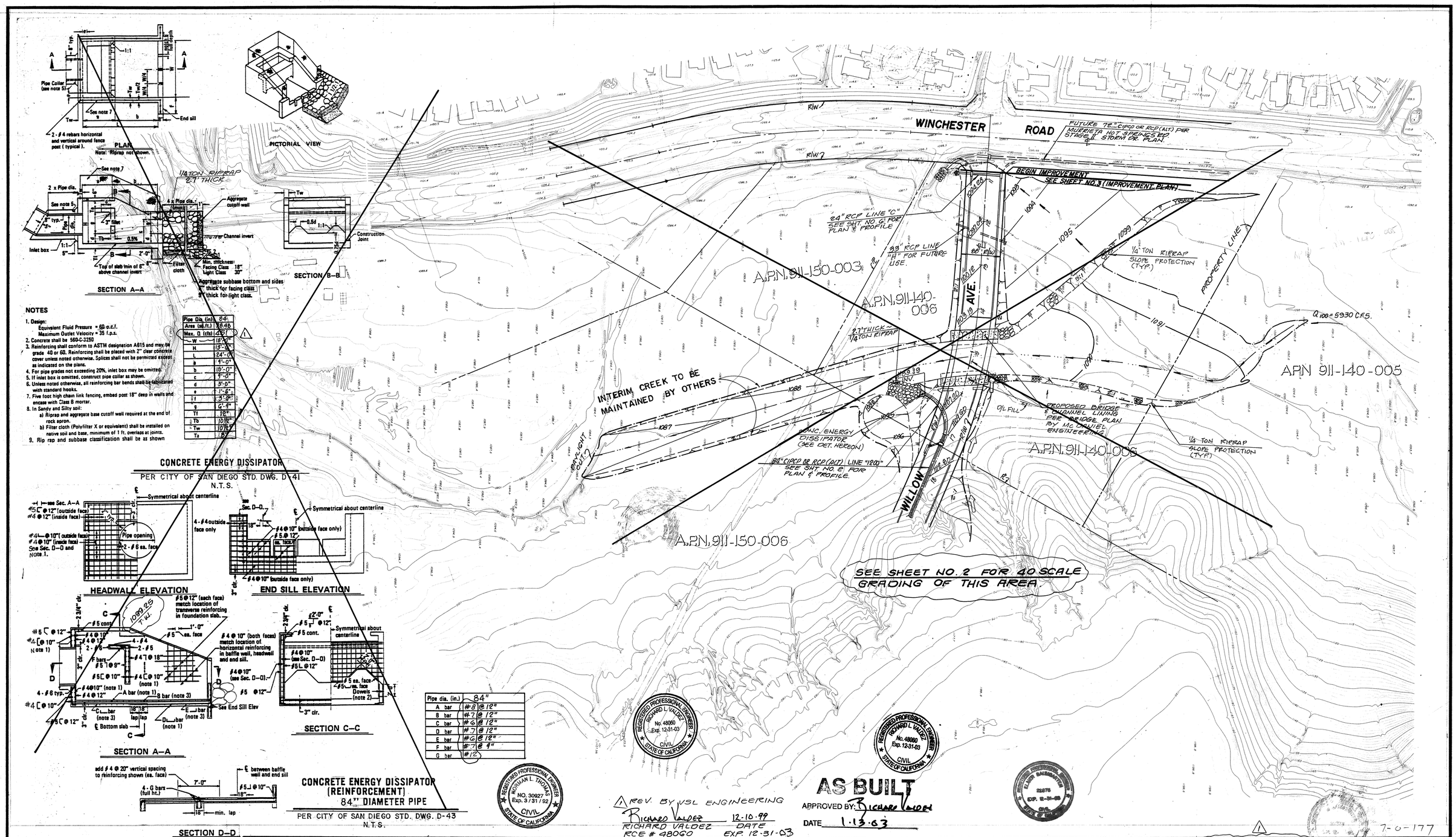
109897



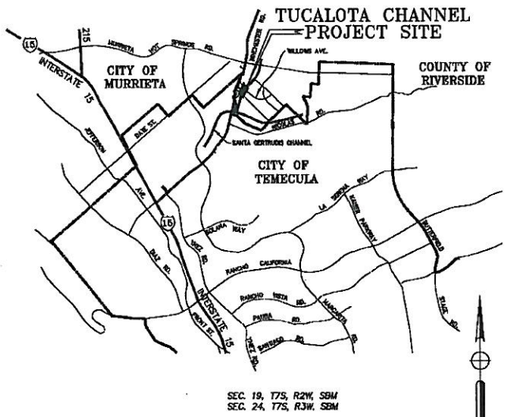
TR. NO. 24778

RANPAC ENGINEERING CORP. 27447 Enterprise Circle West Temecula, California 92390 Tel: (714) 676-7000	BENCH MARK: SEE SHEET 1	REVISIONS: 1 As-Built Notes RV 1-13-03	RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	County of Riverside	(FORMERLY F.D. NO. 161) SANTA GERTRUDIS VALLEY WILLOWS AVENUE & TOWNVIEW AVENUE CONNECTOR PIPE PROFILES DETAIL SHEET	PROJECT NO. 7-0-177
SUBMITTED BY: Norman Tiddy REGISTERED CIVIL ENGINEER NO. 30327 EXP. 3/31/92 DATE: 2/12/90		REF. / DESCRIPTION / APPR / DATE	RECOMMENDED FOR APPROVAL BY: Frank A. Smith PLANNING ENGINEER DATE: 8/6/92	APPROVED BY: Kenneth Edwards CHIEF ENGINEER DATE: 8-8-92	APPROVED BY: Elmer F. Baumgarth FOR TRANS. DEPT. RIVERSIDE COUNTY, CALIF. DATE: 4/27/92	DRAWING NO. 7-147 / SHEET NO. 9 OF 10

JN 139-37/75

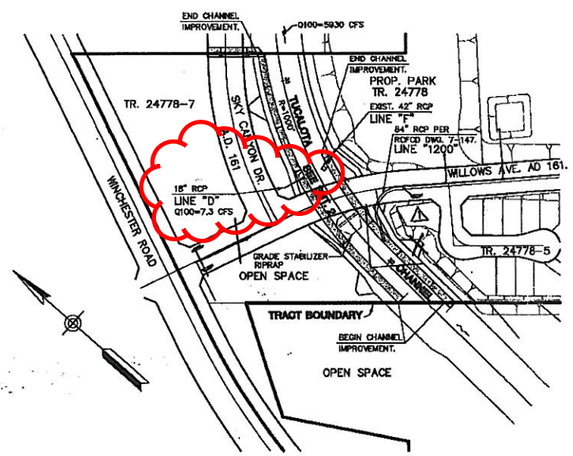

PLAN
Note: Riprap not shown.
PICTORIAL VIEW
SECTION A–A
SECTION B–B
1/4 TON RIPRAP 2.1' THICK
Pipe Collar (see note 5)
See note 7
End sill
2 - #4 rebars horizontal and vertical around fence post (typical).
2 x Pipe dia.
4 x Pipe dia. (min.)
Aggregate cutoff wall
Channel invert
Inlet box
Top of slab min of 6" above channel invert
Filter cloth
Min. thickness: Facing Class 18" Light Class 30"
Aggregate subbase bottom and sides 9" thick for facing class 6" thick for light class.
Construction Joint
NOTES
1. Design:
Equivalent Fluid Pressure = 60 p.c.f.
Maximum Outlet Velocity = 35 f.p.s.
2. Concrete shall be 560-C-3250
3. Reinforcing shall conform to ASTM designation A615 and may be grade 40 or 60. Reinforcing shall be placed with 2" clear concrete cover unless noted otherwise. Splices shall not be permitted except as indicated on the plans.
4. For pipe grades not exceeding 20%, inlet box may be omitted.
5. If inlet box is omitted, construct pipe collar as shown.
6. Unless noted otherwise, all reinforcing bar bends shall be fabricated with standard hooks.
7. Five foot high chain link fencing, embed post 18" deep in walls and encase with Class B mortar.
8. In Sandy and Silty soil:
a) Riprap and aggregate base cutoff wall required at the end of rock apron.
