

Vernola Marketplace Apartment Community –
Phase B
Jurupa Valley, County of Riverside, California

Preliminary Drainage Study

Prepared for:

Vernola Trust

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Prepared By:



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Original Date Prepared: December 2021

[Stamp]

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SECTION 1 - SUMMARY

PURPOSE

The purpose of this report is to document the hydrologic analyses performed in support of the Vernola Marketplace Apartment Community Phase B (VMAC-B) project located in Jurupa Valley, County of Riverside, California. The project is bounded by the Interstate-15 to its west, VMAC Phase A to its south, and a commercial development to its east and north. The project proposes to build a multi-family residential development on approximately 8.3 acres. The VMAC Phase B project consists of 18 apartment buildings along with all associated utility improvements, parking stalls, asphalt/concrete drive aisles, concrete walkways, and landscaping. This report will summarize the hydrologic analyses that were conducted in order to determine the necessary drainage improvements required to provide flood protection for the proposed building and safely convey the runoff through the site.

The scope of this report will include the following:

- Determine the peak 100-year and 10-year flow rates for the developed condition using the Riverside County Flood Control and Water Conservation District (RCFC&WCD) Rational Method.
- Preparation of a preliminary report summarizing the hydrology results.

DESCRIPTION OF WATERSHED

As previously described, the project is proposing a multi-family residential development on approximately 8.3 acres of vacant land. Existing elevations across the site vary from 618 to 656 (NAVD88 datum). The site currently slopes down at approximately 15% grade to the southeast. The existing drainage pattern for the site and the general area is characterized by sheet flow across the site.

Runoff is currently captured via an existing headwall/wingwall and accompanying 30" RCP (Lat J-3) which conveys flows from the site into an existing 12'W a 6'H RCB (Line J) that is maintained by RCFC&WCD. Line J directs flows westward offsite into an existing channel that runs adjacent to Interstate-15. This channel ultimately discharges all intercepted flows into the Santa Ana River.

Line J was previously sized to convey flows from a tributary area of approximately 504 acres. This tributary area is roughly bounded by Bellegrave Avenue to the north, Interstate-15 to the west, Wineville Avenue to the east, and 68th Street to the south. Line J is currently sized to convey a peak flow of approximately 752 cfs. Information regarding Line J and its existing laterals can be found in the report titled "Hydrology Report for Vernola Trust; Line J of the Day Creek MDP" dated April 2011.

PROPOSED CONDITIONS

This report addresses the hydrologic analyses related to the development of the VMAC-B project. The VMAC-B project proposes a multi-family residential development on currently vacant land. In the proposed condition, flows will be captured by a series of catch basins and drop inlets located at localized low points throughout the site. A network of underground storm drain pipes will convey these flows from the drop inlets towards proposed modular wetland systems located near the southwestern corner of the site.

Lat J-3 was previously designed to convey the onsite flows. The developed flows, however, will not drain towards the existing 30" RCP Lat J-3. Rather, Lat J-3 will be bulk-headed and abandoned in place in the proposed condition. A new 18" RCP Lat J-7 and a 30" RCP Lat J-8, located approximately 280' and 180' downstream, respectively, of Lat J-3, are proposed to convey flows from the developed site towards the existing Line J. Before runoff can be conveyed to Line J, it must be treated for water quality requirements.

Three modular wetland systems are being proposed to treat for water quality requirements. Specifications regarding the minimum treatment volume for these proposed underground chambers can be found in the Preliminary-WQMP Report.

METHODOLOGY

HYDROLOGY

Hydrologic calculations were performed in accordance with the RCFC&WCD Hydrology Manual, dated April 1978. The Rational Method was utilized in determining peak flow rates.

The hydrological parameters, including rainfall values and soil types were derived from the RCFC&WCD Hydrology Manual. The isohyetal maps and soil map have been included in Section 2.

Rational Method calculations were performed using a computer program developed by CivilDesign Corporation and Joseph E. Bonadiman and Associates Inc. The computer program is commonly referred to as CivilD which incorporates the hydrological parameters outlined in the RCFC&WCD Hydrology Manual.

The Rational Method was used to determine the peak flow rates to size and design the drainage facilities need to convey onsite flows through the site to the proposed basin. The flow rates were computed by generating a hydrologic "link-node" model in which the overall area is divided into separate drainage sub-areas, each tributary to a concentration point (node) determined by the proposed layout and grading.

The Unit Hydrograph Method was used to determine the peak flow rates and volumes associated with the 100-year, 1-hour storm event for the site. Calculations were performed for both the existing condition and developed condition to be used in the analysis of the proposed basin. See Section 4 for additional information and results regarding the hydrologic analyses performed for this project.

FIG. 1 VICINITY MAP

FIG. 2 USGS TOPOGRAPHY MAP

FIG. 3 AERIAL PHOTOGRAPH

FIG. 4 RECEIVING WATERBODIES

FIG. 5 SOILS MAP

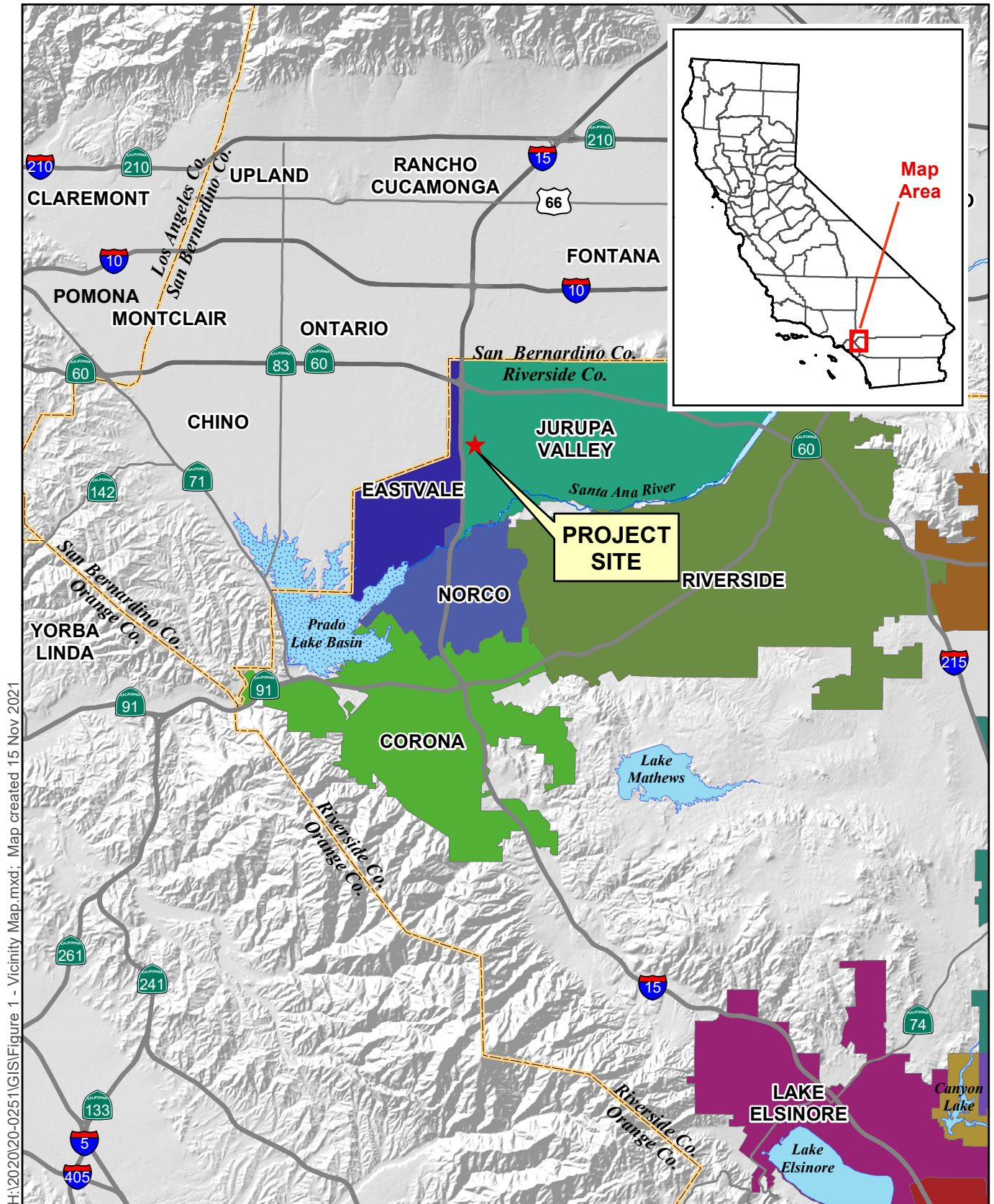
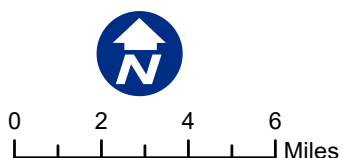
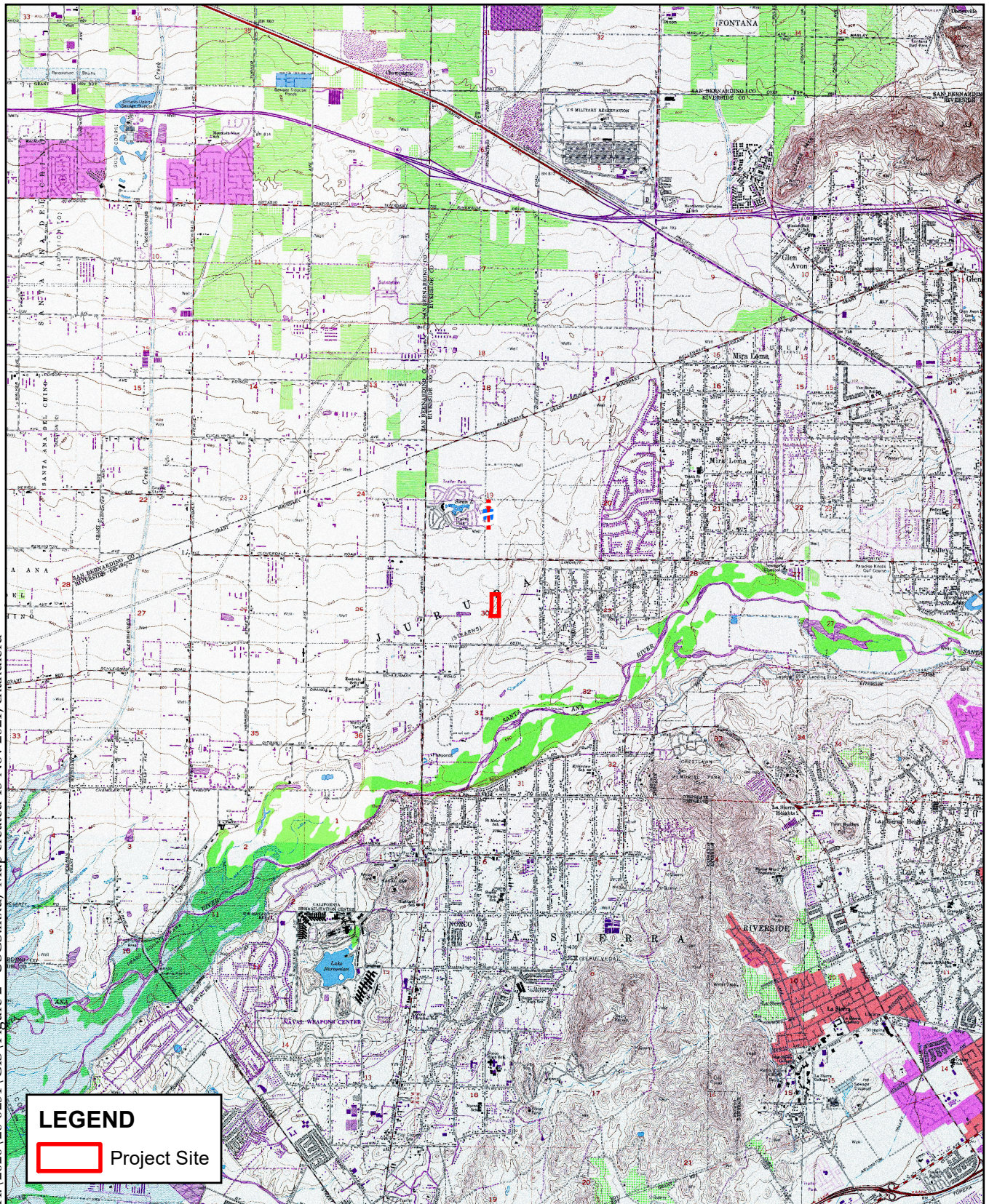


Figure 1 – Vicinity Map
Vernola Marketplace Neighborhood B

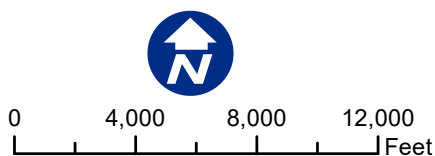


H:\2020\20-0251\GIS\Figure 2 - USGS.mxd; Map created 15 Nov 2021; chandlerd



Sources: ESRI / USGS 7.5min Quads: CUCAMONGA
PEAK, DEVORE, GUASTI, FONTANA

Figure 2 - USGS Map
Vernola Marketplace Neighborhood B



H:\2020\20-0251\GIS\Figure 3 - Aerial Map.mxd; Map created 15 Nov 2021

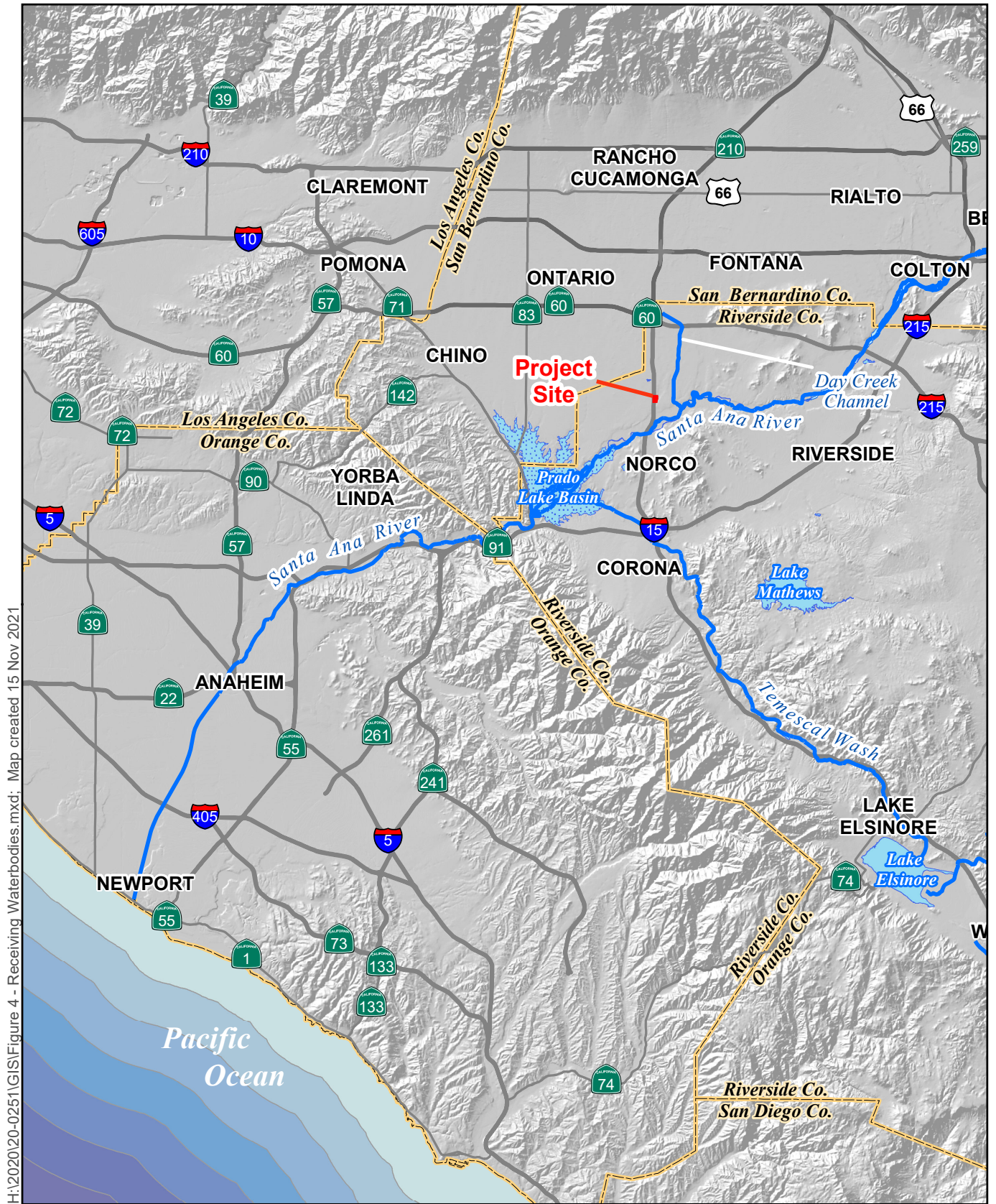


Sources: Riverside Co. GIS, 2021 (streets) and 2020 (imagery).



0 400 800 1,200 Feet

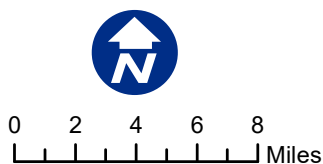
Figure 3 - Aerial Map
Vernola Marketplace Neighborhood B

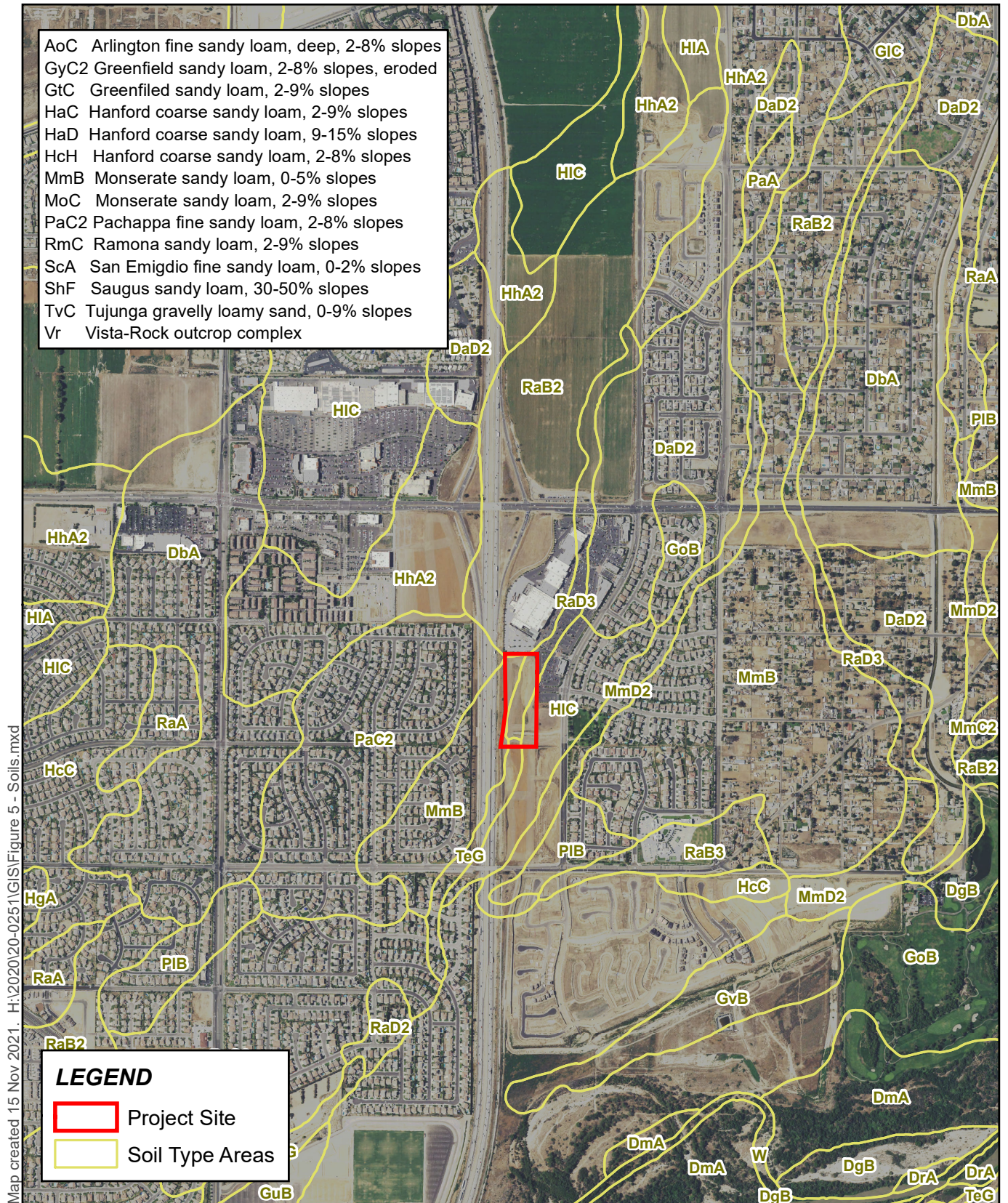


Sources: USGS DLG; USGS 30m DEM

Figure 4 – Receiving Waterbodies

Vernola Marketplace Neighborhood B





Sources: USDA NRCS SSURGO, 2015;
Riverside Co. GIS, 2020; USDA NAIP, 2016.

Figure 5 – Soils Map
Vernola Marketplace Neighborhood B



SECTION 2 - HYDROLOGY ANALYSIS

HYDROLOGY PARAMETERS

The RCFC&WCD Hydrology Manual was used to determine several of the hydrological parameters. The following rainfall depths were utilized in the hydrology analyses, which were obtained from the isohyetal maps provided in the RCFC&WCD Hydrology Manual:

Table 1 - Precipitation Values

	Duration	Duration
Storm Event	1-Hour (inches)	24-Hour (inches)
2-Year	0.5	2.0
100-Year	1.20	6.0

The value for slope of intensity was determined to be 0.5. The isohyetal maps have been included in Appendix A.

Based on the Plate C-1.14 in the RCFC&WCD Hydrology Manual, the project site is predominantly classified as soil type C. However, soil types AC and D are also present within the project site to a lower extent. The soils map is included in Appendix A.

The “Urban Covers - Residential of Commercial Landscaping” cover type for soil types A, C, & D were used to represent the developed condition. The table below summarizes the runoff index values and the recommended values for percentage of impervious cover for each category:

Table 2 - Cover Type

Cover Type	Soil Group A	Soil Group B	Soil Group C	Soil Group D	Percentage of Impervious Cover
Urban Covers - Residential or Commercial Landscaping	32	N/A	69	75	67.9%

ON-SITE RATIONAL METHOD HYDROLOGY

The rational method was used to determine peak flow rates in order to adequately size the proposed subsurface storm drains and associated inlets used to convey on-site flows to the existing Line J. Based on the current site plan for the project, the “Apartment” subarea type was used within the rational method calculations for all areas proposed for development.

The high-density nature of the VMAC-B project has led to a design with many small drop inlets (approximately 40 inlets) proposed throughout the site to capture all runoff. An initial subarea is

provided for an inlet located towards the end of a storm drain line. From there, the “Subarea Flow Addition” feature within CivilD was utilized to add the remaining area tributary to that storm drain line. This method of determining peak flow rates is conservative as the “Subarea Flow Addition” feature does not take the times of concentration into account for the larger tributary area. Rather, it adds the calculated flow rate in its entirety to the storm drain. The main storm drain lines considered are explained further in Section 3.

Runoff is proposed to enter the Line J from two onsite storm drain lines. Subarea 1 consists of approximately 1.5 acres in the south end of the site that enter Line J via an 18” proposed storm drain Line A. Subarea 1 generates approximately 5.6 cfs of runoff. Subarea 2 consists of approximately 6.8 acres, the majority of the site, that ultimately enters Line J via an 30” proposed storm drain Line B. Subarea 2 generates approximately 19.3 cfs of runoff that will enter the modular wetland systems for treatment. Most of the flows that enter the modular wetland systems come from the proposed storm drain Line B. Ultimately, Line J receives 24.9 cfs of flow from the developed VMAC-B project site.

The following table summarizes the rational method results at key points and shows the flow rates generated by the subarea addition feature:

Table 3 – Rational Method Results

Point of Interest	10-Year Peak Flow Rate (cfs)	100-Year Peak Flow Rate (cfs)	100-Year Subarea Addition Flow Rate (cfs)
Node 102 – Area 100 & 100A	0.5	0.8	1.4
Node 104 – Area 100B	-	-	0.8
Node 109 – Area 110 & 110A	0.2	0.3	0.8
Node 106 – Area 120	1.2	1.9	-
Node 111 – Peak Flow Rate for Line A	3.7	5.6	-
Node 202 – Area 200 & 200A	1.3	2.0	-
Node 205 – Area 210	0.8	1.2	-
Node 208 – Area 220	0.8	1.3	-
Node 211 – Area 230 & 230A	0.4	0.5	0.3
Node 216 – Area 240 & 240A	0.3	0.4	0.4
Node 221 – Area 250 & 250A	1.5	2.3	0.3
Node 226 – Area 260	0.8	1.2	-
Node 229 – Area 270	1.0	1.6	-
Node 232 – Area 280 & 280A	0.2	0.3	0.6
Node 237 – Area 290 & 290A	0.2	0.4	0.3

Node 241 – Area 290B	-	-	0.3
Node 243 – Area 300	1.0	1.6	-
Node 248 – Area 400	0.8	1.2	-
Node 251 – Area 410 & 410A	0.3	0.4	0.3
Node 249 – Area 420 & 420A	0.2	0.4	0.3
Node 257 – Area 420B	-	-	0.4
Node 246 – Area 500	0.3	0.5	-
Node 262 – Area 510 & 510A	0.4	0.6	1.2
Node 265 – Area 510B	-	-	0.9
Node 260 – Area 520	0.8	1.2	-
Node 268 – Peak Flow Rate for Line B	12.7	19.3	-

The rational method output files and hydrology map have been included in Appendix A.

SECTION 3 - HYDRAULIC ANALYSIS

ON-SITE STORM DRAIN FACILITIES

Hydraulic analysis was not taken into consideration for the preliminary drainage.

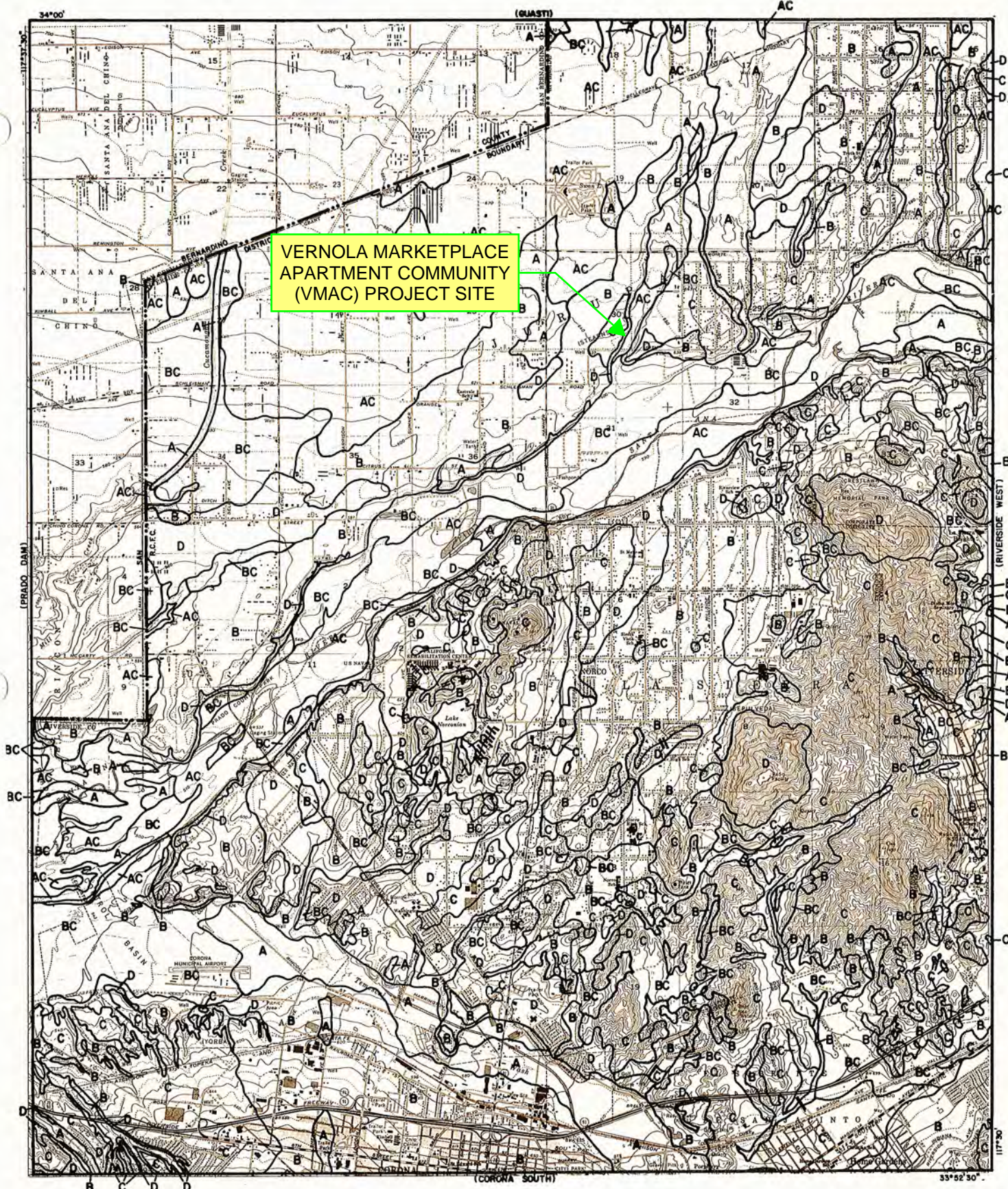
SECTION 4 - CONCLUSION

Based on the analyses and results of this report, the following conclusions were derived from the hydrology results:

- The proposed drainage improvements will adequately convey flows to the basin and provide flood protection for the 100-year storm event.
- The proposed basins will provide adequate water quality treatment.
- The proposed project will not impact flooding condition to upstream or downstream properties.

APPENDIX A – HYDROLOGY ANALYSIS

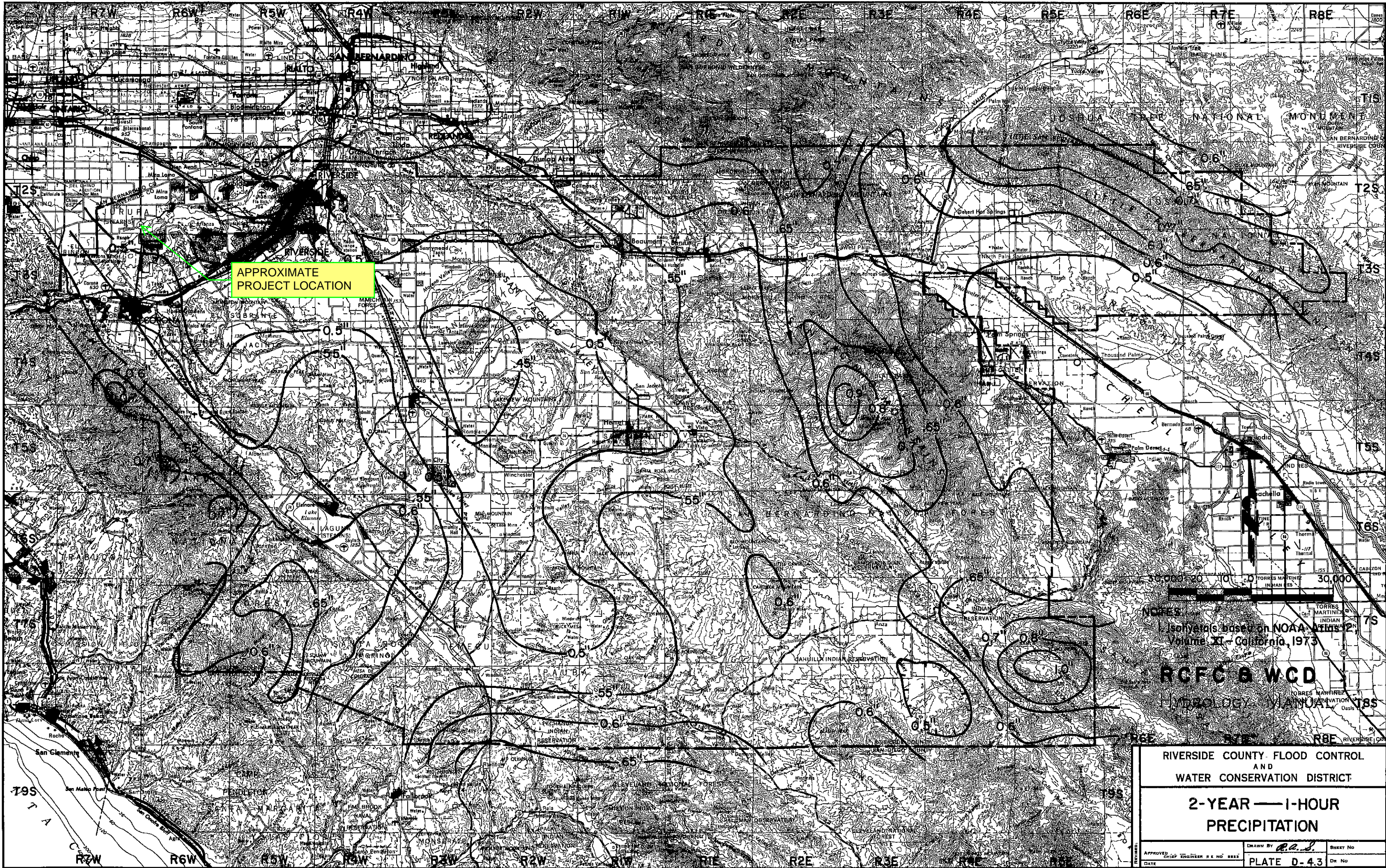
HYDROLOGIC SOILS GROUP MAP (PLATE C-1.14)

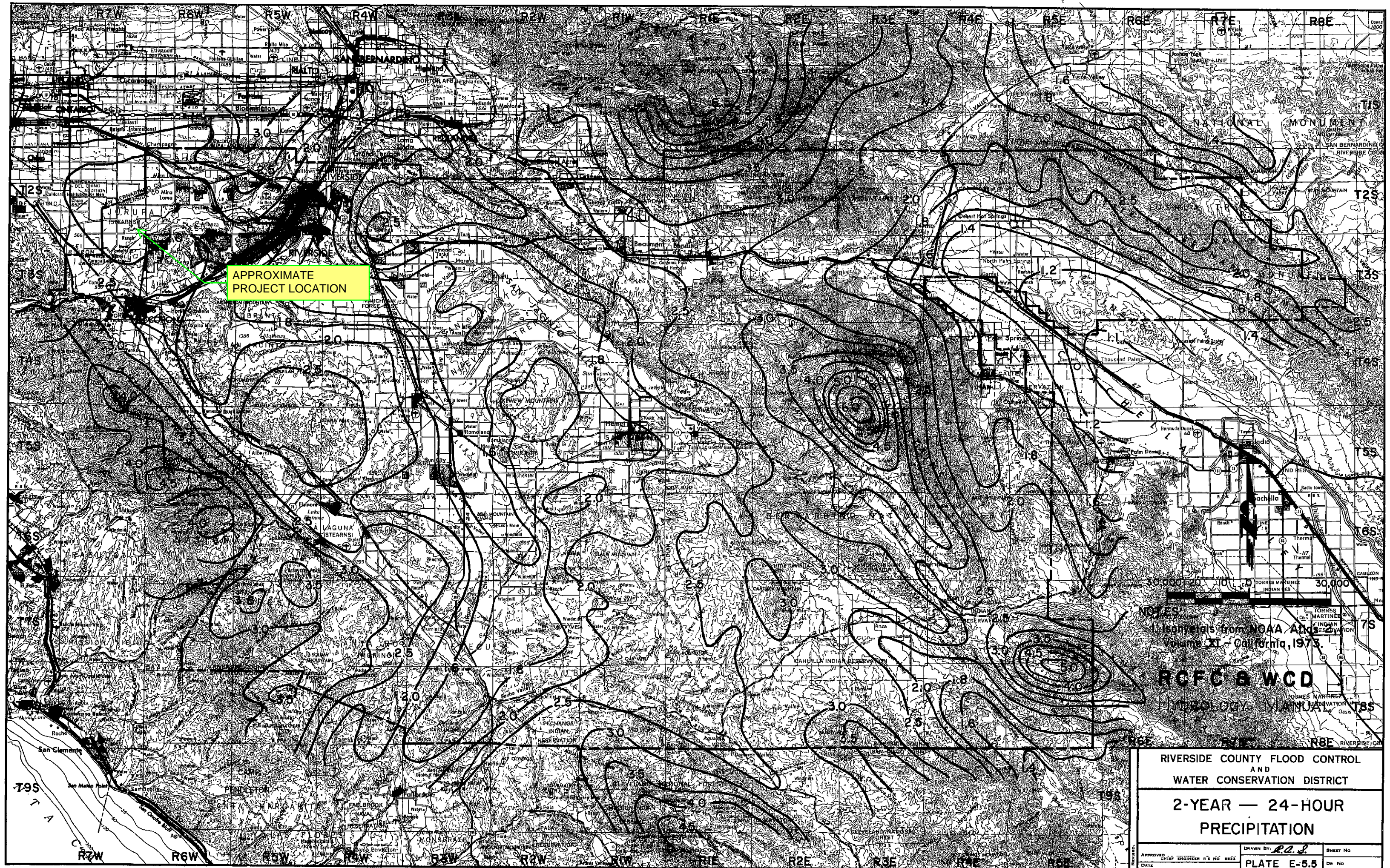


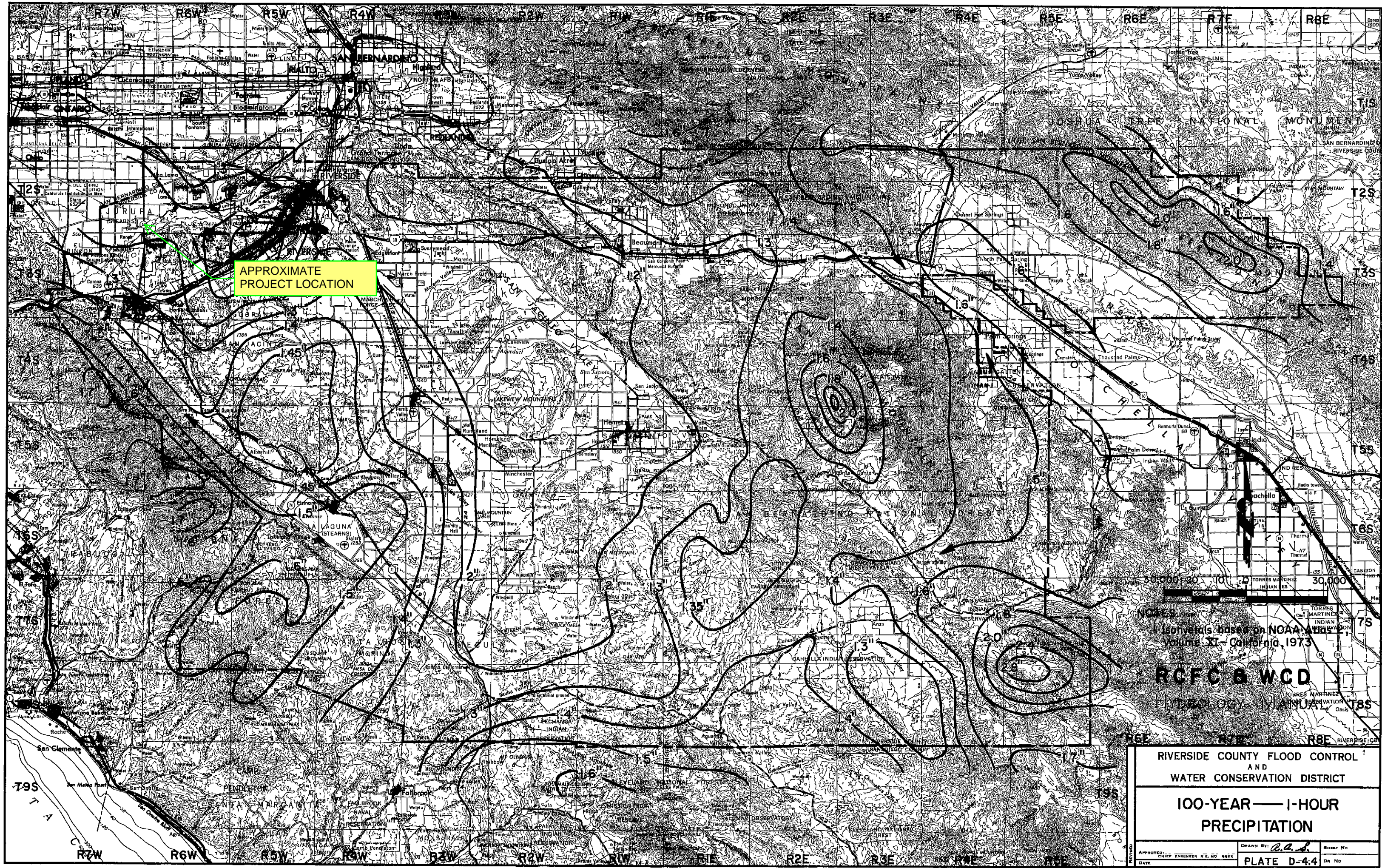
<p>LEGEND</p> <p>— SOILS GROUP BOUNDARY</p> <p>A SOILS GROUP DESIGNATION</p> <p>RCFC&WCD</p> <p>HYDROLOGY MANUAL</p>	<p>HYDROLOGIC SOILS GROUP MAP</p> <p>FOR</p> <p>CORONA-NORTH</p>
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0 5000 FEET

ISOHYETAL MAPS







APPROXIMATE
PROJECT LOCATION

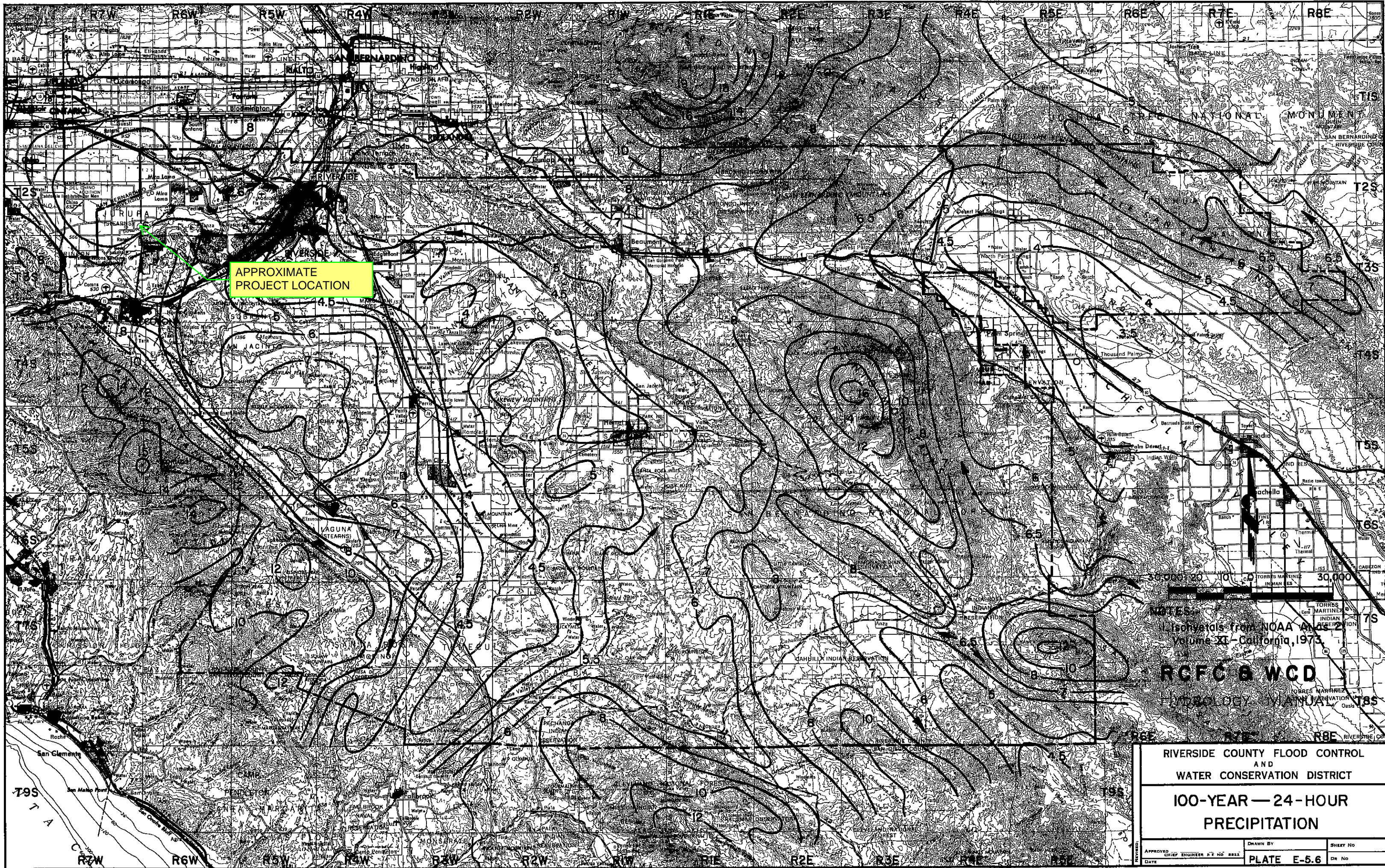
Contours based on NOAA Atlas,
Volume XI - California, 1973

RCFC & WCD
HYDROLOGY MANUAL

RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

**100-YEAR — 1-HOUR
PRECIPITATION**

APPROVED: CHIEF ENGINEER R.E. NO. 4852
DATE: _____
DRAWN BY: *P.A.S.*
SHEET NO. _____
PLATE D-4-4
DN NO. _____



RAINFALL INTENSITY—INCHES PER HOUR

MIRA LOMA			MURRIETA - TEMECULA & RANCHO CALIFORNIA			NORCO			PALM SPRINGS			PERRIS VALLEY		
DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR
5	2.84	4.48	5	3.45	5.10	5	2.77	4.16	5	4.23	6.76	5	2.64	3.78
6	2.58	4.07	6	3.12	4.61	6	2.53	3.79	6	3.80	6.08	6	2.41	3.46
7	2.37	3.75	7	2.87	4.24	7	2.34	3.51	7	3.48	5.56	7	2.24	3.21
8	2.21	3.49	8	2.67	3.94	8	2.19	3.29	8	3.22	5.15	8	2.09	3.01
9	2.08	3.28	9	2.50	3.69	9	2.07	3.10	9	3.01	4.81	9	1.98	2.84
10	1.96	3.10	10	2.36	3.48	10	1.96	2.94	10	2.83	4.52	10	1.88	2.69
11	1.87	2.95	11	2.24	3.30	11	1.87	2.80	11	2.67	4.28	11	1.79	2.57
12	1.78	2.82	12	2.13	3.15	12	1.79	2.68	12	2.54	4.07	12	1.72	2.46
13	1.71	2.70	13	2.04	3.01	13	1.72	2.58	13	2.43	3.88	13	1.65	2.37
14	1.64	2.60	14	1.96	2.89	14	1.66	2.48	14	2.33	3.72	14	1.59	2.29
15	1.58	2.50	15	1.89	2.79	15	1.60	2.40	15	2.23	3.58	15	1.54	2.21
16	1.53	2.42	16	1.82	2.69	16	1.55	2.32	16	2.15	3.44	16	1.49	2.14
17	1.48	2.34	17	1.76	2.60	17	1.50	2.25	17	2.08	3.32	17	1.45	2.08
18	1.44	2.27	18	1.71	2.52	18	1.46	2.19	18	2.01	3.22	18	1.41	2.02
19	1.40	2.21	19	1.66	2.45	19	1.42	2.13	19	1.95	3.12	19	1.37	1.97
20	1.36	2.15	20	1.61	2.38	20	1.39	2.08	20	1.89	3.03	20	1.34	1.92
22	1.29	2.04	22	1.53	2.26	22	1.32	1.98	22	1.79	2.86	22	1.28	1.83
24	1.24	1.95	24	1.46	2.15	24	1.26	1.90	24	1.70	2.72	24	1.22	1.75
26	1.18	1.87	26	1.39	2.06	26	1.22	1.82	26	1.62	2.60	26	1.18	1.69
28	1.14	1.80	28	1.34	1.98	28	1.17	1.76	28	1.56	2.49	28	1.13	1.63
30	1.10	1.73	30	1.29	1.90	30	1.13	1.70	30	1.49	2.39	30	1.10	1.57
32	1.06	1.67	32	1.24	1.84	32	1.10	1.64	32	1.44	2.30	32	1.06	1.52
34	1.03	1.62	34	1.20	1.78	34	1.06	1.59	34	1.39	2.22	34	1.03	1.48
36	1.00	1.57	36	1.17	1.72	36	1.03	1.55	36	1.34	2.15	36	1.00	1.44
38	.97	1.53	38	1.13	1.67	38	1.01	1.51	38	1.30	2.09	38	.98	1.40
40	.94	1.49	40	1.10	1.62	40	.98	1.47	40	1.27	2.02	40	.95	1.37
45	.89	1.40	45	1.03	1.52	45	.92	1.39	45	1.18	1.89	45	.90	1.29
50	.84	1.32	50	.97	1.44	50	.88	1.31	50	1.11	1.78	50	.85	1.22
55	.80	1.26	55	.92	1.36	55	.84	1.25	55	1.05	1.68	55	.81	1.17
60	.76	1.20	60	.88	1.30	60	.80	1.20	60	1.00	1.60	60	.78	1.12
65	.73	1.15	65	.84	1.24	65	.77	1.15	65	.95	1.53	65	.75	1.08
70	.70	1.11	70	.81	1.19	70	.74	1.11	70	.91	1.46	70	.72	1.04
75	.68	1.07	75	.78	1.15	75	.72	1.07	75	.88	1.41	75	.70	1.00
80	.65	1.03	80	.75	1.11	80	.69	1.04	80	.85	1.35	80	.68	.97
85	.63	1.00	85	.73	1.07	85	.67	1.01	85	.82	1.31	85	.66	.94
SLOPE = .530			SLOPE = .550			SLOPE = .500			SLOPE = .580			SLOPE = .490		

RCFC & WCD
HYDROLOGY MANUAL

STANDARD
INTENSITY - DURATION
CURVES DATA

10-YEAR ONSITE HYDROLOGY (RATIONAL METHOD)

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
Rational Hydrology Study Date: 12/10/21 File:PROP10A.out

2020-0251 - VMAC B
ONSITE RATIONAL METHOD HYDROLOGY
10 YEAR STORM EVENT
FN: PROP10A.OUT RSB

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

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

Program License Serial Number 4010

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

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

Standard intensity-duration curves data (Plate D-4.1)
For the [Norco] area used.
10 year storm 10 minute intensity = 1.960(In/Hr)
10 year storm 60 minute intensity = 0.800(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.800(In/Hr)
Slope of intensity duration curve = 0.5000

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

Initial area flow distance = 112.000(Ft.)
Top (of initial area) elevation = 626.200(Ft.)
Bottom (of initial area) elevation = 624.800(Ft.)
Difference in elevation = 1.400(Ft.)
Slope = 0.01250 s(percent)= 1.25
TC = $k(0.323)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$
Initial area time of concentration = 5.123 min.
Rainfall intensity = 2.738(In/Hr) for a 10.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.858
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Initial subarea runoff = 0.493(CFS)
Total initial stream area = 0.210(Ac.)
Pervious area fraction = 0.200

Process from Point/Station 101.000 to Point/Station 102.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 618.100(Ft.)
Downstream point/station elevation = 617.600(Ft.)
Pipe length = 95.00(Ft.) Manning's N = 0.013

No. of pipes = 1 Required pipe flow = 0.493(CFS)
Nearest computed pipe diameter = 9.00(In.)
Calculated individual pipe flow = 0.493(CFS)
Normal flow depth in pipe = 4.02(In.)
Flow top width inside pipe = 8.95(In.)
Critical Depth = 3.80(In.)
Pipe flow velocity = 2.58(Ft/s)
Travel time through pipe = 0.61 min.
Time of concentration (TC) = 5.74 min.

Process from Point/Station 103.000 to Point/Station 102.000
**** SUBAREA FLOW ADDITION ****

APARTMENT subarea type
Runoff Coefficient = 0.856
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Time of concentration = 5.74 min.
Rainfall intensity = 2.587(In/Hr) for a 10.0 year storm
Subarea runoff = 0.886(CFS) for 0.400(Ac.)
Total runoff = 1.380(CFS) Total area = 0.610(Ac.)