b) Filter cloth (Polyfilter X or equivalent) shall be installed on native soil and base, minimum of 1 ft. overlaps at joints.
9. Rip rap and subbase classification shall be as shown
CONCRETE ENERGY DISSIPATOR
PER CITY OF SAN DIEGO STD. DWG. D-41
N.T.S.
HEADWALL ELEVATION
END SILL ELEVATION
SECTION A–A
SECTION C–C
SECTION D–D
CONCRETE ENERGY DISSIPATOR (REINFORCEMENT) 84" DIAMETER PIPE
PER CITY OF SAN DIEGO STD. DWG. D-43
N.T.S.
NOTES
1. Match location of sidewall reinforcing.
2. Dowels having same size and spacing as wall reinforcing may be used in lieu of continuous bars at contractors option.
3. Match location of headwall or end sill reinforcing.
WINCHESTER ROAD
FUTURE 72" CIPCP OR RCP (ALT) PER MURRIETA HOT SPRINGS ED. STAGE II STORM DR. PLAN.
BEGIN IMPROVEMENT
SEE SHEET NO. 3 (IMPROVEMENT PLAN)
24" RCP LINE "C" SEE SHT. NO. 2 FOR PLAN & PROFILE
33" RCP LINE "H" FOR FUTURE USE.
A.P.N. 911-150-003
A.P.N. 911-140-006
9.1' THICK 1/4 TON RIPRAP
1/4 TON RIPRAP SLOPE PROTECTION (TYP)
PROPERTY LINE
Q100 = 5930 C.F.S.
A.P.N. 911-140-005
INTERIM CREEK TO BE MAINTAINED BY OTHERS
PROPOSED BRIDGE & CHANNEL LINING PER BRIDGE PLAN BY MC DANIEL ENGINEERING
A.P.N. 911-140-006
1/4 TON RIPRAP SLOPE PROTECTION (TYP)
CONC. ENERGY DISSIPATOR (SEE DET. HEREON)
84" CIPCP OR RCP (ALT) LINE "1200" SEE SHT. NO. 2 FOR PLAN & PROFILE.
WILLOW AVE.
A.P.N. 911-150-006
SEE SHEET NO. 2 FOR 40 SCALE GRADING OF THIS AREA.
AS BUILT
APPROVED BY: Richard Valdez
DATE 1-13-03
REV. BY VSL ENGINEERING
Richard Valdez 12-10-99
RICHARD VALDEZ DATE
RCE # 48060 EXP. 12-31-03
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: 2-12-90
BENCH MARK:
SEE SHT. NO. 1
REVISIONS
1 DELETE HEADWALL & GRADING. SGM 2-8-00
2 AS-BUILT NOTES RV 1-13-03
REF. DESCRIPTION APPR DATE
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY:
PLANNING ENGINEER
DATE:
APPROVED BY:
CHIEF ENGINEER
DATE:
County of Riverside
APPROVED BY:
FOR TRANS. DEPT.
RIVERSIDE COUNTY, CALIF. DATE: 1/27/92
TR. NO. 24778 (FORMERLY A.D. NO. 161)
SANTA GERTRUDIS VALLEY
WILLOWS AVE. GRADING PLAN
& CONCRETE ENERGY DISSIPATOR DETAIL, STAGE II
PROJECT NO. 7-0-177
DRAWING NO. 7-147
SHEET NO. 10 OF 10
7-0-177