Process from Point/Station 102.000 to Point/Station 104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 617.600(Ft.)
Downstream point/station elevation = 616.800(Ft.)
Pipe length = 160.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.380(CFS)
Nearest computed pipe diameter = 12.00(In.)
Calculated individual pipe flow = 1.380(CFS)
Normal flow depth in pipe = 6.33(In.)
Flow top width inside pipe = 11.98(In.)
Critical Depth = 5.96(In.)
Pipe flow velocity = 3.28(Ft/s)
Travel time through pipe = 0.81 min.
Time of concentration (TC) = 6.55 min.

Process from Point/Station 105.000 to Point/Station 104.000
**** SUBAREA FLOW ADDITION ****

APARTMENT subarea type
Runoff Coefficient = 0.854
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Time of concentration = 6.55 min.
Rainfall intensity = 2.422(In/Hr) for a 10.0 year storm
Subarea runoff = 0.517(CFS) for 0.250(Ac.)
Total runoff = 1.897(CFS) Total area = 0.860(Ac.)

Process from Point/Station 104.000 to Point/Station 108.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 616.800(Ft.)
Downstream point/station elevation = 616.200(Ft.)
Pipe length = 113.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.897(CFS)
Nearest computed pipe diameter = 12.00(In.)
Calculated individual pipe flow = 1.897(CFS)

Normal flow depth in pipe = 7.62(In.)
Flow top width inside pipe = 11.56(In.)
Critical Depth = 7.04(In.)
Pipe flow velocity = 3.61(Ft/s)
Travel time through pipe = 0.52 min.
Time of concentration (TC) = 7.07 min.

Process from Point/Station 104.000 to Point/Station 108.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 0.860(Ac.)
Runoff from this stream = 1.897(CFS)
Time of concentration = 7.07 min.
Rainfall intensity = 2.330(In/Hr)

Process from Point/Station 112.000 to Point/Station 113.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 71.000(Ft.)
Top (of initial area) elevation = 626.400(Ft.)
Bottom (of initial area) elevation = 623.400(Ft.)
Difference in elevation = 3.000(Ft.)
Slope = $0.04225 \text{ s(percent)} = 4.23$
 $TC = k(0.323)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$
Warning: TC computed to be less than 5 min.; program is assuming the
time of concentration is 5 minutes.
Initial area time of concentration = 5.000 min.
Rainfall intensity = 2.771(In/Hr) for a 10.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.858
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Initial subarea runoff = 0.167(CFS)
Total initial stream area = 0.070(Ac.)
Pervious area fraction = 0.200

Process from Point/Station 113.000 to Point/Station 109.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 617.800(Ft.)
Downstream point/station elevation = 617.300(Ft.)
Pipe length = 104.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 0.167(CFS)
Nearest computed pipe diameter = 6.00(In.)
Calculated individual pipe flow = 0.167(CFS)
Normal flow depth in pipe = 2.75(In.)
Flow top width inside pipe = 5.98(In.)
Critical Depth = 2.44(In.)
Pipe flow velocity = 1.91(Ft/s)
Travel time through pipe = 0.91 min.
Time of concentration (TC) = 5.91 min.

Process from Point/Station 110.000 to Point/Station 109.000
**** SUBAREA FLOW ADDITION ****

APARTMENT subarea type
Runoff Coefficient = 0.856
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60

Pervious area fraction = 0.200; Impervious fraction = 0.800
 Time of concentration = 5.91 min.
 Rainfall intensity = 2.549(In/Hr) for a 10.0 year storm
 Subarea runoff = 0.524(CFS) for 0.240(Ac.)
 Total runoff = 0.690(CFS) Total area = 0.310(Ac.)

++++++
 Process from Point/Station 109.000 to Point/Station 108.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 617.300(Ft.)
 Downstream point/station elevation = 616.200(Ft.)
 Pipe length = 213.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 0.690(CFS)
 Nearest computed pipe diameter = 9.00(In.)
 Calculated individual pipe flow = 0.690(CFS)
 Normal flow depth in pipe = 4.92(In.)
 Flow top width inside pipe = 8.96(In.)
 Critical Depth = 4.54(In.)
 Pipe flow velocity = 2.79(Ft/s)
 Travel time through pipe = 1.27 min.
 Time of concentration (TC) = 7.18 min.

++++++
 Process from Point/Station 109.000 to Point/Station 108.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 0.310(Ac.)
 Runoff from this stream = 0.690(CFS)
 Time of concentration = 7.18 min.
 Rainfall intensity = 2.312(In/Hr)
 Summary of stream data:

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

1	1.897	7.07	2.330
2	0.690	7.18	2.312

Largest stream flow has longer or shorter time of concentration

$Q_p = 1.897 + \text{sum of}$
 $Q_a \quad T_b/T_a$
 $0.690 * 0.985 = 0.679$
 $Q_p = 2.576$

Total of 2 streams to confluence:

Flow rates before confluence point:

1.897 0.690

Area of streams before confluence:

0.860 0.310

Results of confluence:

Total flow rate = 2.576(CFS)

Time of concentration = 7.070 min.

Effective stream area after confluence = 1.170(Ac.)

++++++
 Process from Point/Station 108.000 to Point/Station 106.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 616.200(Ft.)
 Downstream point/station elevation = 616.100(Ft.)
 Pipe length = 13.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 2.576(CFS)
 Nearest computed pipe diameter = 12.00(In.)
 Calculated individual pipe flow = 2.576(CFS)
 Normal flow depth in pipe = 8.30(In.)
 Flow top width inside pipe = 11.09(In.)
 Critical Depth = 8.26(In.)
 Pipe flow velocity = 4.44(Ft/s)
 Travel time through pipe = 0.05 min.
 Time of concentration (TC) = 7.12 min.

```

*****
Process from Point/Station      108.000 to Point/Station      106.000
**** CONFLUENCE OF MINOR STREAMS ****

```

```

Along Main Stream number: 1 in normal stream number 1
Stream flow area =      1.170(Ac.)
Runoff from this stream =      2.576(CFS)
Time of concentration =      7.12 min.
Rainfall intensity =      2.322(In/Hr)

```

```

*****
Process from Point/Station      107.000 to Point/Station      106.000
**** INITIAL AREA EVALUATION ****

```

```

Initial area flow distance = 246.000(Ft.)
Top (of initial area) elevation = 633.800(Ft.)
Bottom (of initial area) elevation = 625.200(Ft.)
Difference in elevation = 8.600(Ft.)
Slope = 0.03496 s(percent)= 3.50
TC = k(0.323)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 5.713 min.
Rainfall intensity = 2.593(In/Hr) for a 10.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.856
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Initial subarea runoff = 1.221(CFS)
Total initial stream area = 0.550(Ac.)
Pervious area fraction = 0.200

```

```

*****
Process from Point/Station      107.000 to Point/Station      106.000
**** CONFLUENCE OF MINOR STREAMS ****

```

```

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 0.550(Ac.)
Runoff from this stream = 1.221(CFS)
Time of concentration = 5.71 min.
Rainfall intensity = 2.593(In/Hr)
Summary of stream data:

```

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

1	2.576	7.12	2.322
2	1.221	5.71	2.593

Largest stream flow has longer time of concentration

Qp = 2.576 + sum of
 Qb Ia/Ib
 1.221 * 0.896 = 1.094
 Qp = 3.670

Total of 2 streams to confluence:
 Flow rates before confluence point:
 2.576 1.221

Area of streams before confluence:
 1.170 0.550

Results of confluence:
 Total flow rate = 3.670(CFS)
 Time of concentration = 7.119 min.
 Effective stream area after confluence = 1.720(Ac.)

```

*****
Process from Point/Station      106.000 to Point/Station      111.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

```

Upstream point/station elevation = 616.100(Ft.)
Downstream point/station elevation = 615.800(Ft.)
Pipe length = 52.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 3.670(CFS)
Nearest computed pipe diameter = 15.00(In.)
Calculated individual pipe flow = 3.670(CFS)
Normal flow depth in pipe = 9.68(In.)
Flow top width inside pipe = 14.35(In.)
Critical Depth = 9.29(In.)
Pipe flow velocity = 4.39(Ft/s)
Travel time through pipe = 0.20 min.
Time of concentration (TC) = 7.32 min.
End of computations, total study area = 1.72 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 0.200
Area averaged RI index number = 61.6

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
Rational Hydrology Study Date: 12/10/21 File:PROP10B.out

2020-0251 - VMAC B
ONSITE RATIONAL METHOD HYDROLOGY
10 YEAR STORM EVENT
FN: PROP10B.OUT RSB

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

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

Program License Serial Number 4010

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

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

Standard intensity-duration curves data (Plate D-4.1)
For the [Norco] area used.
10 year storm 10 minute intensity = 1.960(In/Hr)
10 year storm 60 minute intensity = 0.800(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.800(In/Hr)
Slope of intensity duration curve = 0.5000

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

Initial area flow distance = 65.000(Ft.)
Top (of initial area) elevation = 639.200(Ft.)
Bottom (of initial area) elevation = 638.300(Ft.)
Difference in elevation = 0.900(Ft.)
Slope = 0.01385 s(percent)= 1.38
 $TC = k(0.323)*[(length^3)/(elevation\ change)]^{0.2}$
Warning: TC computed to be less than 5 min.; program is assuming the
time of concentration is 5 minutes.
Initial area time of concentration = 5.000 min.
Rainfall intensity = 2.771(In/Hr) for a 10.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.858
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Initial subarea runoff = 0.333(CFS)
Total initial stream area = 0.140(Ac.)
Pervious area fraction = 0.200

Process from Point/Station 201.000 to Point/Station 202.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 621.800(Ft.)

Downstream point/station elevation = 621.000(Ft.)
Pipe length = 154.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 0.333(CFS)
Nearest computed pipe diameter = 6.00(In.)
Calculated individual pipe flow = 0.333(CFS)
Normal flow depth in pipe = 4.15(In.)
Flow top width inside pipe = 5.54(In.)
Critical Depth = 3.51(In.)
Pipe flow velocity = 2.30(Ft/s)
Travel time through pipe = 1.12 min.
Time of concentration (TC) = 6.12 min.

+++++
Process from Point/Station 201.000 to Point/Station 202.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 0.140(Ac.)
Runoff from this stream = 0.333(CFS)
Time of concentration = 6.12 min.
Rainfall intensity = 2.506(In/Hr)

+++++
Process from Point/Station 203.000 to Point/Station 204.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 123.000(Ft.)
Top (of initial area) elevation = 640.000(Ft.)
Bottom (of initial area) elevation = 638.700(Ft.)
Difference in elevation = 1.300(Ft.)
Slope = 0.01057 s(percent)= 1.06
 $TC = k(0.323)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 5.500 min.
Rainfall intensity = 2.642(In/Hr) for a 10.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.857
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Initial subarea runoff = 0.996(CFS)
Total initial stream area = 0.440(Ac.)
Pervious area fraction = 0.200

+++++
Process from Point/Station 204.000 to Point/Station 202.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 621.200(Ft.)
Downstream point/station elevation = 621.000(Ft.)
Pipe length = 44.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 0.996(CFS)
Nearest computed pipe diameter = 9.00(In.)
Calculated individual pipe flow = 0.996(CFS)
Normal flow depth in pipe = 6.63(In.)
Flow top width inside pipe = 7.92(In.)
Critical Depth = 5.49(In.)
Pipe flow velocity = 2.85(Ft/s)
Travel time through pipe = 0.26 min.
Time of concentration (TC) = 5.76 min.

+++++
Process from Point/Station 204.000 to Point/Station 202.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 0.440(Ac.)
Runoff from this stream = 0.996(CFS)
Time of concentration = 5.76 min.

Rainfall intensity = 2.583(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	0.333	6.12	2.506
2	0.996	5.76	2.583

Largest stream flow has longer or shorter time of concentration
Qp = 0.996 + sum of
Qa Tb/Ta
0.333 * 0.941 = 0.314
Qp = 1.310

Total of 2 streams to confluence:
Flow rates before confluence point:
0.333 0.996
Area of streams before confluence:
0.140 0.440
Results of confluence:
Total flow rate = 1.310(CFS)
Time of concentration = 5.757 min.
Effective stream area after confluence = 0.580(Ac.)

Process from Point/Station 202.000 to Point/Station 205.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 621.000(Ft.)
Downstream point/station elevation = 620.600(Ft.)
Pipe length = 72.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.310(CFS)
Nearest computed pipe diameter = 12.00(In.)
Calculated individual pipe flow = 1.310(CFS)
Normal flow depth in pipe = 5.95(In.)
Flow top width inside pipe = 12.00(In.)
Critical Depth = 5.80(In.)
Pipe flow velocity = 3.37(Ft/s)
Travel time through pipe = 0.36 min.
Time of concentration (TC) = 6.11 min.

Process from Point/Station 202.000 to Point/Station 205.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 0.580(Ac.)
Runoff from this stream = 1.310(CFS)
Time of concentration = 6.11 min.
Rainfall intensity = 2.506(In/Hr)

Process from Point/Station 206.000 to Point/Station 207.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 63.000(Ft.)
Top (of initial area) elevation = 639.200(Ft.)
Bottom (of initial area) elevation = 638.300(Ft.)
Difference in elevation = 0.900(Ft.)
Slope = 0.01429 s(percent)= 1.43
TC = $k(0.323)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$
Warning: TC computed to be less than 5 min.; program is assuming the time of concentration is 5 minutes.
Initial area time of concentration = 5.000 min.
Rainfall intensity = 2.771(In/Hr) for a 10.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.858
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000

RI index for soil(AMC 2) = 61.60
 Pervious area fraction = 0.200; Impervious fraction = 0.800
 Initial subarea runoff = 0.809(CFS)
 Total initial stream area = 0.340(Ac.)
 Pervious area fraction = 0.200

++++++
 Process from Point/Station 207.000 to Point/Station 205.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 621.200(Ft.)
 Downstream point/station elevation = 620.600(Ft.)
 Pipe length = 119.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 0.809(CFS)
 Nearest computed pipe diameter = 9.00(In.)
 Calculated individual pipe flow = 0.809(CFS)
 Normal flow depth in pipe = 5.48(In.)
 Flow top width inside pipe = 8.78(In.)
 Critical Depth = 4.93(In.)
 Pipe flow velocity = 2.87(Ft/s)
 Travel time through pipe = 0.69 min.
 Time of concentration (TC) = 5.69 min.

++++++
 Process from Point/Station 207.000 to Point/Station 205.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 0.340(Ac.)
 Runoff from this stream = 0.809(CFS)
 Time of concentration = 5.69 min.
 Rainfall intensity = 2.597(In/Hr)
 Summary of stream data:

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

1	1.310	6.11	2.506
2	0.809	5.69	2.597

Largest stream flow has longer time of concentration

$Q_p = 1.310 + \text{sum of}$
 $Q_b \quad I_a/I_b$
 $0.809 * 0.965 = 0.781$
 $Q_p = 2.090$

Total of 2 streams to confluence:

Flow rates before confluence point:

1.310 0.809

Area of streams before confluence:

0.580 0.340

Results of confluence:

Total flow rate = 2.090(CFS)

Time of concentration = 6.113 min.

Effective stream area after confluence = 0.920(Ac.)

++++++
 Process from Point/Station 205.000 to Point/Station 208.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 620.600(Ft.)
 Downstream point/station elevation = 620.400(Ft.)
 Pipe length = 33.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 2.090(CFS)
 Nearest computed pipe diameter = 12.00(In.)
 Calculated individual pipe flow = 2.090(CFS)
 Normal flow depth in pipe = 7.78(In.)
 Flow top width inside pipe = 11.46(In.)
 Critical Depth = 7.42(In.)
 Pipe flow velocity = 3.88(Ft/s)
 Travel time through pipe = 0.14 min.
 Time of concentration (TC) = 6.25 min.

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*****
Process from Point/Station      205.000 to Point/Station      208.000
**** CONFLUENCE OF MINOR STREAMS ****

```

```

Along Main Stream number: 1 in normal stream number 1
Stream flow area =      0.920(Ac.)
Runoff from this stream =      2.090(CFS)
Time of concentration =      6.25 min.
Rainfall intensity =      2.478(In/Hr)

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*****
Process from Point/Station      209.000 to Point/Station      210.000
**** INITIAL AREA EVALUATION ****

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```

Initial area flow distance = 107.000(Ft.)
Top (of initial area) elevation = 640.500(Ft.)
Bottom (of initial area) elevation = 637.500(Ft.)
Difference in elevation = 3.000(Ft.)
Slope = 0.02804 s(percent)= 2.80
TC = k(0.323)*[(length^3)/(elevation change)]^0.2
Warning: TC computed to be less than 5 min.; program is assuming the
time of concentration is 5 minutes.
Initial area time of concentration = 5.000 min.
Rainfall intensity = 2.771(In/Hr) for a 10.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.858
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Initial subarea runoff = 0.833(CFS)
Total initial stream area = 0.350(Ac.)
Pervious area fraction = 0.200

```

```

*****
Process from Point/Station      210.000 to Point/Station      208.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

```

```

Upstream point/station elevation = 620.800(Ft.)
Downstream point/station elevation = 620.400(Ft.)
Pipe length = 66.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 0.833(CFS)
Nearest computed pipe diameter = 9.00(In.)
Calculated individual pipe flow = 0.833(CFS)
Normal flow depth in pipe = 5.27(In.)
Flow top width inside pipe = 8.87(In.)
Critical Depth = 5.00(In.)
Pipe flow velocity = 3.10(Ft/s)
Travel time through pipe = 0.35 min.
Time of concentration (TC) = 5.35 min.

```