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT



VICINITY MAP

NTS



LOCATION MAP

GRAPHIC SCALE

0' 200' 400' 600' 800'

SCALE: 1" = 200'

GENERAL NOTES (RCFC & WCD):

1. ALL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT STANDARD DRAWINGS. "STANDARD SPECIFICATIONS FOR FLOOD CONTROL AND DRAINAGE FACILITIES CONSTRUCTED WITHIN SUBDIVISIONS", DATED SEPT. 1984. SUBSEQUENT AMENDMENT AND "STANDARD SPECIFICATIONS FOR PUBLIC WORK CONSTRUCTION" (GREENBOOK 1991 EDITION) AND CALTRANS SPECIFICATION.
2. THE CONTRACTOR SHALL NOTIFY THE DISTRICT'S CONSTRUCTION ENGINEER, CLYDE JOHNSON AT LEAST TWO (2) WEEKS PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION BY TELEPHONING (909) 275-1288.
3. LOCATIONS OF PUBLIC UTILITIES SHOWN HAVE BEEN DETERMINED FROM AVAILABLE INFORMATION. HOWEVER, IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE THE TRUE LOCATION OF ANY EXISTING UTILITIES AND TO EXERCISE PROPER PRECAUTIONS TO AVOID INJURY OR DAMAGE THERETO.
4. ALL REINFORCING BARS SHALL CONFORM TO ASTM A615 GRADE 60, DEFORMED BARS.
5. THE SOILS INVESTIGATIONS DATED AUGUST 21, 1989 BY RANPAC SOILS, W.O. NO. 900-52 AND CHANNEL SLOPE COMPACTION REPORT DATED 2/25/2000 BY GEOSOILS, INC. SHALL BE INCLUDED AS A PART OF THESE PLANS. ALL WORK SHALL CONFORM TO RECOMMENDATIONS AS OUTLINED IN SAID REPORTS.
6. CHAMFER ALL EXPOSED EDGES OF CONCRETE 3/4".
7. PRIOR TO THE COMMENCEMENT OF CONSTRUCTION, THE DEVELOPER'S CONTRACTOR SHALL OBTAIN A PERMIT FROM THE STATE DIVISION OF INDUSTRIAL SAFETY COPY OF OF THE PERMIT SHALL BE KEPT ON THE JOB SITE AT ALL TIMES.
8. FOR TRENCH EXCAVATIONS IN NATIVE SOIL, SHORING SHALL BE PROVIDED TO SATISFY STATE OF CALIFORNIA SAFETY REQUIREMENTS AND SOILS REPORT.
9. PRIOR TO EXCAVATION, THE CONTRACTOR SHALL CONTACT PACIFIC BELL LOCATING SERVICES (PHONE 6733-0811) FOR THEIR SERVICE.
10. ALL REINFORCED CONCRETE PIPE SHALL BE BEDDED IN ACCORDANCE WITH RCFCD & WCD STANDARD DWG. NO. M815.
11. PIPE CONSTRUCTION IN FILL AREA MUST BE COORDINATED WITH THE GRADING TO INSURE THAT WHEN THE FILL OPERATION HAS BEEN COMPLETED AT GRADE, A MINIMUM OF TWO FEET ABOVE THE TO OF PIPE OR TO FIVE (5) FEET (MAXIMUM) ABOVE THE PROPOSED SUB-GRADE OF THE PIPE. THE STORM DRAIN TRENCH SHALL BE EXCAVATED AND THE PIPE INSTALLED.
12. WHENEVER APPLICABLE, THE DEVELOPER SHALL OBTAIN A PERMIT FROM THE STATE DEPARTMENT OF FISH AND GAME IN ACCORDANCE WITH SECTION 1602 OF THE CALIFORNIA FISH AND GAME CODE PRIOR COMMENCEMENT OF CONSTRUCTION.
13. CHANNEL BACKFILL FOR ALL FACILITIES WITHIN STREET RIGHT OF WAY IS TO BE PLACED AND COMPACTED UNDER RCFCD &WCD INSPECTION AND MEET OR EXCEED RCFCD & WCD MINIMUM STANDARD.
14. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CLEARING OF THE PROPOSED WORK AREA, AND RELOCATION COSTS OF ALL EXISTING UTILITIES, PERMITTEE MUST INFORM COUNTY OF CONSTRUCTION SCHEDULE AT LEAST 48 HOURS PRIOR TO BEGINNING OF CONSTRUCTION BY TELEPHONING (909) 275-6765.
15. PRIOR TO EXCAVATION CONTRACTOR SHALL CONTACT UNDERGROUND SERVICES ALERT (U.S.A.) PHONE NO. (800) 422-4133 FOR THEIR SERVICES.
16. CHANNEL EXCAVATION SHALL CONFORM TO CALTRANS STANDARD SPECS. SECTION NO. 9.
17. ROCK RIP RAP SHALL CONFORM TO CALTRANS STANDARD SPECIFICATION SECTION 72 METHOD A. ROCK SIZE PER PLAN.
18. LEFT BANK AND RIGHT BANK IS BASED ON LOOKING DOWNSTREAM.
19. RCFCD & WCD RESERVES THE UNRESTRICTED RIGHT TO MAINTAIN ALL AREAS OF THE CHANNEL OUTSIDE OF THE HABITAT CORRIDOR.