```

*****
Process from Point/Station      210.000 to Point/Station      208.000
**** CONFLUENCE OF MINOR STREAMS ****

```

```

Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.350(Ac.)
Runoff from this stream =      0.833(CFS)
Time of concentration =      5.35 min.
Rainfall intensity =      2.678(In/Hr)
Summary of stream data:

```

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	2.090	6.25	2.478
2	0.833	5.35	2.678

Largest stream flow has longer time of concentration

$$Q_p = \frac{2.090 + \sum \frac{Q_b}{I_a/I_b}}{2.861} = \frac{0.833 * 0.925}{2.861} = 0.770$$

Total of 2 streams to confluence:

Flow rates before confluence point:

2.090 0.833

Area of streams before confluence:

0.920 0.350

Results of confluence:

Total flow rate = 2.861(CFS)

Time of concentration = 6.255 min.

Effective stream area after confluence = 1.270(Ac.)

Process from Point/Station 208.000 to Point/Station 211.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 620.400(Ft.)
Downstream point/station elevation = 620.100(Ft.)
Pipe length = 65.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 2.861(CFS)
Nearest computed pipe diameter = 15.00(In.)
Calculated individual pipe flow = 2.861(CFS)
Normal flow depth in pipe = 8.82(In.)
Flow top width inside pipe = 14.76(In.)
Critical Depth = 8.14(In.)
Pipe flow velocity = 3.81(Ft/s)
Travel time through pipe = 0.28 min.
Time of concentration (TC) = 6.54 min.

Process from Point/Station 208.000 to Point/Station 211.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 1.270(Ac.)
Runoff from this stream = 2.861(CFS)
Time of concentration = 6.54 min.
Rainfall intensity = 2.423(In/Hr)

Process from Point/Station 212.000 to Point/Station 213.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 73.000(Ft.)
Top (of initial area) elevation = 638.000(Ft.)
Bottom (of initial area) elevation = 635.600(Ft.)
Difference in elevation = 2.400(Ft.)
Slope = 0.03288 s(percent)= 3.29
TC = $k(0.323)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$
Warning: TC computed to be less than 5 min.; program is assuming the time of concentration is 5 minutes.
Initial area time of concentration = 5.000 min.
Rainfall intensity = 2.771(In/Hr) for a 10.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.858
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Initial subarea runoff = 0.357(CFS)
Total initial stream area = 0.150(Ac.)
Pervious area fraction = 0.200

Process from Point/Station 213.000 to Point/Station 214.000

**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 620.600(Ft.)
 Downstream point/station elevation = 620.300(Ft.)
 Pipe length = 65.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 0.357(CFS)
 Nearest computed pipe diameter = 6.00(In.)
 Calculated individual pipe flow = 0.357(CFS)
 Normal flow depth in pipe = 4.62(In.)
 Flow top width inside pipe = 5.05(In.)
 Critical Depth = 3.64(In.)
 Pipe flow velocity = 2.21(Ft/s)
 Travel time through pipe = 0.49 min.
 Time of concentration (TC) = 5.49 min.

 Process from Point/Station 215.000 to Point/Station 214.000
 **** SUBAREA FLOW ADDITION ****

APARTMENT subarea type
 Runoff Coefficient = 0.857
 Decimal fraction soil group A = 0.200
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.800
 Decimal fraction soil group D = 0.000
 RI index for soil(AMC 2) = 61.60
 Pervious area fraction = 0.200; Impervious fraction = 0.800
 Time of concentration = 5.49 min.
 Rainfall intensity = 2.645(In/Hr) for a 10.0 year storm
 Subarea runoff = 0.204(CFS) for 0.090(Ac.)
 Total runoff = 0.561(CFS) Total area = 0.240(Ac.)

 Process from Point/Station 214.000 to Point/Station 211.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 620.300(Ft.)
 Downstream point/station elevation = 620.100(Ft.)
 Pipe length = 46.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 0.561(CFS)
 Nearest computed pipe diameter = 9.00(In.)
 Calculated individual pipe flow = 0.561(CFS)
 Normal flow depth in pipe = 4.57(In.)
 Flow top width inside pipe = 9.00(In.)
 Critical Depth = 4.07(In.)
 Pipe flow velocity = 2.49(Ft/s)
 Travel time through pipe = 0.31 min.
 Time of concentration (TC) = 5.80 min.

 Process from Point/Station 214.000 to Point/Station 211.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 0.240(Ac.)
 Runoff from this stream = 0.561(CFS)
 Time of concentration = 5.80 min.
 Rainfall intensity = 2.573(In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	2.861	6.54	2.423
2	0.561	5.80	2.573

Largest stream flow has longer time of concentration
 $Q_p = 2.861 + \text{sum of } Q_b \frac{I_a}{I_b}$
 $Q_p = 2.861 + 0.561 * 0.942 = 3.389$
 $Q_p = 3.389$

Total of 2 streams to confluence:
Flow rates before confluence point:
2.861 0.561
Area of streams before confluence:
1.270 0.240
Results of confluence:
Total flow rate = 3.389(CFS)
Time of concentration = 6.539 min.
Effective stream area after confluence = 1.510(Ac.)

Process from Point/Station 211.000 to Point/Station 216.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 620.100(Ft.)
Downstream point/station elevation = 619.800(Ft.)
Pipe length = 56.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 3.389(CFS)
Nearest computed pipe diameter = 15.00(In.)
Calculated individual pipe flow = 3.389(CFS)
Normal flow depth in pipe = 9.40(In.)
Flow top width inside pipe = 14.51(In.)
Critical Depth = 8.91(In.)
Pipe flow velocity = 4.19(Ft/s)
Travel time through pipe = 0.22 min.
Time of concentration (TC) = 6.76 min.

Process from Point/Station 211.000 to Point/Station 216.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 1.510(Ac.)
Runoff from this stream = 3.389(CFS)
Time of concentration = 6.76 min.
Rainfall intensity = 2.383(In/Hr)

Process from Point/Station 217.000 to Point/Station 218.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 87.000(Ft.)
Top (of initial area) elevation = 638.500(Ft.)
Bottom (of initial area) elevation = 636.000(Ft.)
Difference in elevation = 2.500(Ft.)
Slope = 0.02874 s(percent)= 2.87
TC = $k(0.323)*[(length^3)/(elevation\ change)]^{0.2}$
Warning: TC computed to be less than 5 min.; program is assuming the
time of concentration is 5 minutes.
Initial area time of concentration = 5.000 min.
Rainfall intensity = 2.771(In/Hr) for a 10.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.858
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Initial subarea runoff = 0.262(CFS)
Total initial stream area = 0.110(Ac.)
Pervious area fraction = 0.200

Process from Point/Station 218.000 to Point/Station 219.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 620.300(Ft.)
Downstream point/station elevation = 620.000(Ft.)
Pipe length = 53.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 0.262(CFS)

Nearest computed pipe diameter = 6.00(In.)
 Calculated individual pipe flow = 0.262(CFS)
 Normal flow depth in pipe = 3.42(In.)
 Flow top width inside pipe = 5.94(In.)
 Critical Depth = 3.09(In.)
 Pipe flow velocity = 2.27(Ft/s)
 Travel time through pipe = 0.39 min.
 Time of concentration (TC) = 5.39 min.

++++++
 Process from Point/Station 220.000 to Point/Station 219.000
 **** SUBAREA FLOW ADDITION ****

APARTMENT subarea type
 Runoff Coefficient = 0.857
 Decimal fraction soil group A = 0.200
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.800
 Decimal fraction soil group D = 0.000
 RI index for soil(AMC 2) = 61.60
 Pervious area fraction = 0.200; Impervious fraction = 0.800
 Time of concentration = 5.39 min.
 Rainfall intensity = 2.669(In/Hr) for a 10.0 year storm
 Subarea runoff = 0.275(CFS) for 0.120(Ac.)
 Total runoff = 0.536(CFS) Total area = 0.230(Ac.)

++++++
 Process from Point/Station 219.000 to Point/Station 216.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 620.000(Ft.)
 Downstream point/station elevation = 619.800(Ft.)
 Pipe length = 43.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 0.536(CFS)
 Nearest computed pipe diameter = 9.00(In.)
 Calculated individual pipe flow = 0.536(CFS)
 Normal flow depth in pipe = 4.37(In.)
 Flow top width inside pipe = 9.00(In.)
 Critical Depth = 3.97(In.)
 Pipe flow velocity = 2.52(Ft/s)
 Travel time through pipe = 0.28 min.
 Time of concentration (TC) = 5.67 min.

++++++
 Process from Point/Station 219.000 to Point/Station 216.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 0.230(Ac.)
 Runoff from this stream = 0.536(CFS)
 Time of concentration = 5.67 min.
 Rainfall intensity = 2.601(In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	3.389	6.76	2.383
2	0.536	5.67	2.601

Largest stream flow has longer time of concentration
 $Q_p = 3.389 + \text{sum of } Q_b \text{ Ia/Ib}$
 $Q_p = 3.389 + 0.536 * 0.916 = 3.880$

Total of 2 streams to confluence:
 Flow rates before confluence point:
 3.389 0.536
 Area of streams before confluence:
 1.510 0.230
 Results of confluence:

Total flow rate = 3.880(CFS)
Time of concentration = 6.762 min.
Effective stream area after confluence = 1.740(Ac.)

Process from Point/Station 216.000 to Point/Station 221.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 619.800(Ft.)
Downstream point/station elevation = 619.700(Ft.)
Pipe length = 17.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 3.880(CFS)
Nearest computed pipe diameter = 15.00(In.)
Calculated individual pipe flow = 3.880(CFS)
Normal flow depth in pipe = 10.00(In.)
Flow top width inside pipe = 14.14(In.)
Critical Depth = 9.55(In.)
Pipe flow velocity = 4.47(Ft/s)
Travel time through pipe = 0.06 min.
Time of concentration (TC) = 6.83 min.

Process from Point/Station 216.000 to Point/Station 221.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 1.740(Ac.)
Runoff from this stream = 3.880(CFS)
Time of concentration = 6.83 min.
Rainfall intensity = 2.372(In/Hr)

Process from Point/Station 222.000 to Point/Station 223.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 353.000(Ft.)
Top (of initial area) elevation = 638.400(Ft.)
Bottom (of initial area) elevation = 635.200(Ft.)
Difference in elevation = 3.200(Ft.)
Slope = 0.00907 s(percent)= 0.91
 $TC = k(0.323)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 8.646 min.
Rainfall intensity = 2.107(In/Hr) for a 10.0 year storm
APARTMENT subarea type
Runoff coefficient = 0.849
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Initial subarea runoff = 1.539(CFS)
Total initial stream area = 0.860(Ac.)
Pervious area fraction = 0.200

Process from Point/Station 223.000 to Point/Station 224.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 620.600(Ft.)
Downstream point/station elevation = 619.800(Ft.)
Pipe length = 141.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.539(CFS)
Nearest computed pipe diameter = 12.00(In.)
Calculated individual pipe flow = 1.539(CFS)
Normal flow depth in pipe = 6.52(In.)
Flow top width inside pipe = 11.96(In.)
Critical Depth = 6.31(In.)
Pipe flow velocity = 3.53(Ft/s)
Travel time through pipe = 0.67 min.
Time of concentration (TC) = 9.31 min.

 Process from Point/Station 225.000 to Point/Station 224.000
 **** SUBAREA FLOW ADDITION ****

APARTMENT subarea type
 Runoff Coefficient = 0.848
 Decimal fraction soil group A = 0.200
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.800
 Decimal fraction soil group D = 0.000
 RI index for soil(AMC 2) = 61.60
 Pervious area fraction = 0.200; Impervious fraction = 0.800
 Time of concentration = 9.31 min.
 Rainfall intensity = 2.031(In/Hr) for a 10.0 year storm
 Subarea runoff = 0.172(CFS) for 0.100(Ac.)
 Total runoff = 1.711(CFS) Total area = 0.960(Ac.)

 Process from Point/Station 224.000 to Point/Station 221.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 619.800(Ft.)
 Downstream point/station elevation = 619.700(Ft.)
 Pipe length = 21.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 1.711(CFS)
 Nearest computed pipe diameter = 12.00(In.)
 Calculated individual pipe flow = 1.711(CFS)
 Normal flow depth in pipe = 7.37(In.)
 Flow top width inside pipe = 11.68(In.)
 Critical Depth = 6.68(In.)
 Pipe flow velocity = 3.38(Ft/s)
 Travel time through pipe = 0.10 min.
 Time of concentration (TC) = 9.41 min.

 Process from Point/Station 224.000 to Point/Station 221.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 0.960(Ac.)
 Runoff from this stream = 1.711(CFS)
 Time of concentration = 9.41 min.
 Rainfall intensity = 2.020(In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
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1	3.880	6.83	2.372
2	1.711	9.41	2.020

Largest stream flow has longer or shorter time of concentration

Qp = 3.880 + sum of

$$Qa \quad Tb/Ta$$

$$1.711 * 0.725 = 1.240$$
 Qp = 5.121

Total of 2 streams to confluence:
 Flow rates before confluence point:
 3.880 1.711

Area of streams before confluence:
 1.740 0.960

Results of confluence:
 Total flow rate = 5.121(CFS)
 Time of concentration = 6.825 min.
 Effective stream area after confluence = 2.700(Ac.)

 Process from Point/Station 221.000 to Point/Station 226.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 619.700(Ft.)
Downstream point/station elevation = 619.300(Ft.)
Pipe length = 88.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 5.121(CFS)
Nearest computed pipe diameter = 18.00(In.)
Calculated individual pipe flow = 5.121(CFS)
Normal flow depth in pipe = 11.34(In.)
Flow top width inside pipe = 17.38(In.)
Critical Depth = 10.45(In.)
Pipe flow velocity = 4.37(Ft/s)
Travel time through pipe = 0.34 min.
Time of concentration (TC) = 7.16 min.

+++++
Process from Point/Station 221.000 to Point/Station 226.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 2.700(Ac.)
Runoff from this stream = 5.121(CFS)
Time of concentration = 7.16 min.
Rainfall intensity = 2.316(In/Hr)

+++++
Process from Point/Station 227.000 to Point/Station 228.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 59.000(Ft.)
Top (of initial area) elevation = 636.000(Ft.)
Bottom (of initial area) elevation = 633.800(Ft.)
Difference in elevation = 2.200(Ft.)
Slope = 0.03729 s(percent)= 3.73
 $TC = k(0.323)*[(length^3)/(elevation\ change)]^{0.2}$
Warning: TC computed to be less than 5 min.; program is assuming the
time of concentration is 5 minutes.
Initial area time of concentration = 5.000 min.
Rainfall intensity = 2.771(In/Hr) for a 10.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.858
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Initial subarea runoff = 0.761(CFS)
Total initial stream area = 0.320(Ac.)
Pervious area fraction = 0.200

+++++
Process from Point/Station 228.000 to Point/Station 226.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 620.000(Ft.)
Downstream point/station elevation = 619.300(Ft.)
Pipe length = 129.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 0.761(CFS)
Nearest computed pipe diameter = 9.00(In.)
Calculated individual pipe flow = 0.761(CFS)
Normal flow depth in pipe = 5.16(In.)
Flow top width inside pipe = 8.90(In.)
Critical Depth = 4.77(In.)
Pipe flow velocity = 2.91(Ft/s)
Travel time through pipe = 0.74 min.
Time of concentration (TC) = 5.74 min.

+++++
Process from Point/Station 228.000 to Point/Station 226.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 0.320(Ac.)
 Runoff from this stream = 0.761(CFS)
 Time of concentration = 5.74 min.
 Rainfall intensity = 2.587(In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	5.121	7.16	2.316
2	0.761	5.74	2.587

Largest stream flow has longer time of concentration

Qp = 5.121 + sum of

$$Q_b \frac{I_a}{I_b}$$
 0.761 * 0.895 = 0.682
 Qp = 5.802

Total of 2 streams to confluence:

Flow rates before confluence point:

5.121 0.761

Area of streams before confluence:

2.700 0.320

Results of confluence:

Total flow rate = 5.802(CFS)

Time of concentration = 7.161 min.

Effective stream area after confluence = 3.020(Ac.)

 Process from Point/Station 226.000 to Point/Station 229.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 619.300(Ft.)
 Downstream point/station elevation = 619.100(Ft.)
 Pipe length = 41.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 5.802(CFS)
 Nearest computed pipe diameter = 18.00(In.)
 Calculated individual pipe flow = 5.802(CFS)
 Normal flow depth in pipe = 12.07(In.)
 Flow top width inside pipe = 16.92(In.)
 Critical Depth = 11.15(In.)
 Pipe flow velocity = 4.60(Ft/s)
 Travel time through pipe = 0.15 min.
 Time of concentration (TC) = 7.31 min.

 Process from Point/Station 226.000 to Point/Station 229.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1

Stream flow area = 3.020(Ac.)

Runoff from this stream = 5.802(CFS)

Time of concentration = 7.31 min.

Rainfall intensity = 2.292(In/Hr)

 Process from Point/Station 230.000 to Point/Station 231.000
 **** INITIAL AREA EVALUATION ****

Initial area flow distance = 136.000(Ft.)
 Top (of initial area) elevation = 636.400(Ft.)
 Bottom (of initial area) elevation = 633.300(Ft.)
 Difference in elevation = 3.100(Ft.)
 Slope = 0.02279 s(percent)= 2.28

$$TC = k(0.323) * [(length^3) / (elevation\ change)]^{0.2}$$
 Warning: TC computed to be less than 5 min.; program is assuming the time of concentration is 5 minutes.
 Initial area time of concentration = 5.000 min.
 Rainfall intensity = 2.771(In/Hr) for a 10.0 year storm
 APARTMENT subarea type
 Runoff Coefficient = 0.858

Decimal fraction soil group A = 0.200
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.800
 Decimal fraction soil group D = 0.000
 RI index for soil(AMC 2) = 61.60
 Pervious area fraction = 0.200; Impervious fraction = 0.800
 Initial subarea runoff = 1.023(CFS)
 Total initial stream area = 0.430(Ac.)
 Pervious area fraction = 0.200

+-----+
 Process from Point/Station 231.000 to Point/Station 229.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 619.400(Ft.)
 Downstream point/station elevation = 619.100(Ft.)
 Pipe length = 67.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 1.023(CFS)
 Nearest computed pipe diameter = 9.00(In.)
 Calculated individual pipe flow = 1.023(CFS)
 Normal flow depth in pipe = 6.83(In.)
 Flow top width inside pipe = 7.70(In.)
 Critical Depth = 5.58(In.)
 Pipe flow velocity = 2.84(Ft/s)
 Travel time through pipe = 0.39 min.
 Time of concentration (TC) = 5.39 min.

+-----+
 Process from Point/Station 231.000 to Point/Station 229.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 0.430(Ac.)
 Runoff from this stream = 1.023(CFS)
 Time of concentration = 5.39 min.
 Rainfall intensity = 2.669(In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
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1	5.802	7.31	2.292
2	1.023	5.39	2.669

Largest stream flow has longer time of concentration
 $Q_p = 5.802 + \text{sum of}$
 $Q_b \quad I_a/I_b$
 $1.023 * 0.859 = 0.879$
 $Q_p = 6.681$

Total of 2 streams to confluence:
 Flow rates before confluence point:
 5.802 1.023
 Area of streams before confluence:
 3.020 0.430
 Results of confluence:
 Total flow rate = 6.681(CFS)
 Time of concentration = 7.310 min.
 Effective stream area after confluence = 3.450(Ac.)

+-----+
 Process from Point/Station 229.000 to Point/Station 232.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 619.100(Ft.)
 Downstream point/station elevation = 618.300(Ft.)
 Pipe length = 160.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 6.681(CFS)
 Nearest computed pipe diameter = 18.00(In.)
 Calculated individual pipe flow = 6.681(CFS)
 Normal flow depth in pipe = 13.34(In.)
 Flow top width inside pipe = 15.77(In.)

Critical Depth = 12.00(In.)
Pipe flow velocity = 4.76(Ft/s)
Travel time through pipe = 0.56 min.
Time of concentration (TC) = 7.87 min.

++++
Process from Point/Station 229.000 to Point/Station 232.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 3.450(Ac.)
Runoff from this stream = 6.681(CFS)
Time of concentration = 7.87 min.
Rainfall intensity = 2.209(In/Hr)

++++
Process from Point/Station 233.000 to Point/Station 234.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 79.000(Ft.)
Top (of initial area) elevation = 629.900(Ft.)
Bottom (of initial area) elevation = 627.700(Ft.)
Difference in elevation = 2.200(Ft.)
Slope = 0.02785 s(percent)= 2.78
 $TC = k(0.323)*[(length^3)/(elevation\ change)]^{0.2}$
Warning: TC computed to be less than 5 min.; program is assuming the
time of concentration is 5 minutes.
Initial area time of concentration = 5.000 min.
Rainfall intensity = 2.771(In/Hr) for a 10.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.858
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Initial subarea runoff = 0.214(CFS)
Total initial stream area = 0.090(Ac.)
Pervious area fraction = 0.200

++++
Process from Point/Station 234.000 to Point/Station 235.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 619.100(Ft.)
Downstream point/station elevation = 618.800(Ft.)
Pipe length = 48.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 0.214(CFS)
Nearest computed pipe diameter = 6.00(In.)
Calculated individual pipe flow = 0.214(CFS)
Normal flow depth in pipe = 2.93(In.)
Flow top width inside pipe = 6.00(In.)
Critical Depth = 2.78(In.)
Pipe flow velocity = 2.24(Ft/s)
Travel time through pipe = 0.36 min.
Time of concentration (TC) = 5.36 min.

++++
Process from Point/Station 236.000 to Point/Station 235.000
**** SUBAREA FLOW ADDITION ****

APARTMENT subarea type
Runoff Coefficient = 0.857
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Time of concentration = 5.36 min.

Rainfall intensity = 2.677(In/Hr) for a 10.0 year storm
 Subarea runoff = 0.390(CFS) for 0.170(Ac.)
 Total runoff = 0.604(CFS) Total area = 0.260(Ac.)

 Process from Point/Station 235.000 to Point/Station 232.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 618.800(Ft.)
 Downstream point/station elevation = 618.300(Ft.)
 Pipe length = 102.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 0.604(CFS)
 Nearest computed pipe diameter = 9.00(In.)
 Calculated individual pipe flow = 0.604(CFS)
 Normal flow depth in pipe = 4.62(In.)
 Flow top width inside pipe = 9.00(In.)
 Critical Depth = 4.23(In.)
 Pipe flow velocity = 2.65(Ft/s)
 Travel time through pipe = 0.64 min.
 Time of concentration (TC) = 6.00 min.

 Process from Point/Station 235.000 to Point/Station 232.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 0.260(Ac.)
 Runoff from this stream = 0.604(CFS)
 Time of concentration = 6.00 min.
 Rainfall intensity = 2.530(In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	6.681	7.87	2.209
2	0.604	6.00	2.530

Largest stream flow has longer time of concentration
 $Q_p = 6.681 + \text{sum of}$
 $Q_b \quad I_a/I_b$
 $0.604 * 0.873 = 0.528$
 $Q_p = 7.208$

Total of 2 streams to confluence:
 Flow rates before confluence point:
 6.681 0.604
 Area of streams before confluence:
 3.450 0.260
 Results of confluence:
 Total flow rate = 7.208(CFS)
 Time of concentration = 7.870 min.
 Effective stream area after confluence = 3.710(Ac.)

 Process from Point/Station 232.000 to Point/Station 237.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 618.300(Ft.)
 Downstream point/station elevation = 618.200(Ft.)
 Pipe length = 12.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 7.208(CFS)
 Nearest computed pipe diameter = 18.00(In.)
 Calculated individual pipe flow = 7.208(CFS)
 Normal flow depth in pipe = 11.65(In.)
 Flow top width inside pipe = 17.20(In.)
 Critical Depth = 12.47(In.)
 Pipe flow velocity = 5.96(Ft/s)
 Travel time through pipe = 0.03 min.
 Time of concentration (TC) = 7.90 min.

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Process from Point/Station      232.000 to Point/Station      237.000
**** CONFLUENCE OF MINOR STREAMS ****

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Along Main Stream number: 1 in normal stream number 1
Stream flow area = 3.710(Ac.)
Runoff from this stream = 7.208(CFS)
Time of concentration = 7.90 min.
Rainfall intensity = 2.204(In/Hr)

```

*****
Process from Point/Station      238.000 to Point/Station      237.000
**** INITIAL AREA EVALUATION ****

```

Initial area flow distance = 57.000(Ft.)
Top (of initial area) elevation = 630.000(Ft.)
Bottom (of initial area) elevation = 627.700(Ft.)
Difference in elevation = 2.300(Ft.)
Slope = 0.04035 s(percent)= 4.04
 $TC = k(0.323)*[(length^3)/(elevation\ change)]^{0.2}$
Warning: TC computed to be less than 5 min.; program is assuming the time of concentration is 5 minutes.
Initial area time of concentration = 5.000 min.
Rainfall intensity = 2.771(In/Hr) for a 10.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.858
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Initial subarea runoff = 0.238(CFS)
Total initial stream area = 0.100(Ac.)
Pervious area fraction = 0.200

```

*****
Process from Point/Station      238.000 to Point/Station      237.000
**** CONFLUENCE OF MINOR STREAMS ****

```

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 0.100(Ac.)
Runoff from this stream = 0.238(CFS)
Time of concentration = 5.00 min.
Rainfall intensity = 2.771(In/Hr)
Summary of stream data:

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

1	7.208	7.90	2.204
2	0.238	5.00	2.771

Largest stream flow has longer time of concentration
 $Q_p = 7.208 + \text{sum of } Q_b \quad I_a/I_b$
 $0.238 * 0.795 = 0.189$
 $Q_p = 7.398$

Total of 2 streams to confluence:
Flow rates before confluence point:
7.208 0.238
Area of streams before confluence:
3.710 0.100
Results of confluence:
Total flow rate = 7.398(CFS)
Time of concentration = 7.904 min.
Effective stream area after confluence = 3.810(Ac.)

```

*****
Process from Point/Station      237.000 to Point/Station      239.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

```

Upstream point/station elevation = 618.300(Ft.)
Downstream point/station elevation = 618.100(Ft.)
Pipe length = 43.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 7.398(CFS)
Nearest computed pipe diameter = 21.00(In.)
Calculated individual pipe flow = 7.398(CFS)
Normal flow depth in pipe = 12.75(In.)
Flow top width inside pipe = 20.51(In.)
Critical Depth = 12.09(In.)
Pipe flow velocity = 4.84(Ft/s)
Travel time through pipe = 0.15 min.
Time of concentration (TC) = 8.05 min.

+++++
Process from Point/Station 240.000 to Point/Station 239.000
**** SUBAREA FLOW ADDITION ****

APARTMENT subarea type
Runoff Coefficient = 0.850
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Time of concentration = 8.05 min.
Rainfall intensity = 2.184(In/Hr) for a 10.0 year storm
Subarea runoff = 0.223(CFS) for 0.120(Ac.)
Total runoff = 7.620(CFS) Total area = 3.930(Ac.)

+++++
Process from Point/Station 239.000 to Point/Station 241.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 618.100(Ft.)
Downstream point/station elevation = 617.800(Ft.)
Pipe length = 67.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 7.620(CFS)
Nearest computed pipe diameter = 21.00(In.)
Calculated individual pipe flow = 7.620(CFS)
Normal flow depth in pipe = 13.17(In.)
Flow top width inside pipe = 20.31(In.)
Critical Depth = 12.27(In.)
Pipe flow velocity = 4.80(Ft/s)
Travel time through pipe = 0.23 min.
Time of concentration (TC) = 8.28 min.

+++++
Process from Point/Station 242.000 to Point/Station 241.000
**** SUBAREA FLOW ADDITION ****

APARTMENT subarea type
Runoff Coefficient = 0.850
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Time of concentration = 8.28 min.
Rainfall intensity = 2.153(In/Hr) for a 10.0 year storm
Subarea runoff = 0.220(CFS) for 0.120(Ac.)
Total runoff = 7.840(CFS) Total area = 4.050(Ac.)

+++++
Process from Point/Station 241.000 to Point/Station 243.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 617.800(Ft.)
Downstream point/station elevation = 617.600(Ft.)

Pipe length = 67.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 7.840(CFS)
Nearest computed pipe diameter = 21.00(In.)
Calculated individual pipe flow = 7.840(CFS)
Normal flow depth in pipe = 15.66(In.)
Flow top width inside pipe = 18.29(In.)
Critical Depth = 12.45(In.)
Pipe flow velocity = 4.08(Ft/s)
Travel time through pipe = 0.27 min.
Time of concentration (TC) = 8.56 min.

Process from Point/Station 241.000 to Point/Station 243.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 4.050(Ac.)
Runoff from this stream = 7.840(CFS)
Time of concentration = 8.56 min.
Rainfall intensity = 2.118(In/Hr)

Process from Point/Station 244.000 to Point/Station 245.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 159.000(Ft.)
Top (of initial area) elevation = 651.400(Ft.)
Bottom (of initial area) elevation = 630.000(Ft.)
Difference in elevation = 21.400(Ft.)
Slope = 0.13459 s(percent)= 13.46
TC = $k(0.323)*[(length^3)/(elevation\ change)]^{0.2}$
Warning: TC computed to be less than 5 min.; program is assuming the
time of concentration is 5 minutes.
Initial area time of concentration = 5.000 min.
Rainfall intensity = 2.771(In/Hr) for a 10.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.858
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Initial subarea runoff = 1.023(CFS)
Total initial stream area = 0.430(Ac.)
Pervious area fraction = 0.200

Process from Point/Station 245.000 to Point/Station 243.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 618.300(Ft.)
Downstream point/station elevation = 617.600(Ft.)
Pipe length = 141.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.023(CFS)
Nearest computed pipe diameter = 9.00(In.)
Calculated individual pipe flow = 1.023(CFS)
Normal flow depth in pipe = 6.54(In.)
Flow top width inside pipe = 8.02(In.)
Critical Depth = 5.58(In.)
Pipe flow velocity = 2.98(Ft/s)
Travel time through pipe = 0.79 min.
Time of concentration (TC) = 5.79 min.

Process from Point/Station 245.000 to Point/Station 243.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 0.430(Ac.)
Runoff from this stream = 1.023(CFS)

Time of concentration = 5.79 min.
 Rainfall intensity = 2.575(In/Hr)
 Summary of stream data:

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

1	7.840	8.56	2.118
2	1.023	5.79	2.575

Largest stream flow has longer time of concentration
 $Q_p = 7.840 + \text{sum of}$
 $Q_b \quad I_a/I_b$
 $1.023 * 0.822 = 0.841$
 $Q_p = 8.681$

Total of 2 streams to confluence:
 Flow rates before confluence point:
 7.840 1.023
 Area of streams before confluence:
 4.050 0.430
 Results of confluence:
 Total flow rate = 8.681(CFS)
 Time of concentration = 8.559 min.
 Effective stream area after confluence = 4.480(Ac.)

 Process from Point/Station 243.000 to Point/Station 246.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 617.600(Ft.)
 Downstream point/station elevation = 617.200(Ft.)
 Pipe length = 81.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 8.681(CFS)
 Nearest computed pipe diameter = 21.00(In.)
 Calculated individual pipe flow = 8.681(CFS)
 Normal flow depth in pipe = 13.95(In.)
 Flow top width inside pipe = 19.84(In.)
 Critical Depth = 13.14(In.)
 Pipe flow velocity = 5.12(Ft/s)
 Travel time through pipe = 0.26 min.
 Time of concentration (TC) = 8.82 min.

 Process from Point/Station 243.000 to Point/Station 246.000
 **** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 1
 Stream flow area = 4.480(Ac.)
 Runoff from this stream = 8.681(CFS)
 Time of concentration = 8.82 min.
 Rainfall intensity = 2.086(In/Hr)
 Program is now starting with Main Stream No. 2

 Process from Point/Station 247.000 to Point/Station 248.000
 **** INITIAL AREA EVALUATION ****

Initial area flow distance = 500.000(Ft.)
 Top (of initial area) elevation = 638.900(Ft.)
 Bottom (of initial area) elevation = 627.100(Ft.)
 Difference in elevation = 11.800(Ft.)
 Slope = 0.02360 s(percent)= 2.36
 $TC = k(0.323)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$
 Initial area time of concentration = 8.207 min.
 Rainfall intensity = 2.163(In/Hr) for a 10.0 year storm
 APARTMENT subarea type
 Runoff Coefficient = 0.850
 Decimal fraction soil group A = 0.200
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.800

Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Initial subarea runoff = 0.809(CFS)
Total initial stream area = 0.440(Ac.)
Pervious area fraction = 0.200

Process from Point/Station 248.000 to Point/Station 249.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 618.300(Ft.)
Downstream point/station elevation = 618.100(Ft.)
Pipe length = 40.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 0.809(CFS)
Nearest computed pipe diameter = 9.00(In.)
Calculated individual pipe flow = 0.809(CFS)
Normal flow depth in pipe = 5.51(In.)
Flow top width inside pipe = 8.77(In.)
Critical Depth = 4.93(In.)
Pipe flow velocity = 2.86(Ft/s)
Travel time through pipe = 0.23 min.
Time of concentration (TC) = 8.44 min.

Process from Point/Station 248.000 to Point/Station 249.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 2 in normal stream number 1
Stream flow area = 0.440(Ac.)
Runoff from this stream = 0.809(CFS)
Time of concentration = 8.44 min.
Rainfall intensity = 2.133(In/Hr)

Process from Point/Station 250.000 to Point/Station 251.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 93.000(Ft.)
Top (of initial area) elevation = 628.200(Ft.)
Bottom (of initial area) elevation = 626.800(Ft.)
Difference in elevation = 1.400(Ft.)
Slope = 0.01505 s(percent)= 1.51
TC = $k(0.323)*[(length^3)/(elevation\ change)]^{0.2}$
Warning: TC computed to be less than 5 min.; program is assuming the
time of concentration is 5 minutes.
Initial area time of concentration = 5.000 min.
Rainfall intensity = 2.771(In/Hr) for a 10.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.858
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Initial subarea runoff = 0.262(CFS)
Total initial stream area = 0.110(Ac.)
Pervious area fraction = 0.200

Process from Point/Station 251.000 to Point/Station 252.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 618.800(Ft.)
Downstream point/station elevation = 618.300(Ft.)
Pipe length = 91.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 0.262(CFS)
Nearest computed pipe diameter = 6.00(In.)
Calculated individual pipe flow = 0.262(CFS)
Normal flow depth in pipe = 3.45(In.)

Flow top width inside pipe = 5.93(In.)
Critical Depth = 3.09(In.)
Pipe flow velocity = 2.24(Ft/s)
Travel time through pipe = 0.68 min.
Time of concentration (TC) = 5.68 min.

Process from Point/Station 253.000 to Point/Station 252.000
**** SUBAREA FLOW ADDITION ****

APARTMENT subarea type
Runoff Coefficient = 0.856
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Time of concentration = 5.68 min.
Rainfall intensity = 2.601(In/Hr) for a 10.0 year storm
Subarea runoff = 0.178(CFS) for 0.080(Ac.)
Total runoff = 0.440(CFS) Total area = 0.190(Ac.)

Process from Point/Station 252.000 to Point/Station 249.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 618.300(Ft.)
Downstream point/station elevation = 618.100(Ft.)
Pipe length = 41.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 0.440(CFS)
Nearest computed pipe diameter = 9.00(In.)
Calculated individual pipe flow = 0.440(CFS)
Normal flow depth in pipe = 3.85(In.)
Flow top width inside pipe = 8.91(In.)
Critical Depth = 3.58(In.)
Pipe flow velocity = 2.44(Ft/s)
Travel time through pipe = 0.28 min.
Time of concentration (TC) = 5.96 min.

Process from Point/Station 252.000 to Point/Station 249.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 2 in normal stream number 2
Stream flow area = 0.190(Ac.)
Runoff from this stream = 0.440(CFS)
Time of concentration = 5.96 min.
Rainfall intensity = 2.539(In/Hr)

Process from Point/Station 254.000 to Point/Station 249.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 78.000(Ft.)
Top (of initial area) elevation = 627.900(Ft.)
Bottom (of initial area) elevation = 627.200(Ft.)
Difference in elevation = 0.700(Ft.)
Slope = 0.00897 s(percent)= 0.90
 $TC = k(0.323)*[(length^3)/(elevation\ change)]^{0.2}$
Warning: TC computed to be less than 5 min.; program is assuming the
time of concentration is 5 minutes.
Initial area time of concentration = 5.000 min.
Rainfall intensity = 2.771(In/Hr) for a 10.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.858
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60

Pervious area fraction = 0.200; Impervious fraction = 0.800
 Initial subarea runoff = 0.238(CFS)
 Total initial stream area = 0.100(Ac.)
 Pervious area fraction = 0.200

 Process from Point/Station 254.000 to Point/Station 249.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 2 in normal stream number 3
 Stream flow area = 0.100(Ac.)
 Runoff from this stream = 0.238(CFS)
 Time of concentration = 5.00 min.
 Rainfall intensity = 2.771(In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	0.809	8.44	2.133
2	0.440	5.96	2.539
3	0.238	5.00	2.771

Largest stream flow has longer time of concentration

Qp = 0.809 + sum of
 $Q_b \frac{I_a}{I_b}$
 $0.440 * \frac{0.840}{0.840} = 0.370$
 $Q_b \frac{I_a}{I_b}$
 $0.238 * \frac{0.770}{0.770} = 0.183$
 Qp = 1.362

Total of 3 streams to confluence:
 Flow rates before confluence point:
 0.809 0.440 0.238
 Area of streams before confluence:
 0.440 0.190 0.100
 Results of confluence:
 Total flow rate = 1.362(CFS)
 Time of concentration = 8.441 min.
 Effective stream area after confluence = 0.730(Ac.)

 Process from Point/Station 249.000 to Point/Station 255.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 618.100(Ft.)
 Downstream point/station elevation = 617.700(Ft.)
 Pipe length = 72.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 1.362(CFS)
 Nearest computed pipe diameter = 12.00(In.)
 Calculated individual pipe flow = 1.362(CFS)
 Normal flow depth in pipe = 6.09(In.)
 Flow top width inside pipe = 12.00(In.)
 Critical Depth = 5.92(In.)
 Pipe flow velocity = 3.40(Ft/s)
 Travel time through pipe = 0.35 min.
 Time of concentration (TC) = 8.79 min.

 Process from Point/Station 256.000 to Point/Station 255.000
 **** SUBAREA FLOW ADDITION ****

APARTMENT subarea type
 Runoff Coefficient = 0.849
 Decimal fraction soil group A = 0.200
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.800
 Decimal fraction soil group D = 0.000
 RI index for soil(AMC 2) = 61.60
 Pervious area fraction = 0.200; Impervious fraction = 0.800
 Time of concentration = 8.79 min.
 Rainfall intensity = 2.090(In/Hr) for a 10.0 year storm

Subarea runoff = 0.213(CFS) for 0.120(Ac.)
Total runoff = 1.575(CFS) Total area = 0.850(Ac.)

Process from Point/Station 255.000 to Point/Station 257.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 617.700(Ft.)
Downstream point/station elevation = 617.300(Ft.)
Pipe length = 72.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.575(CFS)
Nearest computed pipe diameter = 12.00(In.)
Calculated individual pipe flow = 1.575(CFS)
Normal flow depth in pipe = 6.65(In.)
Flow top width inside pipe = 11.93(In.)
Critical Depth = 6.38(In.)
Pipe flow velocity = 3.52(Ft/s)
Travel time through pipe = 0.34 min.
Time of concentration (TC) = 9.13 min.

Process from Point/Station 258.000 to Point/Station 257.000
**** SUBAREA FLOW ADDITION ****

APARTMENT subarea type
Runoff Coefficient = 0.848
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Time of concentration = 9.13 min.
Rainfall intensity = 2.050(In/Hr) for a 10.0 year storm
Subarea runoff = 0.261(CFS) for 0.150(Ac.)
Total runoff = 1.835(CFS) Total area = 1.000(Ac.)

Process from Point/Station 257.000 to Point/Station 246.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 617.300(Ft.)
Downstream point/station elevation = 617.200(Ft.)
Pipe length = 43.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.835(CFS)
Nearest computed pipe diameter = 15.00(In.)
Calculated individual pipe flow = 1.835(CFS)
Normal flow depth in pipe = 8.28(In.)
Flow top width inside pipe = 14.92(In.)
Critical Depth = 6.46(In.)
Pipe flow velocity = 2.64(Ft/s)
Travel time through pipe = 0.27 min.
Time of concentration (TC) = 9.41 min.

Process from Point/Station 257.000 to Point/Station 246.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area = 1.000(Ac.)
Runoff from this stream = 1.835(CFS)
Time of concentration = 9.41 min.
Rainfall intensity = 2.021(In/Hr)
Program is now starting with Main Stream No. 3

Process from Point/Station 259.000 to Point/Station 246.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 127.000(Ft.)
 Top (of initial area) elevation = 635.700(Ft.)
 Bottom (of initial area) elevation = 627.300(Ft.)
 Difference in elevation = 8.400(Ft.)
 Slope = 0.06614 s(percent)= 6.61
 $TC = k(0.323)*[(length^3)/(elevation\ change)]^{0.2}$
 Warning: TC computed to be less than 5 min.; program is assuming the
 time of concentration is 5 minutes.
 Initial area time of concentration = 5.000 min.
 Rainfall intensity = 2.771(In/Hr) for a 10.0 year storm
 APARTMENT subarea type
 Runoff Coefficient = 0.858
 Decimal fraction soil group A = 0.200
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.800
 Decimal fraction soil group D = 0.000
 RI index for soil(AMC 2) = 61.60
 Pervious area fraction = 0.200; Impervious fraction = 0.800
 Initial subarea runoff = 0.309(CFS)
 Total initial stream area = 0.130(Ac.)
 Pervious area fraction = 0.200

++++++
 Process from Point/Station 259.000 to Point/Station 246.000
 **** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 3
 Stream flow area = 0.130(Ac.)
 Runoff from this stream = 0.309(CFS)
 Time of concentration = 5.00 min.
 Rainfall intensity = 2.771(In/Hr)
 Summary of stream data:

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

1	8.681	8.82	2.086
2	1.835	9.41	2.021
3	0.309	5.00	2.771

Largest stream flow has longer or shorter time of concentration

Qp = 8.681 + sum of

$$\frac{Qa}{1.835} * \frac{Tb}{Ta} = 1.722$$

$$\frac{Qb}{0.309} * \frac{Ta}{Tb} = 0.233$$
 Qp = 10.636

Total of 3 main streams to confluence:

Flow rates before confluence point:
 8.681 1.835 0.309
 Area of streams before confluence:
 4.480 1.000 0.130

Results of confluence:

Total flow rate = 10.636(CFS)
 Time of concentration = 8.823 min.
 Effective stream area after confluence = 5.610(Ac.)

++++++
 Process from Point/Station 246.000 to Point/Station 260.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 617.200(Ft.)
 Downstream point/station elevation = 616.800(Ft.)
 Pipe length = 73.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 10.636(CFS)
 Nearest computed pipe diameter = 21.00(In.)
 Calculated individual pipe flow = 10.636(CFS)
 Normal flow depth in pipe = 15.68(In.)
 Flow top width inside pipe = 18.27(In.)

Critical Depth = 14.59(In.)
Pipe flow velocity = 5.52(Ft/s)
Travel time through pipe = 0.22 min.
Time of concentration (TC) = 9.04 min.

+++++
Process from Point/Station 246.000 to Point/Station 260.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 5.610(Ac.)
Runoff from this stream = 10.636(CFS)
Time of concentration = 9.04 min.
Rainfall intensity = 2.061(In/Hr)

+++++
Process from Point/Station 261.000 to Point/Station 262.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 64.000(Ft.)
Top (of initial area) elevation = 628.000(Ft.)
Bottom (of initial area) elevation = 627.300(Ft.)
Difference in elevation = 0.700(Ft.)
Slope = 0.01094 s(percent)= 1.09
 $TC = k(0.323)*[(length^3)/(elevation\ change)]^{0.2}$
Warning: TC computed to be less than 5 min.; program is assuming the
time of concentration is 5 minutes.
Initial area time of concentration = 5.000 min.
Rainfall intensity = 2.771(In/Hr) for a 10.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.858
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Initial subarea runoff = 0.381(CFS)
Total initial stream area = 0.160(Ac.)
Pervious area fraction = 0.200

+++++
Process from Point/Station 262.000 to Point/Station 263.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 618.200(Ft.)
Downstream point/station elevation = 617.900(Ft.)
Pipe length = 57.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 0.381(CFS)
Nearest computed pipe diameter = 6.00(In.)
Calculated individual pipe flow = 0.381(CFS)
Normal flow depth in pipe = 4.59(In.)
Flow top width inside pipe = 5.08(In.)
Critical Depth = 3.76(In.)
Pipe flow velocity = 2.36(Ft/s)
Travel time through pipe = 0.40 min.
Time of concentration (TC) = 5.40 min.

+++++
Process from Point/Station 264.000 to Point/Station 263.000
**** SUBAREA FLOW ADDITION ****

APARTMENT subarea type
Runoff Coefficient = 0.857
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Time of concentration = 5.40 min.

Rainfall intensity = 2.666(In/Hr) for a 10.0 year storm
Subarea runoff = 0.800(CFS) for 0.350(Ac.)
Total runoff = 1.180(CFS) Total area = 0.510(Ac.)

Process from Point/Station 263.000 to Point/Station 265.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 617.900(Ft.)
Downstream point/station elevation = 617.400(Ft.)
Pipe length = 104.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.180(CFS)
Nearest computed pipe diameter = 12.00(In.)
Calculated individual pipe flow = 1.180(CFS)
Normal flow depth in pipe = 5.84(In.)
Flow top width inside pipe = 12.00(In.)
Critical Depth = 5.49(In.)
Pipe flow velocity = 3.11(Ft/s)
Travel time through pipe = 0.56 min.
Time of concentration (TC) = 5.96 min.

Process from Point/Station 266.000 to Point/Station 265.000
**** SUBAREA FLOW ADDITION ****

APARTMENT subarea type
Runoff Coefficient = 0.856
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Time of concentration = 5.96 min.
Rainfall intensity = 2.538(In/Hr) for a 10.0 year storm
Subarea runoff = 0.565(CFS) for 0.260(Ac.)
Total runoff = 1.745(CFS) Total area = 0.770(Ac.)

Process from Point/Station 265.000 to Point/Station 260.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 617.400(Ft.)
Downstream point/station elevation = 616.800(Ft.)
Pipe length = 112.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.745(CFS)
Nearest computed pipe diameter = 12.00(In.)
Calculated individual pipe flow = 1.745(CFS)
Normal flow depth in pipe = 7.18(In.)
Flow top width inside pipe = 11.76(In.)
Critical Depth = 6.74(In.)
Pipe flow velocity = 3.56(Ft/s)
Travel time through pipe = 0.52 min.
Time of concentration (TC) = 6.49 min.

Process from Point/Station 265.000 to Point/Station 260.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 0.770(Ac.)
Runoff from this stream = 1.745(CFS)
Time of concentration = 6.49 min.
Rainfall intensity = 2.433(In/Hr)

Process from Point/Station 267.000 to Point/Station 260.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 115.000(Ft.)

Top (of initial area) elevation = 628.000(Ft.)
 Bottom (of initial area) elevation = 626.700(Ft.)
 Difference in elevation = 1.300(Ft.)
 Slope = 0.01130 s(percent)= 1.13
 $TC = k(0.323)*[(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 5.282 min.
 Rainfall intensity = 2.696(In/Hr) for a 10.0 year storm
 APARTMENT subarea type
 Runoff Coefficient = 0.858
 Decimal fraction soil group A = 0.200
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.800
 Decimal fraction soil group D = 0.000
 RI index for soil(AMC 2) = 61.60
 Pervious area fraction = 0.200; Impervious fraction = 0.800
 Initial subarea runoff = 0.786(CFS)
 Total initial stream area = 0.340(Ac.)
 Pervious area fraction = 0.200

++++++
 Process from Point/Station 267.000 to Point/Station 260.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 3
 Stream flow area = 0.340(Ac.)
 Runoff from this stream = 0.786(CFS)
 Time of concentration = 5.28 min.
 Rainfall intensity = 2.696(In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	10.636	9.04	2.061
2	1.745	6.49	2.433
3	0.786	5.28	2.696

Largest stream flow has longer time of concentration

Qp = 10.636 + sum of
 $Q_b \quad I_a/I_b$
 $1.745 * 0.847 = 1.478$
 $Q_b \quad I_a/I_b$
 $0.786 * 0.764 = 0.601$
 Qp = 12.715

Total of 3 streams to confluence:
 Flow rates before confluence point:
 10.636 1.745 0.786
 Area of streams before confluence:
 5.610 0.770 0.340
 Results of confluence:
 Total flow rate = 12.715(CFS)
 Time of concentration = 9.043 min.
 Effective stream area after confluence = 6.720(Ac.)

++++++
 Process from Point/Station 260.000 to Point/Station 268.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 616.800(Ft.)
 Downstream point/station elevation = 616.100(Ft.)
 Pipe length = 150.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 12.715(CFS)
 Nearest computed pipe diameter = 24.00(In.)
 Calculated individual pipe flow = 12.715(CFS)
 Normal flow depth in pipe = 16.57(In.)
 Flow top width inside pipe = 22.19(In.)
 Critical Depth = 15.39(In.)
 Pipe flow velocity = 5.49(Ft/s)
 Travel time through pipe = 0.46 min.
 Time of concentration (TC) = 9.50 min.
 End of computations, total study area = 6.72 (Ac.)
 The following figures may

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

Area averaged pervious area fraction(A_p) = 0.200

Area averaged RI index number = 61.6

100-YEAR ONSITE HYDROLOGY (RATIONAL METHOD)

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
Rational Hydrology Study Date: 12/08/21 File:PROP100A.out

20-0251 - VMAC-B
ONSITE RATIONAL METHOD HYDROLOGY
100 YEAR STORM EVENT
FN: PROP100A.OUT RSB

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

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

Program License Serial Number 4010

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

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

Standard intensity-duration curves data (Plate D-4.1)

For the [Norco] area used.

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

10 year storm 60 minute intensity = 0.800(In/Hr)

100 year storm 10 minute intensity = 2.940(In/Hr)

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

Storm event year = 100.0

Calculated rainfall intensity data:

1 hour intensity = 1.200(In/Hr)

Slope of intensity duration curve = 0.5000

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

Initial area flow distance = 112.000(Ft.)
Top (of initial area) elevation = 626.200(Ft.)
Bottom (of initial area) elevation = 624.800(Ft.)
Difference in elevation = 1.400(Ft.)
Slope = 0.01250 s(percent)= 1.25
TC = $k(0.323)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 5.123 min.
Rainfall intensity = 4.107(In/Hr) for a 100.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.870
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Initial subarea runoff = 0.750(CFS)
Total initial stream area = 0.210(Ac.)
Pervious area fraction = 0.200

+++++
Process from Point/Station 101.000 to Point/Station 102.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 618.100(Ft.)
Downstream point/station elevation = 617.600(Ft.)
Pipe length = 95.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 0.750(CFS)

Nearest computed pipe diameter = 9.00(In.)
Calculated individual pipe flow = 0.750(CFS)
Normal flow depth in pipe = 5.16(In.)
Flow top width inside pipe = 8.90(In.)
Critical Depth = 4.73(In.)
Pipe flow velocity = 2.87(Ft/s)
Travel time through pipe = 0.55 min.
Time of concentration (TC) = 5.68 min.

Process from Point/Station 103.000 to Point/Station 102.000
**** SUBAREA FLOW ADDITION ****

APARTMENT subarea type
Runoff Coefficient = 0.868
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Time of concentration = 5.68 min.
Rainfall intensity = 3.902(In/Hr) for a 100.0 year storm
Subarea runoff = 1.355(CFS) for 0.400(Ac.)
Total runoff = 2.105(CFS) Total area = 0.610(Ac.)

Process from Point/Station 102.000 to Point/Station 104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 617.600(Ft.)
Downstream point/station elevation = 616.800(Ft.)
Pipe length = 160.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 2.105(CFS)
Nearest computed pipe diameter = 12.00(In.)
Calculated individual pipe flow = 2.105(CFS)
Normal flow depth in pipe = 8.39(In.)
Flow top width inside pipe = 11.01(In.)
Critical Depth = 7.43(In.)
Pipe flow velocity = 3.59(Ft/s)
Travel time through pipe = 0.74 min.
Time of concentration (TC) = 6.42 min.

Process from Point/Station 105.000 to Point/Station 104.000
**** SUBAREA FLOW ADDITION ****

APARTMENT subarea type
Runoff Coefficient = 0.867
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Time of concentration = 6.42 min.
Rainfall intensity = 3.669(In/Hr) for a 100.0 year storm
Subarea runoff = 0.795(CFS) for 0.250(Ac.)
Total runoff = 2.900(CFS) Total area = 0.860(Ac.)

Process from Point/Station 104.000 to Point/Station 108.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 616.800(Ft.)
Downstream point/station elevation = 616.200(Ft.)
Pipe length = 113.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 2.900(CFS)
Nearest computed pipe diameter = 15.00(In.)
Calculated individual pipe flow = 2.900(CFS)
Normal flow depth in pipe = 8.52(In.)

Flow top width inside pipe = 14.86(In.)
Critical Depth = 8.21(In.)
Pipe flow velocity = 4.03(Ft/s)
Travel time through pipe = 0.47 min.
Time of concentration (TC) = 6.88 min.

Process from Point/Station 104.000 to Point/Station 108.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 0.860(Ac.)
Runoff from this stream = 2.900(CFS)
Time of concentration = 6.88 min.
Rainfall intensity = 3.543(In/Hr)

Process from Point/Station 112.000 to Point/Station 113.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 71.000(Ft.)
Top (of initial area) elevation = 626.400(Ft.)
Bottom (of initial area) elevation = 623.400(Ft.)
Difference in elevation = 3.000(Ft.)
Slope = 0.04225 s(percent) = 4.23
 $TC = k(0.323)*[(length^3)/(elevation\ change)]^{0.2}$
Warning: TC computed to be less than 5 min.; program is assuming the
time of concentration is 5 minutes.
Initial area time of concentration = 5.000 min.
Rainfall intensity = 4.157(In/Hr) for a 100.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.870
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Initial subarea runoff = 0.253(CFS)
Total initial stream area = 0.070(Ac.)
Pervious area fraction = 0.200

Process from Point/Station 113.000 to Point/Station 109.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 617.800(Ft.)
Downstream point/station elevation = 617.300(Ft.)
Pipe length = 104.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 0.253(CFS)
Nearest computed pipe diameter = 6.00(In.)
Calculated individual pipe flow = 0.253(CFS)
Normal flow depth in pipe = 3.53(In.)
Flow top width inside pipe = 5.91(In.)
Critical Depth = 3.04(In.)
Pipe flow velocity = 2.11(Ft/s)
Travel time through pipe = 0.82 min.
Time of concentration (TC) = 5.82 min.

Process from Point/Station 110.000 to Point/Station 109.000
**** SUBAREA FLOW ADDITION ****

APARTMENT subarea type
Runoff Coefficient = 0.868
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800

Time of concentration = 5.82 min.
 Rainfall intensity = 3.853(In/Hr) for a 100.0 year storm
 Subarea runoff = 0.803(CFS) for 0.240(Ac.)
 Total runoff = 1.056(CFS) Total area = 0.310(Ac.)

 Process from Point/Station 109.000 to Point/Station 108.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 617.300(Ft.)
 Downstream point/station elevation = 616.200(Ft.)
 Pipe length = 213.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 1.056(CFS)
 Nearest computed pipe diameter = 9.00(In.)
 Calculated individual pipe flow = 1.056(CFS)
 Normal flow depth in pipe = 6.60(In.)
 Flow top width inside pipe = 7.96(In.)
 Critical Depth = 5.66(In.)
 Pipe flow velocity = 3.04(Ft/s)
 Travel time through pipe = 1.17 min.
 Time of concentration (TC) = 6.99 min.

 Process from Point/Station 109.000 to Point/Station 108.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 0.310(Ac.)
 Runoff from this stream = 1.056(CFS)
 Time of concentration = 6.99 min.
 Rainfall intensity = 3.516(In/Hr)
 Summary of stream data:

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

1	2.900	6.88	3.543
2	1.056	6.99	3.516

Largest stream flow has longer or shorter time of concentration
 $Q_p = 2.900 + \text{sum of } Q_a \frac{T_b}{T_a}$
 $Q_p = 1.056 * 0.985 = 1.040$
 $Q_p = 3.940$

Total of 2 streams to confluence:
 Flow rates before confluence point:
 2.900 1.056
 Area of streams before confluence:
 0.860 0.310
 Results of confluence:
 Total flow rate = 3.940(CFS)
 Time of concentration = 6.884 min.
 Effective stream area after confluence = 1.170(Ac.)

 Process from Point/Station 108.000 to Point/Station 106.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 616.200(Ft.)
 Downstream point/station elevation = 616.100(Ft.)
 Pipe length = 13.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 3.940(CFS)
 Nearest computed pipe diameter = 15.00(In.)
 Calculated individual pipe flow = 3.940(CFS)
 Normal flow depth in pipe = 9.21(In.)
 Flow top width inside pipe = 14.60(In.)
 Critical Depth = 9.63(In.)
 Pipe flow velocity = 4.99(Ft/s)
 Travel time through pipe = 0.04 min.
 Time of concentration (TC) = 6.93 min.

Process from Point/Station 108.000 to Point/Station 106.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 1.170(Ac.)
Runoff from this stream = 3.940(CFS)
Time of concentration = 6.93 min.
Rainfall intensity = 3.531(In/Hr)

Process from Point/Station 107.000 to Point/Station 106.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 246.000(Ft.)
Top (of initial area) elevation = 633.800(Ft.)
Bottom (of initial area) elevation = 625.200(Ft.)
Difference in elevation = 8.600(Ft.)
Slope = 0.03496 s(percent)= 3.50
TC = $k(0.323)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$
Initial area time of concentration = 5.713 min.
Rainfall intensity = 3.889(In/Hr) for a 100.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.868
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Initial subarea runoff = 1.857(CFS)
Total initial stream area = 0.550(Ac.)
Pervious area fraction = 0.200

Process from Point/Station 107.000 to Point/Station 106.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 0.550(Ac.)
Runoff from this stream = 1.857(CFS)
Time of concentration = 5.71 min.
Rainfall intensity = 3.889(In/Hr)
Summary of stream data:

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

1	3.940	6.93	3.531
2	1.857	5.71	3.889

Largest stream flow has longer time of concentration

Qp = 3.940 + sum of
Qb Ia/Ib
1.857 * 0.908 = 1.687
Qp = 5.627

Total of 2 streams to confluence:

Flow rates before confluence point:

3.940 1.857

Area of streams before confluence:

1.170 0.550

Results of confluence:

Total flow rate = 5.627(CFS)

Time of concentration = 6.928 min.

Effective stream area after confluence = 1.720(Ac.)

Process from Point/Station 106.000 to Point/Station 111.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 616.100(Ft.)
Downstream point/station elevation = 615.800(Ft.)
Pipe length = 52.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 5.627(CFS)
Nearest computed pipe diameter = 18.00(In.)
Calculated individual pipe flow = 5.627(CFS)
Normal flow depth in pipe = 11.16(In.)
Flow top width inside pipe = 17.48(In.)
Critical Depth = 10.98(In.)
Pipe flow velocity = 4.89(Ft/s)
Travel time through pipe = 0.18 min.
Time of concentration (TC) = 7.11 min.
End of computations, total study area = 1.72 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 0.200
Area averaged RI index number = 61.6

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
Rational Hydrology Study Date: 12/10/21 File:PROP100B.out

20-0251 - VMAC-B
ONSITE RATIONAL METHOD HYDROLOGY
100 YEAR STORM EVENT
FN: PROP100B.OUT RSB

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

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

Program License Serial Number 4010

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

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

Standard intensity-duration curves data (Plate D-4.1)
For the [Norco] area used.
10 year storm 10 minute intensity = 1.960(In/Hr)
10 year storm 60 minute intensity = 0.800(In/Hr)
100 year storm 10 minute intensity = 2.940(In/Hr)
100 year storm 60 minute intensity = 1.200(In/Hr)

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

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

Initial area flow distance = 65.000(Ft.)
Top (of initial area) elevation = 639.200(Ft.)
Bottom (of initial area) elevation = 638.300(Ft.)
Difference in elevation = 0.900(Ft.)
Slope = 0.01385 s(percent)= 1.38
 $TC = k(0.323)*[(length^3)/(elevation\ change)]^{0.2}$
Warning: TC computed to be less than 5 min.; program is assuming the
time of concentration is 5 minutes.
Initial area time of concentration = 5.000 min.
Rainfall intensity = 4.157(In/Hr) for a 100.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.870
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Initial subarea runoff = 0.506(CFS)
Total initial stream area = 0.140(Ac.)
Pervious area fraction = 0.200

Process from Point/Station 201.000 to Point/Station 202.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 621.800(Ft.)

Downstream point/station elevation = 621.000(Ft.)
Pipe length = 154.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 0.506(CFS)
Nearest computed pipe diameter = 9.00(In.)
Calculated individual pipe flow = 0.506(CFS)
Normal flow depth in pipe = 4.10(In.)
Flow top width inside pipe = 8.96(In.)
Critical Depth = 3.85(In.)
Pipe flow velocity = 2.59(Ft/s)
Travel time through pipe = 0.99 min.
Time of concentration (TC) = 5.99 min.

+++++
Process from Point/Station 201.000 to Point/Station 202.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 0.140(Ac.)
Runoff from this stream = 0.506(CFS)
Time of concentration = 5.99 min.
Rainfall intensity = 3.797(In/Hr)

+++++
Process from Point/Station 203.000 to Point/Station 204.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 123.000(Ft.)
Top (of initial area) elevation = 640.000(Ft.)
Bottom (of initial area) elevation = 638.700(Ft.)
Difference in elevation = 1.300(Ft.)
Slope = 0.01057 s(percent)= 1.06
 $TC = k(0.323)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 5.500 min.
Rainfall intensity = 3.963(In/Hr) for a 100.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.869
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Initial subarea runoff = 1.515(CFS)
Total initial stream area = 0.440(Ac.)
Pervious area fraction = 0.200

+++++
Process from Point/Station 204.000 to Point/Station 202.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 621.200(Ft.)
Downstream point/station elevation = 621.000(Ft.)
Pipe length = 44.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.515(CFS)
Nearest computed pipe diameter = 12.00(In.)
Calculated individual pipe flow = 1.515(CFS)
Normal flow depth in pipe = 6.91(In.)
Flow top width inside pipe = 11.86(In.)
Critical Depth = 6.26(In.)
Pipe flow velocity = 3.23(Ft/s)
Travel time through pipe = 0.23 min.
Time of concentration (TC) = 5.73 min.

+++++
Process from Point/Station 204.000 to Point/Station 202.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 0.440(Ac.)
Runoff from this stream = 1.515(CFS)
Time of concentration = 5.73 min.

Rainfall intensity = 3.884(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	0.506	5.99	3.797
2	1.515	5.73	3.884

Largest stream flow has longer or shorter time of concentration
Qp = 1.515 + sum of
Qa Tb/Ta
0.506 * 0.956 = 0.484
Qp = 1.999

Total of 2 streams to confluence:
Flow rates before confluence point:
0.506 1.515
Area of streams before confluence:
0.140 0.440
Results of confluence:
Total flow rate = 1.999(CFS)
Time of concentration = 5.727 min.
Effective stream area after confluence = 0.580(Ac.)

Process from Point/Station 202.000 to Point/Station 205.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 621.000(Ft.)
Downstream point/station elevation = 620.600(Ft.)
Pipe length = 72.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.999(CFS)
Nearest computed pipe diameter = 12.00(In.)
Calculated individual pipe flow = 1.999(CFS)
Normal flow depth in pipe = 7.77(In.)
Flow top width inside pipe = 11.47(In.)
Critical Depth = 7.24(In.)
Pipe flow velocity = 3.71(Ft/s)
Travel time through pipe = 0.32 min.
Time of concentration (TC) = 6.05 min.

Process from Point/Station 202.000 to Point/Station 205.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 0.580(Ac.)
Runoff from this stream = 1.999(CFS)
Time of concentration = 6.05 min.
Rainfall intensity = 3.779(In/Hr)

Process from Point/Station 206.000 to Point/Station 207.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 63.000(Ft.)
Top (of initial area) elevation = 639.200(Ft.)
Bottom (of initial area) elevation = 638.300(Ft.)
Difference in elevation = 0.900(Ft.)
Slope = 0.01429 s(percent)= 1.43
TC = $k(0.323)*[(length^3)/(elevation\ change)]^{0.2}$
Warning: TC computed to be less than 5 min.; program is assuming the time of concentration is 5 minutes.
Initial area time of concentration = 5.000 min.
Rainfall intensity = 4.157(In/Hr) for a 100.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.870
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000

RI index for soil(AMC 2) = 61.60
 Pervious area fraction = 0.200; Impervious fraction = 0.800
 Initial subarea runoff = 1.230(CFS)
 Total initial stream area = 0.340(Ac.)
 Pervious area fraction = 0.200

++++++
 Process from Point/Station 207.000 to Point/Station 205.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 621.200(Ft.)
 Downstream point/station elevation = 620.600(Ft.)
 Pipe length = 119.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 1.230(CFS)
 Nearest computed pipe diameter = 12.00(In.)
 Calculated individual pipe flow = 1.230(CFS)
 Normal flow depth in pipe = 5.90(In.)
 Flow top width inside pipe = 12.00(In.)
 Critical Depth = 5.62(In.)
 Pipe flow velocity = 3.20(Ft/s)
 Travel time through pipe = 0.62 min.
 Time of concentration (TC) = 5.62 min.

++++++
 Process from Point/Station 207.000 to Point/Station 205.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 0.340(Ac.)
 Runoff from this stream = 1.230(CFS)
 Time of concentration = 5.62 min.
 Rainfall intensity = 3.921(In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
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1	1.999	6.05	3.779
2	1.230	5.62	3.921

Largest stream flow has longer time of concentration

$Q_p = 1.999 + \text{sum of } Q_b \frac{I_a/I_b}{1.230 * 0.964} = 1.185$
 $Q_p = 3.184$

Total of 2 streams to confluence:

Flow rates before confluence point:

1.999 1.230

Area of streams before confluence:

0.580 0.340

Results of confluence:

Total flow rate = 3.184(CFS)

Time of concentration = 6.050 min.

Effective stream area after confluence = 0.920(Ac.)

++++++
 Process from Point/Station 205.000 to Point/Station 208.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 620.600(Ft.)
 Downstream point/station elevation = 620.400(Ft.)
 Pipe length = 33.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 3.184(CFS)
 Nearest computed pipe diameter = 15.00(In.)
 Calculated individual pipe flow = 3.184(CFS)
 Normal flow depth in pipe = 8.66(In.)
 Flow top width inside pipe = 14.82(In.)
 Critical Depth = 8.61(In.)
 Pipe flow velocity = 4.34(Ft/s)
 Travel time through pipe = 0.13 min.
 Time of concentration (TC) = 6.18 min.

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*****
Process from Point/Station      205.000 to Point/Station      208.000
**** CONFLUENCE OF MINOR STREAMS ****

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Along Main Stream number: 1 in normal stream number 1
Stream flow area =      0.920(Ac.)
Runoff from this stream =      3.184(CFS)
Time of concentration =      6.18 min.
Rainfall intensity =      3.740(In/Hr)

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*****
Process from Point/Station      209.000 to Point/Station      210.000
**** INITIAL AREA EVALUATION ****

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Initial area flow distance = 107.000(Ft.)
Top (of initial area) elevation = 640.500(Ft.)
Bottom (of initial area) elevation = 637.500(Ft.)
Difference in elevation = 3.000(Ft.)
Slope = 0.02804 s(percent)= 2.80
TC = k(0.323)*[(length^3)/(elevation change)]^0.2
Warning: TC computed to be less than 5 min.; program is assuming the
time of concentration is 5 minutes.
Initial area time of concentration = 5.000 min.
Rainfall intensity = 4.157(In/Hr) for a 100.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.870
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Initial subarea runoff = 1.266(CFS)
Total initial stream area = 0.350(Ac.)
Pervious area fraction = 0.200

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*****
Process from Point/Station      210.000 to Point/Station      208.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

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Upstream point/station elevation = 620.800(Ft.)
Downstream point/station elevation = 620.400(Ft.)
Pipe length = 66.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.266(CFS)
Nearest computed pipe diameter = 9.00(In.)
Calculated individual pipe flow = 1.266(CFS)
Normal flow depth in pipe = 7.24(In.)
Flow top width inside pipe = 7.14(In.)
Critical Depth = 6.22(In.)
Pipe flow velocity = 3.32(Ft/s)
Travel time through pipe = 0.33 min.
Time of concentration (TC) = 5.33 min.

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*****
Process from Point/Station      210.000 to Point/Station      208.000
**** CONFLUENCE OF MINOR STREAMS ****

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Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.350(Ac.)
Runoff from this stream =      1.266(CFS)
Time of concentration =      5.33 min.
Rainfall intensity =      4.026(In/Hr)
Summary of stream data:

```

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	3.184	6.18	3.740
2	1.266	5.33	4.026

Largest stream flow has longer time of concentration

$$Q_p = \frac{3.184 + \sum Q_b}{1.266} \times \frac{I_a}{I_b} = \frac{3.184 + 1.266}{1.266} \times 0.929 = 1.176$$

Total of 2 streams to confluence:
Flow rates before confluence point:
3.184 1.266

Area of streams before confluence:
0.920 0.350

Results of confluence:

Total flow rate = 4.360(CFS)

Time of concentration = 6.177 min.

Effective stream area after confluence = 1.270(Ac.)

Process from Point/Station 208.000 to Point/Station 211.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 620.400(Ft.)
Downstream point/station elevation = 620.100(Ft.)
Pipe length = 65.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 4.360(CFS)
Nearest computed pipe diameter = 15.00(In.)
Calculated individual pipe flow = 4.360(CFS)
Normal flow depth in pipe = 12.21(In.)
Flow top width inside pipe = 11.67(In.)
Critical Depth = 10.15(In.)
Pipe flow velocity = 4.08(Ft/s)
Travel time through pipe = 0.27 min.
Time of concentration (TC) = 6.44 min.

Process from Point/Station 208.000 to Point/Station 211.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 1.270(Ac.)
Runoff from this stream = 4.360(CFS)
Time of concentration = 6.44 min.
Rainfall intensity = 3.662(In/Hr)

Process from Point/Station 212.000 to Point/Station 213.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 73.000(Ft.)
Top (of initial area) elevation = 638.000(Ft.)
Bottom (of initial area) elevation = 635.600(Ft.)
Difference in elevation = 2.400(Ft.)
Slope = 0.03288 s(percent) = 3.29
TC = $k(0.323) * [(length^3)/(elevation\ change)]^{0.2}$
Warning: TC computed to be less than 5 min.; program is assuming the time of concentration is 5 minutes.
Initial area time of concentration = 5.000 min.
Rainfall intensity = 4.157(In/Hr) for a 100.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.870
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Initial subarea runoff = 0.542(CFS)
Total initial stream area = 0.150(Ac.)
Pervious area fraction = 0.200

Process from Point/Station 213.000 to Point/Station 214.000

**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 620.600(Ft.)
 Downstream point/station elevation = 620.300(Ft.)
 Pipe length = 65.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 0.542(CFS)
 Nearest computed pipe diameter = 9.00(In.)
 Calculated individual pipe flow = 0.542(CFS)
 Normal flow depth in pipe = 4.41(In.)
 Flow top width inside pipe = 9.00(In.)
 Critical Depth = 4.00(In.)
 Pipe flow velocity = 2.52(Ft/s)
 Travel time through pipe = 0.43 min.
 Time of concentration (TC) = 5.43 min.

 Process from Point/Station 215.000 to Point/Station 214.000
 **** SUBAREA FLOW ADDITION ****

APARTMENT subarea type
 Runoff Coefficient = 0.869
 Decimal fraction soil group A = 0.200
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.800
 Decimal fraction soil group D = 0.000
 RI index for soil(AMC 2) = 61.60
 Pervious area fraction = 0.200; Impervious fraction = 0.800
 Time of concentration = 5.43 min.
 Rainfall intensity = 3.989(In/Hr) for a 100.0 year storm
 Subarea runoff = 0.312(CFS) for 0.090(Ac.)
 Total runoff = 0.854(CFS) Total area = 0.240(Ac.)

 Process from Point/Station 214.000 to Point/Station 211.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 620.300(Ft.)
 Downstream point/station elevation = 620.100(Ft.)
 Pipe length = 46.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 0.854(CFS)
 Nearest computed pipe diameter = 9.00(In.)
 Calculated individual pipe flow = 0.854(CFS)
 Normal flow depth in pipe = 6.00(In.)
 Flow top width inside pipe = 8.49(In.)
 Critical Depth = 5.07(In.)
 Pipe flow velocity = 2.73(Ft/s)
 Travel time through pipe = 0.28 min.
 Time of concentration (TC) = 5.71 min.

 Process from Point/Station 214.000 to Point/Station 211.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 0.240(Ac.)
 Runoff from this stream = 0.854(CFS)
 Time of concentration = 5.71 min.
 Rainfall intensity = 3.890(In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	4.360	6.44	3.662
2	0.854	5.71	3.890

Largest stream flow has longer time of concentration
 $Q_p = 4.360 + \text{sum of } Q_b \frac{I_a}{I_b}$
 $Q_p = 0.854 * 0.941 = 0.804$
 $Q_p = 5.165$

Total of 2 streams to confluence:
 Flow rates before confluence point:
 4.360 0.854
 Area of streams before confluence:
 1.270 0.240
 Results of confluence:
 Total flow rate = 5.165(CFS)
 Time of concentration = 6.442 min.
 Effective stream area after confluence = 1.510(Ac.)

 Process from Point/Station 211.000 to Point/Station 216.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 620.100(Ft.)
 Downstream point/station elevation = 619.800(Ft.)
 Pipe length = 56.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 5.165(CFS)
 Nearest computed pipe diameter = 18.00(In.)
 Calculated individual pipe flow = 5.165(CFS)
 Normal flow depth in pipe = 10.80(In.)
 Flow top width inside pipe = 17.63(In.)
 Critical Depth = 10.50(In.)
 Pipe flow velocity = 4.67(Ft/s)
 Travel time through pipe = 0.20 min.
 Time of concentration (TC) = 6.64 min.

 Process from Point/Station 211.000 to Point/Station 216.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
 Stream flow area = 1.510(Ac.)
 Runoff from this stream = 5.165(CFS)
 Time of concentration = 6.64 min.
 Rainfall intensity = 3.607(In/Hr)

 Process from Point/Station 217.000 to Point/Station 218.000
 **** INITIAL AREA EVALUATION ****

Initial area flow distance = 87.000(Ft.)
 Top (of initial area) elevation = 638.500(Ft.)
 Bottom (of initial area) elevation = 636.000(Ft.)
 Difference in elevation = 2.500(Ft.)
 Slope = 0.02874 s(percent)= 2.87
 $TC = k(0.323)*[(length^3)/(elevation\ change)]^{0.2}$
 Warning: TC computed to be less than 5 min.; program is assuming the
 time of concentration is 5 minutes.
 Initial area time of concentration = 5.000 min.
 Rainfall intensity = 4.157(In/Hr) for a 100.0 year storm
 APARTMENT subarea type
 Runoff Coefficient = 0.870
 Decimal fraction soil group A = 0.200
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.800
 Decimal fraction soil group D = 0.000
 RI index for soil(AMC 2) = 61.60
 Pervious area fraction = 0.200; Impervious fraction = 0.800
 Initial subarea runoff = 0.398(CFS)
 Total initial stream area = 0.110(Ac.)
 Pervious area fraction = 0.200

 Process from Point/Station 218.000 to Point/Station 219.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 620.300(Ft.)
 Downstream point/station elevation = 620.000(Ft.)
 Pipe length = 53.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 0.398(CFS)

Nearest computed pipe diameter = 6.00(In.)
 Calculated individual pipe flow = 0.398(CFS)
 Normal flow depth in pipe = 4.64(In.)
 Flow top width inside pipe = 5.02(In.)
 Critical Depth = 3.85(In.)
 Pipe flow velocity = 2.45(Ft/s)
 Travel time through pipe = 0.36 min.
 Time of concentration (TC) = 5.36 min.

++++++
 Process from Point/Station 220.000 to Point/Station 219.000
 **** SUBAREA FLOW ADDITION ****

APARTMENT subarea type
 Runoff Coefficient = 0.869
 Decimal fraction soil group A = 0.200
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.800
 Decimal fraction soil group D = 0.000
 RI index for soil(AMC 2) = 61.60
 Pervious area fraction = 0.200; Impervious fraction = 0.800
 Time of concentration = 5.36 min.
 Rainfall intensity = 4.014(In/Hr) for a 100.0 year storm
 Subarea runoff = 0.419(CFS) for 0.120(Ac.)
 Total runoff = 0.817(CFS) Total area = 0.230(Ac.)

++++++
 Process from Point/Station 219.000 to Point/Station 216.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 620.000(Ft.)
 Downstream point/station elevation = 619.800(Ft.)
 Pipe length = 43.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 0.817(CFS)
 Nearest computed pipe diameter = 9.00(In.)
 Calculated individual pipe flow = 0.817(CFS)
 Normal flow depth in pipe = 5.67(In.)
 Flow top width inside pipe = 8.69(In.)
 Critical Depth = 4.96(In.)
 Pipe flow velocity = 2.78(Ft/s)
 Travel time through pipe = 0.26 min.
 Time of concentration (TC) = 5.62 min.

++++++
 Process from Point/Station 219.000 to Point/Station 216.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 0.230(Ac.)
 Runoff from this stream = 0.817(CFS)
 Time of concentration = 5.62 min.
 Rainfall intensity = 3.921(In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	5.165	6.64	3.607
2	0.817	5.62	3.921

Largest stream flow has longer time of concentration
 $Q_p = 5.165 + \text{sum of } Q_b \frac{I_a}{I_b}$
 $Q_p = 5.165 + 0.817 * 0.920 = 5.916$

Total of 2 streams to confluence:
 Flow rates before confluence point:
 5.165 0.817
 Area of streams before confluence:
 1.510 0.230
 Results of confluence:

Total flow rate = 5.916(CFS)
Time of concentration = 6.642 min.
Effective stream area after confluence = 1.740(Ac.)

Process from Point/Station 216.000 to Point/Station 221.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 619.800(Ft.)
Downstream point/station elevation = 619.700(Ft.)
Pipe length = 17.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 5.916(CFS)
Nearest computed pipe diameter = 18.00(In.)
Calculated individual pipe flow = 5.916(CFS)
Normal flow depth in pipe = 11.46(In.)
Flow top width inside pipe = 17.31(In.)
Critical Depth = 11.26(In.)
Pipe flow velocity = 4.98(Ft/s)
Travel time through pipe = 0.06 min.
Time of concentration (TC) = 6.70 min.

Process from Point/Station 216.000 to Point/Station 221.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 1.740(Ac.)
Runoff from this stream = 5.916(CFS)
Time of concentration = 6.70 min.
Rainfall intensity = 3.591(In/Hr)

Process from Point/Station 222.000 to Point/Station 223.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 353.000(Ft.)
Top (of initial area) elevation = 638.400(Ft.)
Bottom (of initial area) elevation = 635.200(Ft.)
Difference in elevation = 3.200(Ft.)
Slope = 0.00907 s(percent)= 0.91
 $TC = k(0.323)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 8.646 min.
Rainfall intensity = 3.161(In/Hr) for a 100.0 year storm
APARTMENT subarea type
Runoff coefficient = 0.863
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Initial subarea runoff = 2.345(CFS)
Total initial stream area = 0.860(Ac.)
Pervious area fraction = 0.200

Process from Point/Station 223.000 to Point/Station 224.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 620.600(Ft.)
Downstream point/station elevation = 619.800(Ft.)
Pipe length = 141.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 2.345(CFS)
Nearest computed pipe diameter = 12.00(In.)
Calculated individual pipe flow = 2.345(CFS)
Normal flow depth in pipe = 8.68(In.)
Flow top width inside pipe = 10.73(In.)
Critical Depth = 7.87(In.)
Pipe flow velocity = 3.85(Ft/s)
Travel time through pipe = 0.61 min.
Time of concentration (TC) = 9.26 min.

 Process from Point/Station 225.000 to Point/Station 224.000
 **** SUBAREA FLOW ADDITION ****

APARTMENT subarea type
 Runoff Coefficient = 0.862
 Decimal fraction soil group A = 0.200
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.800
 Decimal fraction soil group D = 0.000
 RI index for soil(AMC 2) = 61.60
 Pervious area fraction = 0.200; Impervious fraction = 0.800
 Time of concentration = 9.26 min.
 Rainfall intensity = 3.055(In/Hr) for a 100.0 year storm
 Subarea runoff = 0.263(CFS) for 0.100(Ac.)
 Total runoff = 2.608(CFS) Total area = 0.960(Ac.)

 Process from Point/Station 224.000 to Point/Station 221.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 619.800(Ft.)
 Downstream point/station elevation = 619.700(Ft.)
 Pipe length = 21.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 2.608(CFS)
 Nearest computed pipe diameter = 15.00(In.)
 Calculated individual pipe flow = 2.608(CFS)
 Normal flow depth in pipe = 8.24(In.)
 Flow top width inside pipe = 14.93(In.)
 Critical Depth = 7.77(In.)
 Pipe flow velocity = 3.77(Ft/s)
 Travel time through pipe = 0.09 min.
 Time of concentration (TC) = 9.35 min.

 Process from Point/Station 224.000 to Point/Station 221.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 0.960(Ac.)
 Runoff from this stream = 2.608(CFS)
 Time of concentration = 9.35 min.
 Rainfall intensity = 3.040(In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
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1	5.916	6.70	3.591
2	2.608	9.35	3.040

Largest stream flow has longer or shorter time of concentration

Qp = 5.916 + sum of

$$Qa \quad Tb/Ta$$

$$2.608 * 0.717 = 1.869$$
 Qp = 7.784

Total of 2 streams to confluence:
 Flow rates before confluence point:
 5.916 2.608

Area of streams before confluence:
 1.740 0.960

Results of confluence:
 Total flow rate = 7.784(CFS)
 Time of concentration = 6.699 min.
 Effective stream area after confluence = 2.700(Ac.)

 Process from Point/Station 221.000 to Point/Station 226.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 619.700(Ft.)
Downstream point/station elevation = 619.300(Ft.)
Pipe length = 88.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 7.784(CFS)
Nearest computed pipe diameter = 21.00(In.)
Calculated individual pipe flow = 7.784(CFS)
Normal flow depth in pipe = 13.30(In.)
Flow top width inside pipe = 20.24(In.)
Critical Depth = 12.42(In.)
Pipe flow velocity = 4.85(Ft/s)
Travel time through pipe = 0.30 min.
Time of concentration (TC) = 7.00 min.

+++++
Process from Point/Station 221.000 to Point/Station 226.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 2.700(Ac.)
Runoff from this stream = 7.784(CFS)
Time of concentration = 7.00 min.
Rainfall intensity = 3.513(In/Hr)

+++++
Process from Point/Station 227.000 to Point/Station 228.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 59.000(Ft.)
Top (of initial area) elevation = 636.000(Ft.)
Bottom (of initial area) elevation = 633.800(Ft.)
Difference in elevation = 2.200(Ft.)
Slope = 0.03729 s(percent)= 3.73
 $TC = k(0.323)*[(length^3)/(elevation\ change)]^{0.2}$
Warning: TC computed to be less than 5 min.; program is assuming the
time of concentration is 5 minutes.
Initial area time of concentration = 5.000 min.
Rainfall intensity = 4.157(In/Hr) for a 100.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.870
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Initial subarea runoff = 1.157(CFS)
Total initial stream area = 0.320(Ac.)
Pervious area fraction = 0.200

+++++
Process from Point/Station 228.000 to Point/Station 226.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 620.000(Ft.)
Downstream point/station elevation = 619.300(Ft.)
Pipe length = 129.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.157(CFS)
Nearest computed pipe diameter = 9.00(In.)
Calculated individual pipe flow = 1.157(CFS)
Normal flow depth in pipe = 7.00(In.)
Flow top width inside pipe = 7.49(In.)
Critical Depth = 5.94(In.)
Pipe flow velocity = 3.14(Ft/s)
Travel time through pipe = 0.68 min.
Time of concentration (TC) = 5.68 min.

+++++
Process from Point/Station 228.000 to Point/Station 226.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 0.320(Ac.)
 Runoff from this stream = 1.157(CFS)
 Time of concentration = 5.68 min.
 Rainfall intensity = 3.898(In/Hr)
 Summary of stream data:

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

1	7.784	7.00	3.513
2	1.157	5.68	3.898

Largest stream flow has longer time of concentration
 $Q_p = 7.784 + \text{sum of } Q_b \frac{I_a}{I_b}$
 $Q_p = 1.157 * 0.901 = 1.043$
 $Q_p = 8.827$

Total of 2 streams to confluence:
 Flow rates before confluence point:
 7.784 1.157
 Area of streams before confluence:
 2.700 0.320
 Results of confluence:
 Total flow rate = 8.827(CFS)
 Time of concentration = 7.002 min.
 Effective stream area after confluence = 3.020(Ac.)

 Process from Point/Station 226.000 to Point/Station 229.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 619.300(Ft.)
 Downstream point/station elevation = 619.100(Ft.)
 Pipe length = 41.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 8.827(CFS)
 Nearest computed pipe diameter = 21.00(In.)
 Calculated individual pipe flow = 8.827(CFS)
 Normal flow depth in pipe = 14.18(In.)
 Flow top width inside pipe = 19.67(In.)
 Critical Depth = 13.24(In.)
 Pipe flow velocity = 5.11(Ft/s)
 Travel time through pipe = 0.13 min.
 Time of concentration (TC) = 7.14 min.

 Process from Point/Station 226.000 to Point/Station 229.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
 Stream flow area = 3.020(Ac.)
 Runoff from this stream = 8.827(CFS)
 Time of concentration = 7.14 min.
 Rainfall intensity = 3.480(In/Hr)

 Process from Point/Station 230.000 to Point/Station 231.000
 **** INITIAL AREA EVALUATION ****

Initial area flow distance = 136.000(Ft.)
 Top (of initial area) elevation = 636.400(Ft.)
 Bottom (of initial area) elevation = 633.300(Ft.)
 Difference in elevation = 3.100(Ft.)
 Slope = 0.02279 s(percent)= 2.28
 $TC = k(0.323) * [(length^3)/(elevation\ change)]^{0.2}$
 Warning: TC computed to be less than 5 min.; program is assuming the time of concentration is 5 minutes.
 Initial area time of concentration = 5.000 min.
 Rainfall intensity = 4.157(In/Hr) for a 100.0 year storm
 APARTMENT subarea type
 Runoff Coefficient = 0.870

Decimal fraction soil group A = 0.200
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.800
 Decimal fraction soil group D = 0.000
 RI index for soil(AMC 2) = 61.60
 Pervious area fraction = 0.200; Impervious fraction = 0.800
 Initial subarea runoff = 1.555(CFS)
 Total initial stream area = 0.430(Ac.)
 Pervious area fraction = 0.200

+-----+
 Process from Point/Station 231.000 to Point/Station 229.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 619.400(Ft.)
 Downstream point/station elevation = 619.100(Ft.)
 Pipe length = 67.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 1.555(CFS)
 Nearest computed pipe diameter = 12.00(In.)
 Calculated individual pipe flow = 1.555(CFS)
 Normal flow depth in pipe = 7.07(In.)
 Flow top width inside pipe = 11.81(In.)
 Critical Depth = 6.35(In.)
 Pipe flow velocity = 3.23(Ft/s)
 Travel time through pipe = 0.35 min.
 Time of concentration (TC) = 5.35 min.

+-----+
 Process from Point/Station 231.000 to Point/Station 229.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 0.430(Ac.)
 Runoff from this stream = 1.555(CFS)
 Time of concentration = 5.35 min.
 Rainfall intensity = 4.020(In/Hr)
 Summary of stream data:

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

1	8.827	7.14	3.480
2	1.555	5.35	4.020

Largest stream flow has longer time of concentration
 $Q_p = 8.827 + \text{sum of } Q_b \text{ Ia/Ib}$
 $1.555 * 0.865 = 1.346$
 $Q_p = 10.173$

Total of 2 streams to confluence:
 Flow rates before confluence point:
 8.827 1.555
 Area of streams before confluence:
 3.020 0.430
 Results of confluence:
 Total flow rate = 10.173(CFS)
 Time of concentration = 7.136 min.
 Effective stream area after confluence = 3.450(Ac.)