ENGINEER'S NOTE:

CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT. INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE CITY AND ENGINEER HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPT FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNER OR THE ENGINEER.

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITIES OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A DILIGENT SEARCH OF ALL AVAILABLE RECORDS. THE CONTRACTOR IS REQUIRED TO TAKE ALL PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES SHOWN AND ANY OTHER LINES OR STRUCTURES SHOWN OR NOT SHOWN ON THESE PLANS. AND IS RESPONSIBLE FOR THE PROTECTION OF, AND ANY DAMAGE TO THESE LINES OR STRUCTURES.

THE PRIVATE ENGINEER SIGNING THESE PLANS IS RESPONSIBLE FOR ASSURING THE ACCURACY OF DESIGN AND ACCEPTABILITY OF THE WORK HEREON. IN THE EVENT OF DISCREPANCIES ARISING AFTER CITY APPROVAL OR DURING CONSTRUCTION, THE PRIVATE ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING AN ACCEPTABLE SOLUTION AND REVISING THE PLANS FOR APPROVAL BY THE CITY.

INDEX

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

JS 231	JUNCTION STRUCTURE NO. 6
CH 238	TRAPEZOIDAL CHANNEL
CH 330	MAINTENANCE RAMP
M 801	CHAIN LINK FENCE DETAILS
M 815	BEDDING AND PAY LINES
M 818	WIRE FENCE DETAIL
M 816	CONCRETE BULKHEAD

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 STRUCTURE 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 STRUCTURE 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.

CALIFORNIA COUNCIL OF CIVIL ENGINEERS & LAND SURVEYORS

BENCHMARK DESCRIPTION:

RIVERSIDE COUNTY BENCHMARK T-46-81
2-1/2" BRASS DISK IN CONCRETE BRIDGE WALL LOCATED FROM THE INTERSECTION OF RANCHO CALIFORNIA ROAD AND FRONT STREET 1.7 MILES NW ON FRONT STREET-JEFFERSON AVENUE AND WINCHESTER ROAD (HIGHWAY 79), 2.0 MILES NE ON WINCHESTER ROAD (HIGHWAY 79) TO A BRIDGE OVER THE TUCALOTA CREEK AND SANTA GERTRUDIS CREEK FORK. IN THE SE WING WALL, 6' SE CORNER OF BRIDGE ABUTMENT, 3' E OF STEEL GUARD RAIL, 19' N OF TELEPHONE SERVICE BOX.
ADJ. DATE: 9-13-82 ELEV. 1091.074

MAINTENANCE NOTE:

THE FOLLOWING ITEMS ARE TO BE INSPECTED BY RCFCD & WCD AND TO BE MAINTAINED IN THE INTERIM BY RCTD FROM STA. 28+74.32 TO STA. 37+00.00 (RT. BANK) AND FROM STA. 27+58.38 TO STA. 33+81.00 (LT. BANK) OF THE CHANNEL COMPLETE WITH ALL APPURTENANCES WITHIN R.O.W. AS SHOWN ON SHEETS 2 & 3..

Underground Service Alert
Call: TOLL FREE
1-800
227-2600
TWO WORKING DAYS BEFORE YOU DIG

SEAL: REGISTERED PROFESSIONAL ENGINEER RICHARD L. VALDEZ No. 48060 Exp. 12-31-03 CIVIL STATE OF CALIFORNIA

VSL engineering land planning & surveying
40935 COUNTY CENTER DRIVE, TEMECULA, CA. 92591
TEL. (909) 676-3709
FAX. (909) 676-2709
SUBMITTED BY: RICHARD VALDEZ
REGISTERED CIVIL ENGINEER NO.48060
Expires 12-31-03
DATE: 8-25-00

BENCHMARK: SEE SHEET NO. 1

REVISIONS

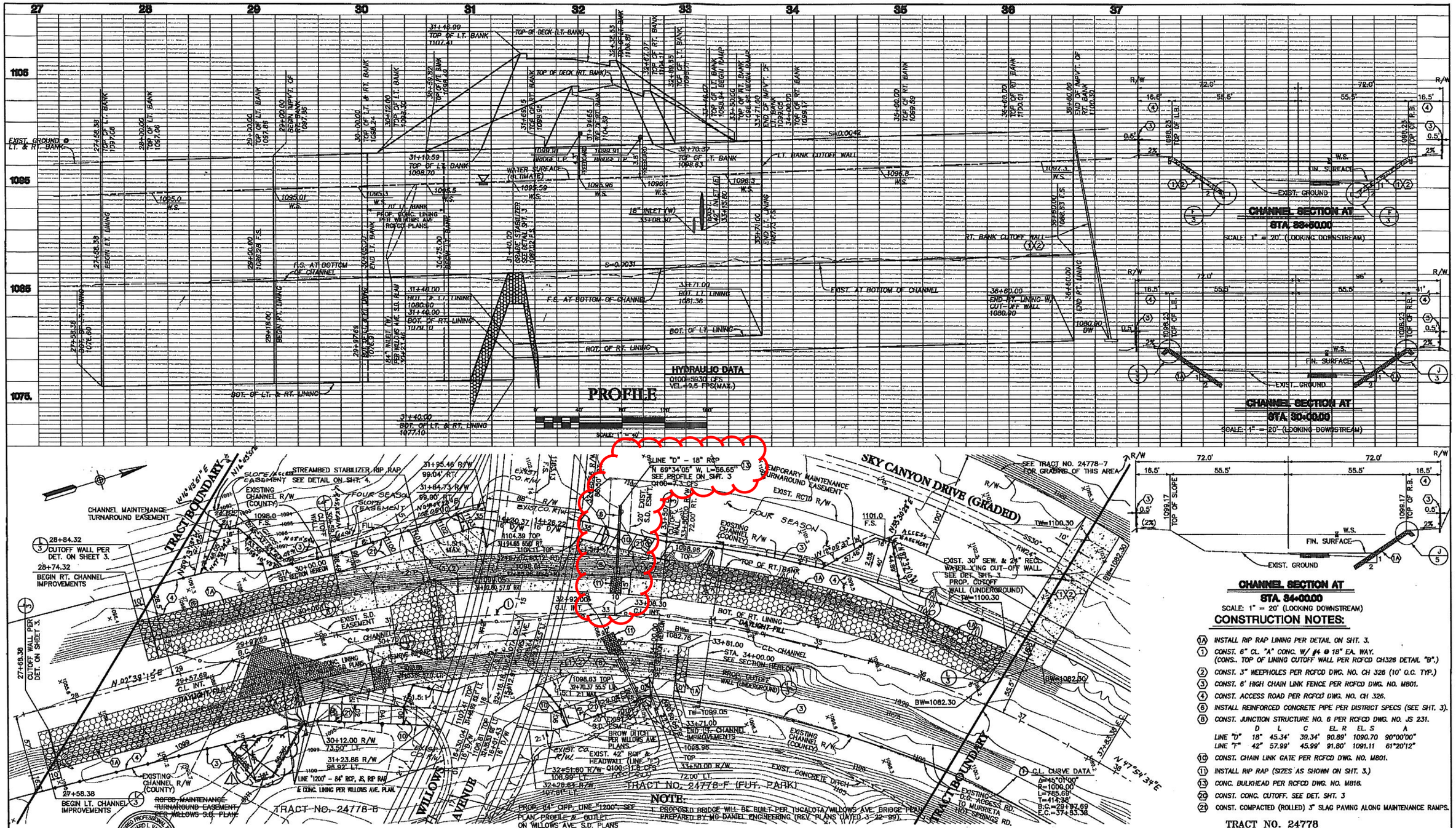
REF.	DESCRIPTION	APPR.	APPR.	DATE
1	REMOVE TEMP. TURNAROUND STA 29+50 - LEFT BANK	SSH	SEN	10-30-03 10-30-03