+-----+
 Process from Point/Station 229.000 to Point/Station 232.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 619.100(Ft.)
 Downstream point/station elevation = 618.300(Ft.)
 Pipe length = 160.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 10.173(CFS)
 Nearest computed pipe diameter = 21.00(In.)
 Calculated individual pipe flow = 10.173(CFS)
 Normal flow depth in pipe = 15.70(In.)
 Flow top width inside pipe = 18.24(In.)

Critical Depth = 14.26(In.)
Pipe flow velocity = 5.28(Ft/s)
Travel time through pipe = 0.51 min.
Time of concentration (TC) = 7.64 min.

++++
Process from Point/Station 229.000 to Point/Station 232.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 3.450(Ac.)
Runoff from this stream = 10.173(CFS)
Time of concentration = 7.64 min.
Rainfall intensity = 3.363(In/Hr)

++++
Process from Point/Station 233.000 to Point/Station 234.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 79.000(Ft.)
Top (of initial area) elevation = 629.900(Ft.)
Bottom (of initial area) elevation = 627.700(Ft.)
Difference in elevation = 2.200(Ft.)
Slope = 0.02785 s(percent)= 2.78
 $TC = k(0.323)*[(length^3)/(elevation\ change)]^{0.2}$
Warning: TC computed to be less than 5 min.; program is assuming the
time of concentration is 5 minutes.
Initial area time of concentration = 5.000 min.
Rainfall intensity = 4.157(In/Hr) for a 100.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.870
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Initial subarea runoff = 0.325(CFS)
Total initial stream area = 0.090(Ac.)
Pervious area fraction = 0.200

++++
Process from Point/Station 234.000 to Point/Station 235.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 619.100(Ft.)
Downstream point/station elevation = 618.800(Ft.)
Pipe length = 48.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 0.325(CFS)
Nearest computed pipe diameter = 6.00(In.)
Calculated individual pipe flow = 0.325(CFS)
Normal flow depth in pipe = 3.82(In.)
Flow top width inside pipe = 5.77(In.)
Critical Depth = 3.46(In.)
Pipe flow velocity = 2.47(Ft/s)
Travel time through pipe = 0.32 min.
Time of concentration (TC) = 5.32 min.

++++
Process from Point/Station 236.000 to Point/Station 235.000
**** SUBAREA FLOW ADDITION ****

APARTMENT subarea type
Runoff Coefficient = 0.869
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Time of concentration = 5.32 min.

Rainfall intensity = 4.028(In/Hr) for a 100.0 year storm
 Subarea runoff = 0.595(CFS) for 0.170(Ac.)
 Total runoff = 0.921(CFS) Total area = 0.260(Ac.)

 Process from Point/Station 235.000 to Point/Station 232.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 618.800(Ft.)
 Downstream point/station elevation = 618.300(Ft.)
 Pipe length = 102.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 0.921(CFS)
 Nearest computed pipe diameter = 9.00(In.)
 Calculated individual pipe flow = 0.921(CFS)
 Normal flow depth in pipe = 6.06(In.)
 Flow top width inside pipe = 8.44(In.)
 Critical Depth = 5.27(In.)
 Pipe flow velocity = 2.91(Ft/s)
 Travel time through pipe = 0.58 min.
 Time of concentration (TC) = 5.91 min.

 Process from Point/Station 235.000 to Point/Station 232.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 0.260(Ac.)
 Runoff from this stream = 0.921(CFS)
 Time of concentration = 5.91 min.
 Rainfall intensity = 3.824(In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	10.173	7.64	3.363
2	0.921	5.91	3.824

Largest stream flow has longer time of concentration
 $Q_p = 10.173 + \text{sum of } Q_b \cdot I_a/I_b$
 $Q_p = 10.173 + 0.921 \cdot 0.879 = 10.983$

Total of 2 streams to confluence:
 Flow rates before confluence point:
 10.173 0.921
 Area of streams before confluence:
 3.450 0.260
 Results of confluence:
 Total flow rate = 10.983(CFS)
 Time of concentration = 7.641 min.
 Effective stream area after confluence = 3.710(Ac.)

 Process from Point/Station 232.000 to Point/Station 237.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 618.300(Ft.)
 Downstream point/station elevation = 618.200(Ft.)
 Pipe length = 12.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 10.983(CFS)
 Nearest computed pipe diameter = 21.00(In.)
 Calculated individual pipe flow = 10.983(CFS)
 Normal flow depth in pipe = 13.69(In.)
 Flow top width inside pipe = 20.01(In.)
 Critical Depth = 14.81(In.)
 Pipe flow velocity = 6.62(Ft/s)
 Travel time through pipe = 0.03 min.
 Time of concentration (TC) = 7.67 min.

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*****
Process from Point/Station      232.000 to Point/Station      237.000
**** CONFLUENCE OF MINOR STREAMS ****

```

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 3.710(Ac.)
Runoff from this stream = 10.983(CFS)
Time of concentration = 7.67 min.
Rainfall intensity = 3.356(In/Hr)

```

*****
Process from Point/Station      238.000 to Point/Station      237.000
**** INITIAL AREA EVALUATION ****

```

Initial area flow distance = 57.000(Ft.)
Top (of initial area) elevation = 630.000(Ft.)
Bottom (of initial area) elevation = 627.700(Ft.)
Difference in elevation = 2.300(Ft.)
Slope = 0.04035 s(percent)= 4.04
 $TC = k(0.323)*[(length^3)/(elevation\ change)]^{0.2}$
Warning: TC computed to be less than 5 min.; program is assuming the time of concentration is 5 minutes.
Initial area time of concentration = 5.000 min.
Rainfall intensity = 4.157(In/Hr) for a 100.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.870
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Initial subarea runoff = 0.362(CFS)
Total initial stream area = 0.100(Ac.)
Pervious area fraction = 0.200

```

*****
Process from Point/Station      238.000 to Point/Station      237.000
**** CONFLUENCE OF MINOR STREAMS ****

```

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 0.100(Ac.)
Runoff from this stream = 0.362(CFS)
Time of concentration = 5.00 min.
Rainfall intensity = 4.157(In/Hr)
Summary of stream data:

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

1	10.983	7.67	3.356
2	0.362	5.00	4.157

Largest stream flow has longer time of concentration
 $Q_p = 10.983 + \text{sum of } Q_b \cdot I_a/I_b$
 $Q_p = 0.362 * 0.807 = 0.292$
 $Q_p = 11.275$

Total of 2 streams to confluence:
Flow rates before confluence point:
10.983 0.362
Area of streams before confluence:
3.710 0.100
Results of confluence:
Total flow rate = 11.275(CFS)
Time of concentration = 7.671 min.
Effective stream area after confluence = 3.810(Ac.)