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: PLANNING ENGINEER DATE: 9-11-00
APPROVED BY: CHIEF ENGINEER DATE: 9/12/00

County of Riverside
APPROVED BY: FOR TRANSPORTATION DEPARTMENT RIVERSIDE COUNTY, CALIF. DATE: 8/29/00

SANTA GERTRUDIS VALLEY
TITLE SHEET
TUCALOTA CREEK S.D. STAGE II
TRACT NO. 24778

PROJECT NO. 7-0-0030-02
DRAWING NO. 7-169
SHEET NO. 1 OF 3



CONSTRUCTION NOTES:

1A. INSTALL RIP RAP LINING PER DETAIL ON SHT. 3.
1. CONST. 6" CL. "A" CONC. W/ #4 @ 18" EA. WAY. (CONS.. TOP OF LINING CUTOFF WALL PER RCFCD CH326 DETAIL "B".)
2. CONST. 3" WEEPHOLES PER RCFCD DWG. NO. CH 326 (10' O.C. TYP.)
3. CONST. 6' HIGH CHAIN LINK FENCE PER RCFCD DWG. NO. M801.
4. CONST. ACCESS ROAD PER RCFCD DWG. NO. CH 326.
6. INSTALL REINFORCED CONCRETE PIPE PER DISTRICT SPECS (SEE SHT. 3).
8. CONST. JUNCTION STRUCTURE NO. 6 PER RCFCD DWG. NO. JS 231.

	D	L	C	EL. R	EL. S	Δ
LINE "D"	18"	45.34'	39.34'	90.89'	1090.70	90°00'00"
LINE "F"	42"	57.99'	45.99'	91.80'	1091.11	61°20'12"

10. CONST. CHAIN LINK GATE PER RCFCD DWG. NO. M801.
11. INSTALL RIP RAP (SIZES AS SHOWN ON SHT. 3.)
13. CONC. BULKHEAD PER RCFCD DWG. NO. M816.
20. CONST. CONC. CUTOFF. SEE DET. SHT. 3
21. CONST. COMPACTED (ROLLED) 3" SLAG PAVING ALONG MAINTENANCE RAMPS.

VSL engineering, land planning & surveying
40635 COUNTY CENTER DR., SUITE "D", TEMECULA, CA. 92591
TEL. (909) 296-3930
FAX. (909) 296-3931

SUBMITTED BY: RICHARD VALDEZ
REGISTERED CIVIL ENGINEER NO. 48060
Expires 12-31-03
DATE: 8-25-00

BENCHMARK: SEE SHEET NO. 1

REVISIONS

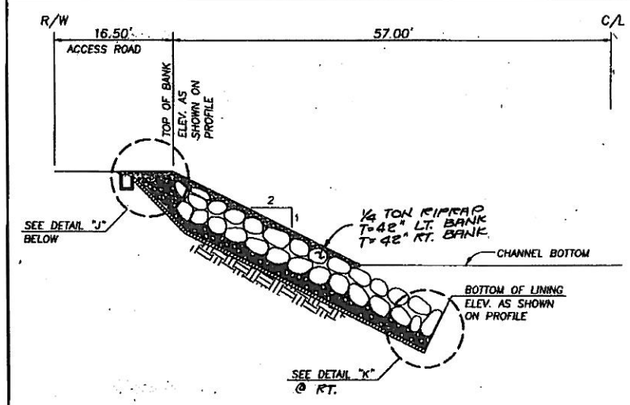
REF.	DESCRIPTION	APPR.	APPR.	DATE
1	REMOVE TEMP. TURNAROUND STA 29+50 - LEFT BANK & INSTALL FENCE			10-9-00

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: PLANNING ENGINEER DATE: 9-11-00
APPROVED BY: CHIEF ENGINEER DATE: 9/12/00

County of Riverside
APPROVED BY: FOR TRANSPORTATION DEPARTMENT RIVERSIDE COUNTY, CALIF. DATE: 8/29/00

COUNTY OF RIVERSIDE
SANTA GERTRUDIS VALLEY
TUCALOTA CREEK S.D. STAGE II
STA. 27+58.38 TO STA. 36+60.00

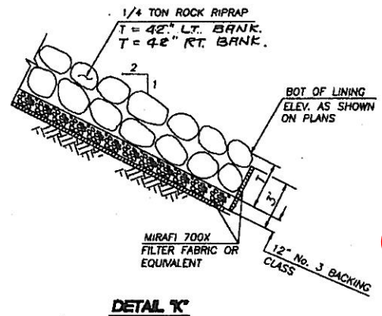
PROJECT NO. 7-0-0030-02
DRAWING NO. 7-189
SHEET NO. 2 OF 3



CHANNEL RIPRAP LINING SECTION

ROCK RIPRAP CHANNEL SECTIONS (TYP.)

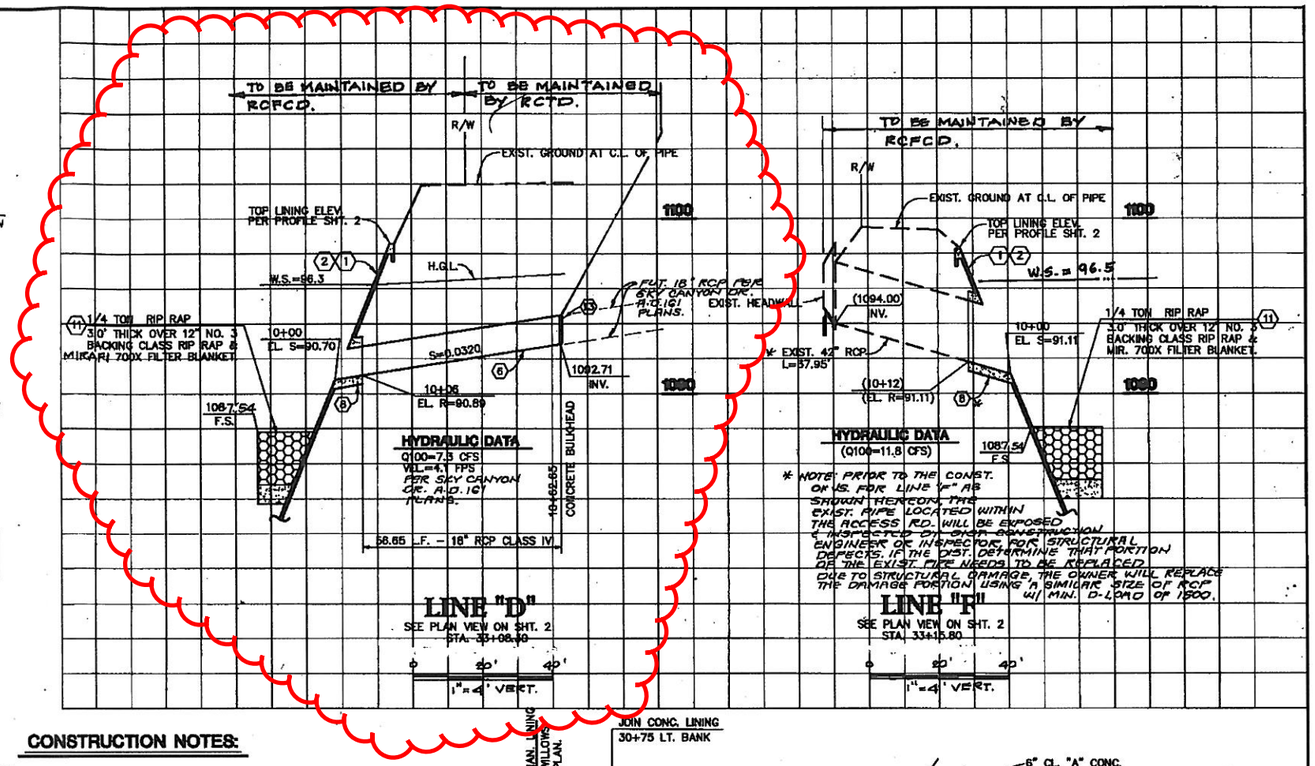
HORIZ : 1" = 10'
VERT : 1" = 50'

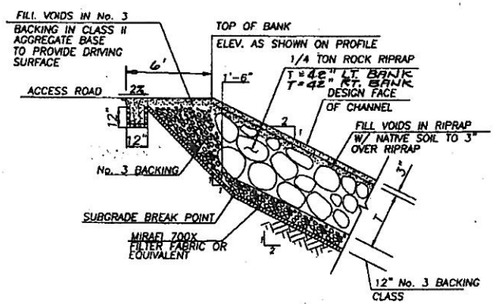


DETAIL "K"
(TYP. BOTH SIDE OF CHANNEL)
SCALE : 1" = 4'

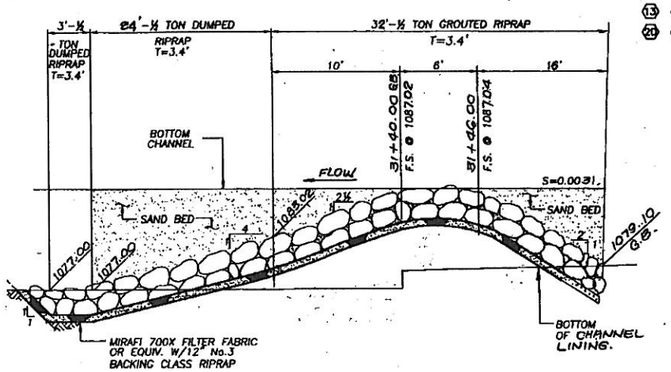
NOTE :

FOR ROCK RIPRAP AND BACKING GRADATIONS SEE CALTRANS SPECS. SECTION 72-2.02





DETAIL "J"
(TYP. BOTH SIDE OF CHANNEL)
SCALE : 1" = 4'

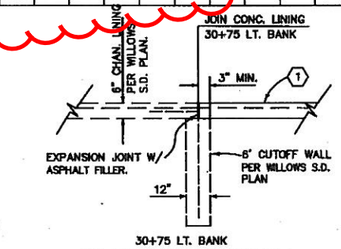


STREAMBED STABILIZER
@ STA. 31+40.00
N. T. S.

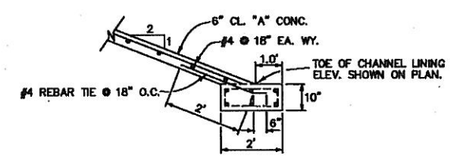
REGISTERED PROFESSIONAL ENGINEER RICHARD L. VALDEZ No. 48060 Exp. 12-31-03 CIVIL STATE OF CALIFORNIA

CONSTRUCTION NOTES:

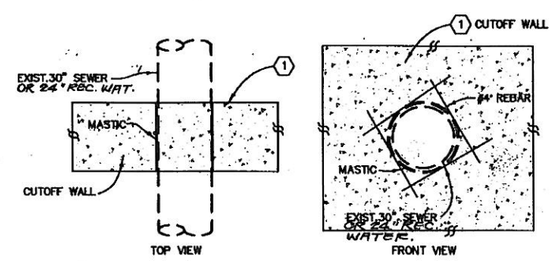
(1A) INSTALL RIP RAP LINING PER DETAIL HEREON.
(1) CONST. 6" CL. "A" CONC. W/ #4 @ 18" EA. WAY. (CONS.. TOP OF LINING CUTOFF WALL PER RCFCD CH326 DETAIL "B".)
(2) CONST. 3" WEEPHOLES PER RCFCD DWG. NO. CH 326 (10' O.C. TYP.)
(6) INSTALL REINFORCED CONCRETE PIPE PER DISTRICT SPECS.
(8) CONST. JUNCTION STRUCTURE NO. 6 PER RCFCD DWG. NO. JS 231.
(11) INSTALL RIP RAP (SIZES AS SHOWN ON PLANS.)
(13) CONC. BULKHEAD PER RCFCD DWG. NO. M816.
(20) CONST. CONC. CUTOFF. SEE DET. HEREON



CUTOFF WALL SECTION "T"
N.T.S.

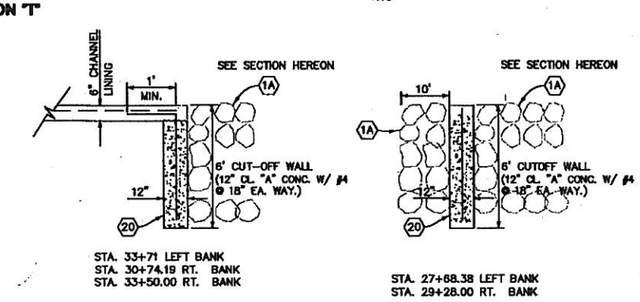


CONC. FOOTING DET. "F"
NTS



NOTE: CUTOFF WALL REINFORCEMENT NOT SHOWN.

DETAIL: CUTOFF WALL AT END OF RT. LINING XING 30" SEWER OR 24" RECLAIMED WATER.
NTS



CUT-OFF WALL DETAIL "L"
N.T.S.

TRACT NO. 24778

0' 40' 80' 120' 160'
SCALE: 1" = 40'

VSL engineering, land planning & surveying
40635 COUNTY CENTER DR., SUITE "A", TEMECULA, CA. 92591
TEL. (909) 676-3700
FAX (909) 676-2709
SUBMITTED BY: Richard Valdez
DATE: 1-11-00
REGISTERED CIVIL ENGINEER NO.48060
Expires 12-31-03

BENCHMARK:
SEE SHEET NO. 1

REVISIONS				
REF.	DESCRIPTION	APPR.	APPR.	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: PLANNING ENGINEER
DATE: 9-11-00
APPROVED BY: CHIEF ENGINEER
DATE: 9/12/00

County of Riverside
APPROVED BY:
FOR TRANSPORTATION DEPARTMENT RIVERSIDE COUNTY, CALIF. DATE: 8/29/00

COUNTY OF RIVERSIDE
SANTA GERTRUDIS VALLEY
TUCALOTA CREEK STAGE II
DETAIL & PROFILE

PROJECT NO. 7-0-00030-02
DRAWING NO. 7-199
SHEET NO. 3 OF 3

TUCALOTA_SHT2_ALT1.dwg 11-14-99 13:48:02 am PST