```

*****
Process from Point/Station      237.000 to Point/Station      239.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

```

Upstream point/station elevation = 618.300(Ft.)
Downstream point/station elevation = 618.100(Ft.)
Pipe length = 43.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 11.275(CFS)
Nearest computed pipe diameter = 24.00(In.)
Calculated individual pipe flow = 11.275(CFS)
Normal flow depth in pipe = 15.23(In.)
Flow top width inside pipe = 23.11(In.)
Critical Depth = 14.46(In.)
Pipe flow velocity = 5.36(Ft/s)
Travel time through pipe = 0.13 min.
Time of concentration (TC) = 7.80 min.

+++++
Process from Point/Station 240.000 to Point/Station 239.000
**** SUBAREA FLOW ADDITION ****

APARTMENT subarea type
Runoff Coefficient = 0.864
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Time of concentration = 7.80 min.
Rainfall intensity = 3.327(In/Hr) for a 100.0 year storm
Subarea runoff = 0.345(CFS) for 0.120(Ac.)
Total runoff = 11.620(CFS) Total area = 3.930(Ac.)

+++++
Process from Point/Station 239.000 to Point/Station 241.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 618.100(Ft.)
Downstream point/station elevation = 617.800(Ft.)
Pipe length = 67.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 11.620(CFS)
Nearest computed pipe diameter = 24.00(In.)
Calculated individual pipe flow = 11.620(CFS)
Normal flow depth in pipe = 15.76(In.)
Flow top width inside pipe = 22.79(In.)
Critical Depth = 14.68(In.)
Pipe flow velocity = 5.31(Ft/s)
Travel time through pipe = 0.21 min.
Time of concentration (TC) = 8.02 min.

+++++
Process from Point/Station 242.000 to Point/Station 241.000
**** SUBAREA FLOW ADDITION ****

APARTMENT subarea type
Runoff Coefficient = 0.864
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Time of concentration = 8.02 min.
Rainfall intensity = 3.283(In/Hr) for a 100.0 year storm
Subarea runoff = 0.340(CFS) for 0.120(Ac.)
Total runoff = 11.960(CFS) Total area = 4.050(Ac.)

+++++
Process from Point/Station 241.000 to Point/Station 243.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 617.800(Ft.)
Downstream point/station elevation = 617.600(Ft.)

Pipe length = 67.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 11.960(CFS)
Nearest computed pipe diameter = 24.00(In.)
Calculated individual pipe flow = 11.960(CFS)
Normal flow depth in pipe = 19.01(In.)
Flow top width inside pipe = 19.48(In.)
Critical Depth = 14.91(In.)
Pipe flow velocity = 4.48(Ft/s)
Travel time through pipe = 0.25 min.
Time of concentration (TC) = 8.26 min.

Process from Point/Station 241.000 to Point/Station 243.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 4.050(Ac.)
Runoff from this stream = 11.960(CFS)
Time of concentration = 8.26 min.
Rainfall intensity = 3.233(In/Hr)

Process from Point/Station 244.000 to Point/Station 245.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 159.000(Ft.)
Top (of initial area) elevation = 651.400(Ft.)
Bottom (of initial area) elevation = 630.000(Ft.)
Difference in elevation = 21.400(Ft.)
Slope = 0.13459 s(percent)= 13.46
TC = $k(0.323)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$
Warning: TC computed to be less than 5 min.; program is assuming the
time of concentration is 5 minutes.
Initial area time of concentration = 5.000 min.
Rainfall intensity = 4.157(In/Hr) for a 100.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.870
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Initial subarea runoff = 1.555(CFS)
Total initial stream area = 0.430(Ac.)
Pervious area fraction = 0.200

Process from Point/Station 245.000 to Point/Station 243.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 618.300(Ft.)
Downstream point/station elevation = 617.600(Ft.)
Pipe length = 141.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.555(CFS)
Nearest computed pipe diameter = 12.00(In.)
Calculated individual pipe flow = 1.555(CFS)
Normal flow depth in pipe = 6.83(In.)
Flow top width inside pipe = 11.88(In.)
Critical Depth = 6.35(In.)
Pipe flow velocity = 3.37(Ft/s)
Travel time through pipe = 0.70 min.
Time of concentration (TC) = 5.70 min.

Process from Point/Station 245.000 to Point/Station 243.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 0.430(Ac.)
Runoff from this stream = 1.555(CFS)

Time of concentration = 5.70 min.
 Rainfall intensity = 3.894(In/Hr)
 Summary of stream data:

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

1	11.960	8.26	3.233
2	1.555	5.70	3.894

Largest stream flow has longer time of concentration
 $Q_p = 11.960 + \text{sum of } Q_b$
 $1.555 * \frac{I_a/I_b}{0.830} = 1.291$
 $Q_p = 13.251$

Total of 2 streams to confluence:
 Flow rates before confluence point:
 11.960 1.555
 Area of streams before confluence:
 4.050 0.430
 Results of confluence:
 Total flow rate = 13.251(CFS)
 Time of concentration = 8.264 min.
 Effective stream area after confluence = 4.480(Ac.)

 Process from Point/Station 243.000 to Point/Station 246.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 617.600(Ft.)
 Downstream point/station elevation = 617.200(Ft.)
 Pipe length = 81.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 13.251(CFS)
 Nearest computed pipe diameter = 24.00(In.)
 Calculated individual pipe flow = 13.251(CFS)
 Normal flow depth in pipe = 16.73(In.)
 Flow top width inside pipe = 22.05(In.)
 Critical Depth = 15.73(In.)
 Pipe flow velocity = 5.66(Ft/s)
 Travel time through pipe = 0.24 min.
 Time of concentration (TC) = 8.50 min.

 Process from Point/Station 243.000 to Point/Station 246.000
 **** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
 In Main Stream number: 1
 Stream flow area = 4.480(Ac.)
 Runoff from this stream = 13.251(CFS)
 Time of concentration = 8.50 min.
 Rainfall intensity = 3.188(In/Hr)
 Program is now starting with Main Stream No. 2

 Process from Point/Station 247.000 to Point/Station 248.000
 **** INITIAL AREA EVALUATION ****

Initial area flow distance = 500.000(Ft.)
 Top (of initial area) elevation = 638.900(Ft.)
 Bottom (of initial area) elevation = 627.100(Ft.)
 Difference in elevation = 11.800(Ft.)
 Slope = 0.02360 s(percent)= 2.36
 $TC = k(0.323)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$
 Initial area time of concentration = 8.207 min.
 Rainfall intensity = 3.245(In/Hr) for a 100.0 year storm
 APARTMENT subarea type
 Runoff Coefficient = 0.863
 Decimal fraction soil group A = 0.200
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.800

Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Initial subarea runoff = 1.232(CFS)
Total initial stream area = 0.440(Ac.)
Pervious area fraction = 0.200

Process from Point/Station 248.000 to Point/Station 249.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 618.300(Ft.)
Downstream point/station elevation = 618.100(Ft.)
Pipe length = 40.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.232(CFS)
Nearest computed pipe diameter = 12.00(In.)
Calculated individual pipe flow = 1.232(CFS)
Normal flow depth in pipe = 5.92(In.)
Flow top width inside pipe = 12.00(In.)
Critical Depth = 5.62(In.)
Pipe flow velocity = 3.19(Ft/s)
Travel time through pipe = 0.21 min.
Time of concentration (TC) = 8.42 min.

Process from Point/Station 248.000 to Point/Station 249.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 2 in normal stream number 1
Stream flow area = 0.440(Ac.)
Runoff from this stream = 1.232(CFS)
Time of concentration = 8.42 min.
Rainfall intensity = 3.204(In/Hr)

Process from Point/Station 250.000 to Point/Station 251.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 93.000(Ft.)
Top (of initial area) elevation = 628.200(Ft.)
Bottom (of initial area) elevation = 626.800(Ft.)
Difference in elevation = 1.400(Ft.)
Slope = 0.01505 s(percent)= 1.51
 $TC = k(0.323)*[(length^3)/(elevation\ change)]^{0.2}$
Warning: TC computed to be less than 5 min.; program is assuming the
time of concentration is 5 minutes.
Initial area time of concentration = 5.000 min.
Rainfall intensity = 4.157(In/Hr) for a 100.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.870
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Initial subarea runoff = 0.398(CFS)
Total initial stream area = 0.110(Ac.)
Pervious area fraction = 0.200

Process from Point/Station 251.000 to Point/Station 252.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 618.800(Ft.)
Downstream point/station elevation = 618.300(Ft.)
Pipe length = 91.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 0.398(CFS)
Nearest computed pipe diameter = 6.00(In.)
Calculated individual pipe flow = 0.398(CFS)
Normal flow depth in pipe = 4.69(In.)

Flow top width inside pipe = 4.96(In.)
Critical Depth = 3.85(In.)
Pipe flow velocity = 2.41(Ft/s)
Travel time through pipe = 0.63 min.
Time of concentration (TC) = 5.63 min.

Process from Point/Station 253.000 to Point/Station 252.000
**** SUBAREA FLOW ADDITION ****

APARTMENT subarea type
Runoff Coefficient = 0.868
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Time of concentration = 5.63 min.
Rainfall intensity = 3.918(In/Hr) for a 100.0 year storm
Subarea runoff = 0.272(CFS) for 0.080(Ac.)
Total runoff = 0.670(CFS) Total area = 0.190(Ac.)

Process from Point/Station 252.000 to Point/Station 249.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 618.300(Ft.)
Downstream point/station elevation = 618.100(Ft.)
Pipe length = 41.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 0.670(CFS)
Nearest computed pipe diameter = 9.00(In.)
Calculated individual pipe flow = 0.670(CFS)
Normal flow depth in pipe = 4.92(In.)
Flow top width inside pipe = 8.96(In.)
Critical Depth = 4.46(In.)
Pipe flow velocity = 2.71(Ft/s)
Travel time through pipe = 0.25 min.
Time of concentration (TC) = 5.88 min.

Process from Point/Station 252.000 to Point/Station 249.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 2 in normal stream number 2
Stream flow area = 0.190(Ac.)
Runoff from this stream = 0.670(CFS)
Time of concentration = 5.88 min.
Rainfall intensity = 3.833(In/Hr)

Process from Point/Station 254.000 to Point/Station 249.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 78.000(Ft.)
Top (of initial area) elevation = 627.900(Ft.)
Bottom (of initial area) elevation = 627.200(Ft.)
Difference in elevation = 0.700(Ft.)
Slope = 0.00897 s(percent)= 0.90
 $TC = k(0.323)*[(length^3)/(elevation\ change)]^{0.2}$
Warning: TC computed to be less than 5 min.; program is assuming the time of concentration is 5 minutes.
Initial area time of concentration = 5.000 min.
Rainfall intensity = 4.157(In/Hr) for a 100.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.870
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60

Pervious area fraction = 0.200; Impervious fraction = 0.800
Initial subarea runoff = 0.362(CFS)
Total initial stream area = 0.100(Ac.)
Pervious area fraction = 0.200

+++++
Process from Point/Station 254.000 to Point/Station 249.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 2 in normal stream number 3
Stream flow area = 0.100(Ac.)
Runoff from this stream = 0.362(CFS)
Time of concentration = 5.00 min.
Rainfall intensity = 4.157(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	1.232	8.42	3.204
2	0.670	5.88	3.833
3	0.362	5.00	4.157

Largest stream flow has longer time of concentration

Qp = 1.232 + sum of
Qb Ia/Ib
0.670 * 0.836 = 0.560
Qb Ia/Ib
0.362 * 0.771 = 0.279
Qp = 2.071

Total of 3 streams to confluence:
Flow rates before confluence point:
1.232 0.670 0.362
Area of streams before confluence:
0.440 0.190 0.100
Results of confluence:
Total flow rate = 2.071(CFS)
Time of concentration = 8.416 min.
Effective stream area after confluence = 0.730(Ac.)

+++++
Process from Point/Station 249.000 to Point/Station 255.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 618.100(Ft.)
Downstream point/station elevation = 617.700(Ft.)
Pipe length = 72.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 2.071(CFS)
Nearest computed pipe diameter = 12.00(In.)
Calculated individual pipe flow = 2.071(CFS)
Normal flow depth in pipe = 7.97(In.)
Flow top width inside pipe = 11.34(In.)
Critical Depth = 7.38(In.)
Pipe flow velocity = 3.74(Ft/s)
Travel time through pipe = 0.32 min.
Time of concentration (TC) = 8.74 min.

+++++
Process from Point/Station 256.000 to Point/Station 255.000
**** SUBAREA FLOW ADDITION ****

APARTMENT subarea type
Runoff Coefficient = 0.862
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Time of concentration = 8.74 min.
Rainfall intensity = 3.145(In/Hr) for a 100.0 year storm

Subarea runoff = 0.325(CFS) for 0.120(Ac.)
Total runoff = 2.397(CFS) Total area = 0.850(Ac.)

Process from Point/Station 255.000 to Point/Station 257.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 617.700(Ft.)
Downstream point/station elevation = 617.300(Ft.)
Pipe length = 72.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 2.397(CFS)
Nearest computed pipe diameter = 12.00(In.)
Calculated individual pipe flow = 2.397(CFS)
Normal flow depth in pipe = 8.92(In.)
Flow top width inside pipe = 10.49(In.)
Critical Depth = 7.96(In.)
Pipe flow velocity = 3.83(Ft/s)
Travel time through pipe = 0.31 min.
Time of concentration (TC) = 9.05 min.

Process from Point/Station 258.000 to Point/Station 257.000
**** SUBAREA FLOW ADDITION ****

APARTMENT subarea type
Runoff Coefficient = 0.862
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Time of concentration = 9.05 min.
Rainfall intensity = 3.090(In/Hr) for a 100.0 year storm
Subarea runoff = 0.399(CFS) for 0.150(Ac.)
Total runoff = 2.796(CFS) Total area = 1.000(Ac.)

Process from Point/Station 257.000 to Point/Station 246.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 617.300(Ft.)
Downstream point/station elevation = 617.200(Ft.)
Pipe length = 43.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 2.796(CFS)
Nearest computed pipe diameter = 15.00(In.)
Calculated individual pipe flow = 2.796(CFS)
Normal flow depth in pipe = 11.10(In.)
Flow top width inside pipe = 13.16(In.)
Critical Depth = 8.05(In.)
Pipe flow velocity = 2.87(Ft/s)
Travel time through pipe = 0.25 min.
Time of concentration (TC) = 9.30 min.

Process from Point/Station 257.000 to Point/Station 246.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area = 1.000(Ac.)
Runoff from this stream = 2.796(CFS)
Time of concentration = 9.30 min.
Rainfall intensity = 3.048(In/Hr)
Program is now starting with Main Stream No. 3

Process from Point/Station 259.000 to Point/Station 246.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 127.000(Ft.)
 Top (of initial area) elevation = 635.700(Ft.)
 Bottom (of initial area) elevation = 627.300(Ft.)
 Difference in elevation = 8.400(Ft.)
 Slope = 0.06614 s(percent)= 6.61
 $TC = k(0.323)*[(length^3)/(elevation\ change)]^{0.2}$
 Warning: TC computed to be less than 5 min.; program is assuming the
 time of concentration is 5 minutes.
 Initial area time of concentration = 5.000 min.
 Rainfall intensity = 4.157(In/Hr) for a 100.0 year storm
 APARTMENT subarea type
 Runoff Coefficient = 0.870
 Decimal fraction soil group A = 0.200
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.800
 Decimal fraction soil group D = 0.000
 RI index for soil(AMC 2) = 61.60
 Pervious area fraction = 0.200; Impervious fraction = 0.800
 Initial subarea runoff = 0.470(CFS)
 Total initial stream area = 0.130(Ac.)
 Pervious area fraction = 0.200

++++++
 Process from Point/Station 259.000 to Point/Station 246.000
 **** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 3
 Stream flow area = 0.130(Ac.)
 Runoff from this stream = 0.470(CFS)
 Time of concentration = 5.00 min.
 Rainfall intensity = 4.157(In/Hr)
 Summary of stream data:

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

1	13.251	8.50	3.188
2	2.796	9.30	3.048
3	0.470	5.00	4.157

Largest stream flow has longer or shorter time of concentration

Qp = 13.251 + sum of

$$\frac{Qa}{Qb} * \frac{Tb}{Ta} = 2.796 * \frac{0.914}{0.767} = 2.556$$

$$\frac{Qb}{Qc} * \frac{Tc}{Tb} = 0.470 * \frac{5.00}{9.30} = 0.361$$

 Qp = 16.168

Total of 3 main streams to confluence:

Flow rates before confluence point:
 13.251 2.796 0.470
 Area of streams before confluence:
 4.480 1.000 0.130

Results of confluence:

Total flow rate = 16.168(CFS)
 Time of concentration = 8.503 min.
 Effective stream area after confluence = 5.610(Ac.)

++++++
 Process from Point/Station 246.000 to Point/Station 260.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 617.200(Ft.)
 Downstream point/station elevation = 616.800(Ft.)
 Pipe length = 73.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 16.168(CFS)
 Nearest computed pipe diameter = 24.00(In.)
 Calculated individual pipe flow = 16.168(CFS)
 Normal flow depth in pipe = 18.96(In.)
 Flow top width inside pipe = 19.55(In.)

Critical Depth = 17.38(In.)
Pipe flow velocity = 6.07(Ft/s)
Travel time through pipe = 0.20 min.
Time of concentration (TC) = 8.70 min.

+++++
Process from Point/Station 246.000 to Point/Station 260.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 5.610(Ac.)
Runoff from this stream = 16.168(CFS)
Time of concentration = 8.70 min.
Rainfall intensity = 3.151(In/Hr)

+++++
Process from Point/Station 261.000 to Point/Station 262.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 64.000(Ft.)
Top (of initial area) elevation = 628.000(Ft.)
Bottom (of initial area) elevation = 627.300(Ft.)
Difference in elevation = 0.700(Ft.)
Slope = 0.01094 s(percent)= 1.09
 $TC = k(0.323)*[(length^3)/(elevation\ change)]^{0.2}$
Warning: TC computed to be less than 5 min.; program is assuming the
time of concentration is 5 minutes.
Initial area time of concentration = 5.000 min.
Rainfall intensity = 4.157(In/Hr) for a 100.0 year storm
APARTMENT subarea type
Runoff Coefficient = 0.870
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Initial subarea runoff = 0.579(CFS)
Total initial stream area = 0.160(Ac.)
Pervious area fraction = 0.200

+++++
Process from Point/Station 262.000 to Point/Station 263.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 618.200(Ft.)
Downstream point/station elevation = 617.900(Ft.)
Pipe length = 57.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 0.579(CFS)
Nearest computed pipe diameter = 9.00(In.)
Calculated individual pipe flow = 0.579(CFS)
Normal flow depth in pipe = 4.41(In.)
Flow top width inside pipe = 9.00(In.)
Critical Depth = 4.13(In.)
Pipe flow velocity = 2.69(Ft/s)
Travel time through pipe = 0.35 min.
Time of concentration (TC) = 5.35 min.

+++++
Process from Point/Station 264.000 to Point/Station 263.000
**** SUBAREA FLOW ADDITION ****

APARTMENT subarea type
Runoff Coefficient = 0.869
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Time of concentration = 5.35 min.

Rainfall intensity = 4.018(In/Hr) for a 100.0 year storm
Subarea runoff = 1.222(CFS) for 0.350(Ac.)
Total runoff = 1.801(CFS) Total area = 0.510(Ac.)

Process from Point/Station 263.000 to Point/Station 265.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 617.900(Ft.)
Downstream point/station elevation = 617.400(Ft.)
Pipe length = 104.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.801(CFS)
Nearest computed pipe diameter = 12.00(In.)
Calculated individual pipe flow = 1.801(CFS)
Normal flow depth in pipe = 7.61(In.)
Flow top width inside pipe = 11.56(In.)
Critical Depth = 6.85(In.)
Pipe flow velocity = 3.43(Ft/s)
Travel time through pipe = 0.50 min.
Time of concentration (TC) = 5.86 min.

Process from Point/Station 266.000 to Point/Station 265.000
**** SUBAREA FLOW ADDITION ****

APARTMENT subarea type
Runoff Coefficient = 0.868
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 61.60
Pervious area fraction = 0.200; Impervious fraction = 0.800
Time of concentration = 5.86 min.
Rainfall intensity = 3.841(In/Hr) for a 100.0 year storm
Subarea runoff = 0.867(CFS) for 0.260(Ac.)
Total runoff = 2.667(CFS) Total area = 0.770(Ac.)

Process from Point/Station 265.000 to Point/Station 260.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 617.400(Ft.)
Downstream point/station elevation = 616.800(Ft.)
Pipe length = 112.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 2.667(CFS)
Nearest computed pipe diameter = 15.00(In.)
Calculated individual pipe flow = 2.667(CFS)
Normal flow depth in pipe = 8.06(In.)
Flow top width inside pipe = 14.96(In.)
Critical Depth = 7.86(In.)
Pipe flow velocity = 3.97(Ft/s)
Travel time through pipe = 0.47 min.
Time of concentration (TC) = 6.33 min.

Process from Point/Station 265.000 to Point/Station 260.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 0.770(Ac.)
Runoff from this stream = 2.667(CFS)
Time of concentration = 6.33 min.
Rainfall intensity = 3.695(In/Hr)

Process from Point/Station 267.000 to Point/Station 260.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 115.000(Ft.)

Top (of initial area) elevation = 628.000(Ft.)
 Bottom (of initial area) elevation = 626.700(Ft.)
 Difference in elevation = 1.300(Ft.)
 Slope = 0.01130 s(percent)= 1.13
 $TC = k(0.323)*[(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 5.282 min.
 Rainfall intensity = 4.044(In/Hr) for a 100.0 year storm
 APARTMENT subarea type
 Runoff Coefficient = 0.869
 Decimal fraction soil group A = 0.200
 Decimal fraction soil group B = 0.000
 Decimal fraction soil group C = 0.800
 Decimal fraction soil group D = 0.000
 RI index for soil(AMC 2) = 61.60
 Pervious area fraction = 0.200; Impervious fraction = 0.800
 Initial subarea runoff = 1.195(CFS)
 Total initial stream area = 0.340(Ac.)
 Pervious area fraction = 0.200

++++++
 Process from Point/Station 267.000 to Point/Station 260.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 3
 Stream flow area = 0.340(Ac.)
 Runoff from this stream = 1.195(CFS)
 Time of concentration = 5.28 min.
 Rainfall intensity = 4.044(In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	16.168	8.70	3.151
2	2.667	6.33	3.695
3	1.195	5.28	4.044

Largest stream flow has longer time of concentration

Qp = 16.168 + sum of
 $Q_b \quad I_a/I_b$
 $2.667 * 0.853 = 2.275$
 $Q_b \quad I_a/I_b$
 $1.195 * 0.779 = 0.931$
 Qp = 19.374

Total of 3 streams to confluence:
 Flow rates before confluence point:
 16.168 2.667 1.195
 Area of streams before confluence:
 5.610 0.770 0.340
 Results of confluence:
 Total flow rate = 19.374(CFS)
 Time of concentration = 8.703 min.
 Effective stream area after confluence = 6.720(Ac.)

++++++
 Process from Point/Station 260.000 to Point/Station 268.000
 **** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 616.800(Ft.)
 Downstream point/station elevation = 616.100(Ft.)
 Pipe length = 150.00(Ft.) Manning's N = 0.013
 No. of pipes = 1 Required pipe flow = 19.374(CFS)
 Nearest computed pipe diameter = 27.00(In.)
 Calculated individual pipe flow = 19.374(CFS)
 Normal flow depth in pipe = 20.32(In.)
 Flow top width inside pipe = 23.30(In.)
 Critical Depth = 18.48(In.)
 Pipe flow velocity = 6.03(Ft/s)
 Travel time through pipe = 0.41 min.
 Time of concentration (TC) = 9.12 min.
 End of computations, total study area = 6.72 (Ac.)
 The following figures may

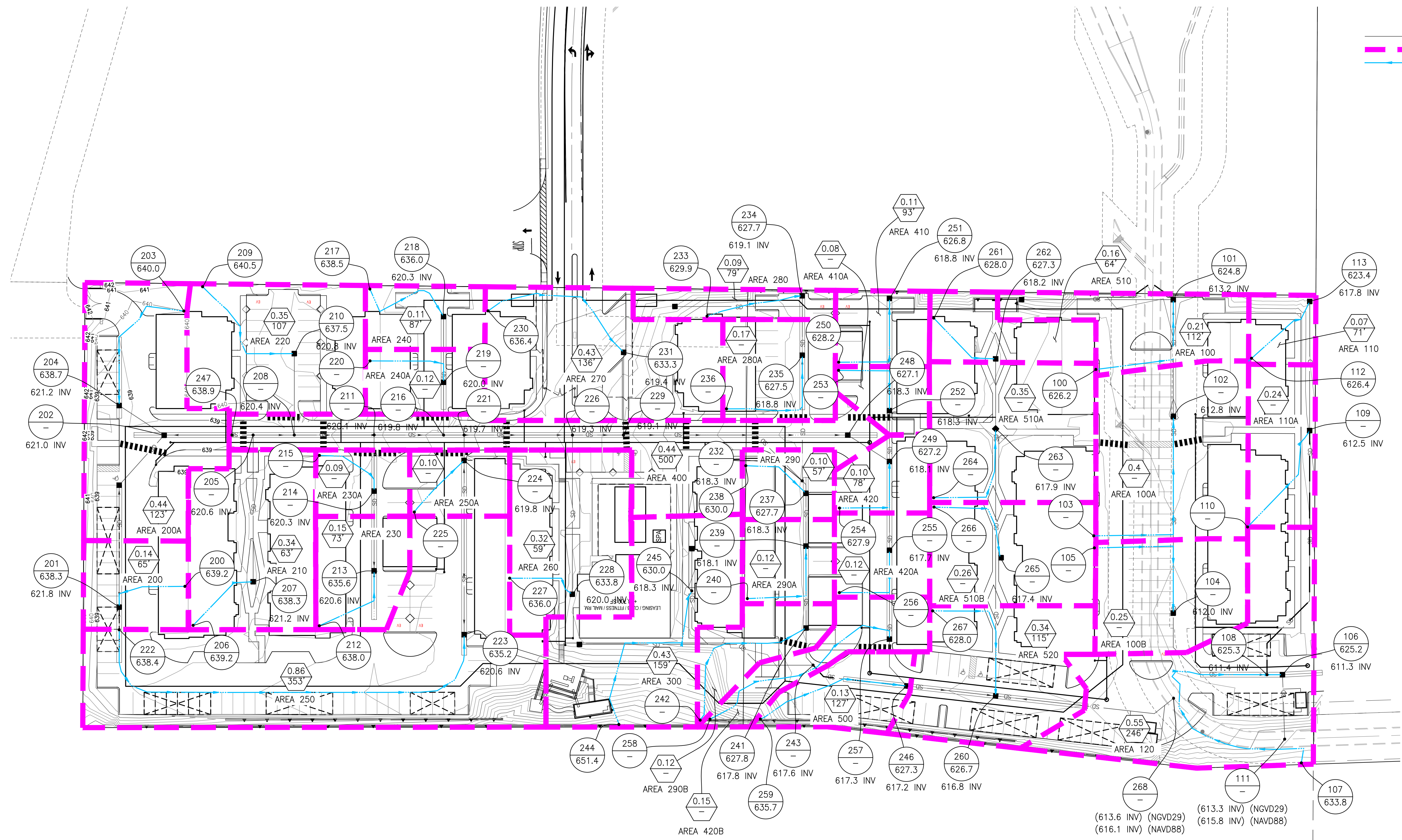
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(A_p) = 0.200

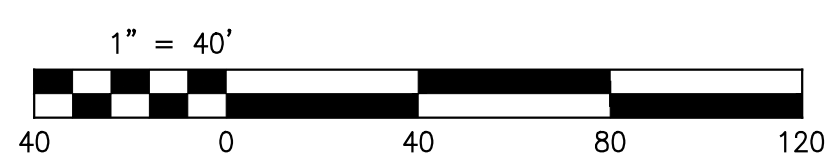
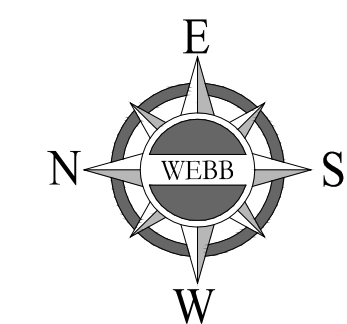
Area averaged RI index number = 61.6

RATIONAL METHOD HYDROLOGY MAPS

12/17/2021



- SD STORM DRAIN CENTERLINE
- DRAINAGE MANAGEMENT BOUNDARY
- FLOW DIRECTION
- LANDSCAPING
- 101
14xx
NODE DESIGNATION
NODE ELEVATION
- XXXX.X INV
INVERT ELEVATION
- 5.0
1000
WATERSHED AREA (ACRES)
LONGEST WATER PATH (FT)



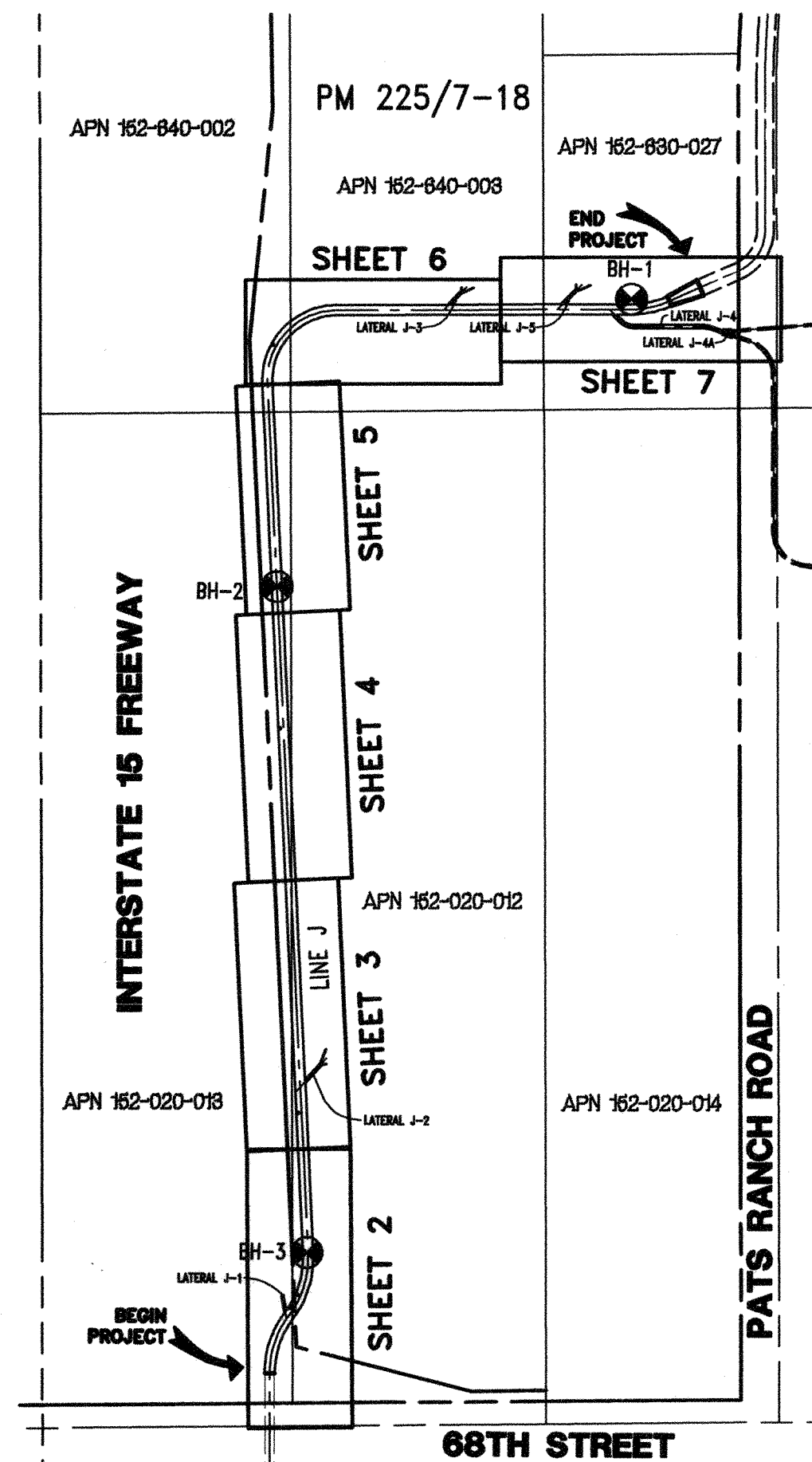
COUNTY OF RIVERSIDE			
RATIONAL METHOD HYDROLOGY MAP 20-0251 VMAC-B			
SCALE: 1"=40'	DATE: 12/17/21	DESIGNED: RSB	CHECKED: 9KK
PLN CK REF: F.B.	ALBERT A. WEBB ASSOCIATES	ENGINEERING CONSULTANTS 3788 MCGRAY STREET RIVERSIDE, CA 92506 PH. (951) 686-1070 FAX (951) 788-1256	W.O. 20-0251 SHEET 1 OF 1 SHEETS DWG. NO.

H:\2020\20-0251\DRAINAGE\HYD\DWG LAYOUT.DWG 12/17/2021 4:13:14 PM

APPENDIX B – REFERENCES

LINE J SD IMPROVEMENT PLANS

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT



INDEX MAP

GENERAL NOTES

- 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 JUNE 2008, AND STANDARD DRAWINGS, RECENT EDITION DATED APRIL 2005.
- THE CONTRACTOR IS REQUIRED TO CONTACT ALL UTILITY AGENCIES REGARDING TEMPORARY SUPPORT AND SHORING REQUIREMENTS FOR THE VARIOUS UTILITIES SHOWN IN THE PLAN.
- CONSTRUCTION INSPECTION WILL BE PERFORMED BY RIVERSIDE COUNTY FLOOD CONTROL. CONTACT HENRY OLIVO AT (951) 955-1288. THE DISTRICT MUST BE NOTIFIED TWENTY DAYS PRIOR TO CONSTRUCTION.
- ALL STATIONING REFERS TO THE CENTERLINE OF CONSTRUCTION UNLESS OTHERWISE NOTED.
- STATIONING FOR LATERALS AND CONNECTOR PIPE REFER TO THE CENTERLINE-CENTERLINE INTERSECTION STATION.
- FORTY-EIGHT HOURS BEFORE EXCAVATION, CALL UNDERGROUND SERVICE ALERT (800) 227-2600.
- ALL ELEVATIONS SHOWN ARE IN FEET AND DECIMALS THEREOF BASED ON U.S.C. & G.S. DATUM.

MB 352/40-54

MB 421/93-101

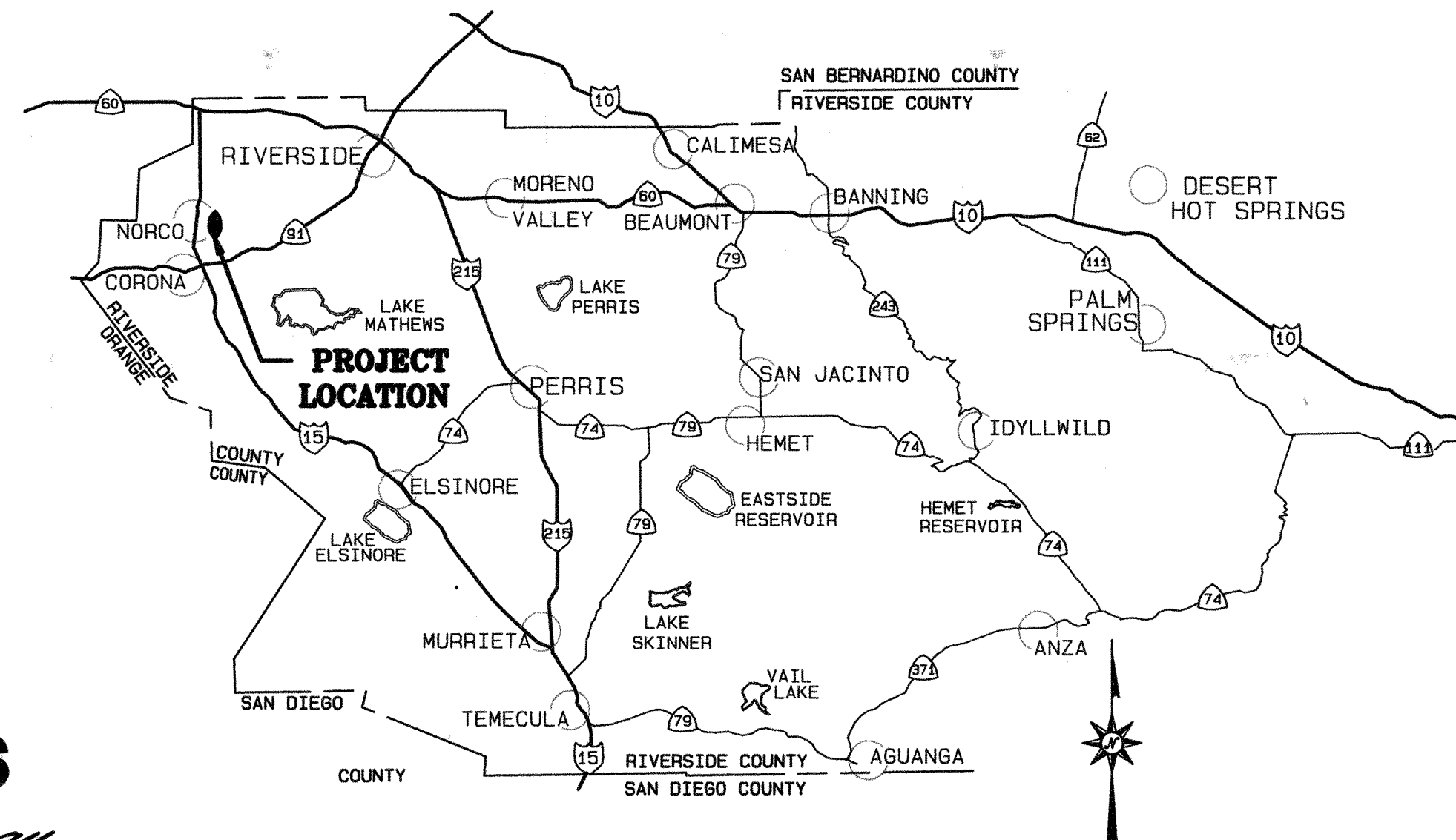
RECORD DRAWINGS

APPROVED BY: *[Signature]*

DATE: 4/18/13

GENERAL NOTES CONT.

- ALL CROSS SECTIONS ARE TAKEN LOOKING DOWNSTREAM.
- ELEVATIONS AND LOCATIONS OF UTILITIES SHOWN ARE APPROXIMATE UNLESS OTHERWISE NOTED. ALL UTILITIES ARE TO BE PROTECTED IN PLACE UNLESS OTHERWISE NOTED.
- OPENINGS RESULTING FROM THE CUTTING OR PARTIAL REMOVAL OF EXISTING CULVERTS, PIPES OR SIMILAR STRUCTURES TO BE ABANDONED SHALL BE SEALED WITH 6 INCHES OF CLASS "B" CONCRETE.
- 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.
- HYDRAULIC GRADE LINES SHOWN IN PROFILES ARE FOR 100 YEAR FREQUENCY FLOWS, UNLESS OTHERWISE NOTED.
- THE CONTRACTOR SHALL COMPLY WITH THE STATE AND LOCAL SAFETY CODES DURING THE PROGRESS OF WORK.
- THE CONTRACTOR SHALL MAINTAIN ADJACENT STREETS IN A NEAT, SAFE, CLEAN AND SANITARY CONDITION AT ALL TIMES AND TO THE SATISFACTION OF R.C.F.C. & W.C.D.'S INSPECTOR. THE ADJACENT STREETS SHALL BE KEPT CLEAN OF DEBRIS, WITH DUST AND OTHER NUISANCE BEING CONTROLLED AT ALL TIMES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY CLEAN-UP ON ADJACENT STREETS AFFECTED BY HIS CONSTRUCTION. METHOD OF STREET CLEANING SHALL BE BY DRY SWEEPING OF ALL PAVED AREAS.
- PIPE CONNECTED TO THE MAINLINE PIPE SHALL CONFORM TO JUNCTION STRUCTURE NO. 4 (JS 229) UNLESS OTHERWISE NOTED.
- ADJUST ALL STORM DRAIN AND SEWER MANHOLES, AND WATER VALVES TO GRADE.
- ALL PIPE LENGTHS ARE HORIZONTAL PROJECTIONS (NOT TRUE LENGTHS OF PIPE) AND ARE THE BASIS OF THE ESTIMATES OF QUANTITIES. THE CONTRACTOR SHALL DETERMINE THE TRUE QUANTITY OF PIPE REQUIRED FOR THIS PROJECT PRIOR TO PLACING THE ORDER.
- ELEVATIONS SHOWN ARE TO THE INVERT OF PIPE, EXCEPT WHERE OTHERWISE NOTED.
- AT THE DISCRETION OF THE ENGINEER, THE CONTRACTOR MAY BE REQUIRED TO VERIFY BY POT-HOLING THE LOCATION OF POTENTIALLY AFFECTED UTILITIES.
- BH-1 INDICATES SOIL BORING LOCATIONS BASED ON THE SOILS REPORT DATED 25 JULY 2011. LOCATIONS SHOWN ARE APPROXIMATE.



VICINITY MAP
N.T.S.

GENERAL NOTES CONT.

- ALL BACKFILL AND BEDDING AROUND STRUCTURES AND PIPES SHALL BE COMPACTED TO NOT LESS THAN 90 PERCENT RELATIVE COMPACTION EXCEPT WHERE SUCH MATERIAL IS PLACED UNDER EXISTING PAVED ROADWAYS, THE TOP 3 FEET, MEASURED FROM THE FINISHED PAVING, SHALL BE COMPACTED TO 95 PERCENT RELATIVE COMPACTION.
- PIPE BEDDING SHALL CONFORM TO RCFC&WCD STD. DWG. NO. MB15 EXCEPT FOR COVER <2 FEET. FOR COVER <2 FEET, CONCRETE SLURRY (2000 PSI - 2 SACK) SHALL BE USED. THE ENTIRE TRENCH SHALL BE SLURRY EXTENDING 4 INCHES MINIMUM AND 12 INCHES MAXIMUM ABOVE THE TOP OF THE PIPE.
- APPROVAL OF THESE PLANS BY THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT DOES NOT RELIEVE THE DESIGN ENGINEER OF RESPONSIBILITY FOR THE ENGINEERING DESIGN. IF FIELD CHANGES ARE REQUIRED, IT WILL BE THE RESPONSIBILITY OF THE DESIGN ENGINEER TO MAKE THE NECESSARY CORRECTIONS.
- THE CONTRACTOR SHALL SECURE ALL REQUIRED ENCROACHMENT AND/OR STATE AND FEDERAL REGULATORY PERMITS PRIOR TO THE COMMENCEMENT OF ANY WORK.
- STANDARD DRAWINGS CALLED FOR ON THE PLAN & PROFILE SHALL CONFORM TO R.C.F.C. & W.C.D. STD. DRAWINGS, CALTRANS, APWA OR RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT STANDARD PLANS.

TRAFFIC GENERAL NOTES:

- ANY CONTRACTOR PERFORMING WORK ON THIS PROJECT SHALL FAMILIARIZE HIMSELF WITH THIS SITE AND SHALL BE SOLELY RESPONSIBLE FOR ANY DAMAGE TO EXISTING FACILITIES RESULTING DIRECTLY OR INDIRECTLY FROM THEIR OPERATIONS, WHETHER OR NOT SUCH FACILITIES ARE SHOWN ON THESE PLANS.
- CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS AND A BUSINESS LICENSE FROM RIVERSIDE COUNTY AND CALTRANS.
- IN CASE OF ACCIDENTS INVOLVING SAFETY MATTERS COVERED BY SECTION 6409.1B OF THE CALIFORNIA LABOR CODE, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE STATE DIVISION OF INDUSTRIAL SAFETY.
- CONSTRUCTION TRUCK TRAFFIC MERGING INTO TRAFFIC LANES SHALL BE BY USE OF FLAGMAN AND APPROPRIATE SIGNAGE.
- TRAFFIC CONTROL CHANNELIZERS SHALL BE EPOXYED TO THE PAVEMENT.

SHEET INDEX

TITLE SHEET
PLAN & PROFILE LINE J
PLAN & PROFILE LATERAL J-1 LATERAL DETAILS
PLAN & PROFILE LATERAL J-2 LATERAL DETAILS
PLAN & PROFILE LATERAL J-3 LATERAL DETAILS
PLAN & PROFILE LATERAL J-4 & J-4A LATERAL DETAILS
PLAN & PROFILE LATERAL J-5 LATERAL DETAILS
GRADING PLANS
GRADING PLANS
TRAFFIC CONTROL PLANS

SHEET NO.

1
2-7
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RCFC & WCD STD. DWGS.

JS226 JUNCTION STRUCTURE NO. 1
JS228 JUNCTION STRUCTURE NO. 3
M801 CHAIN LINK FENCE
M803 CONCRETE COLLAR
MH253 MANHOLE NO. 3
MH254 MANHOLE NO. 4
TS304 TRANSITION STRUCTURE NO. 4

CALTRANS STD. DWGS.

D75A STEEL PIPE INLET (TYPE OMP)
D80 REINFORCED CONCRETE SINGLE BOX CULVERT
D82 RCB CONNECTION DETAIL
D90 PIPE CULVERT HEADWALL

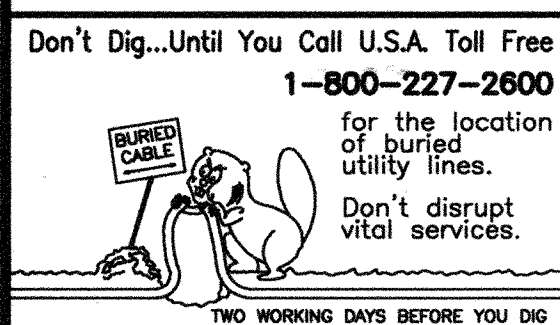
APWA STD. DWGS.

361-2 TRASH RACK

TRAFFIC HANDLING NOTES:

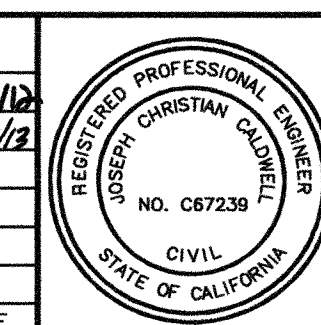
- ALL ITEMS TO BE FURNISHED AND ALL WORK TO BE DONE SHALL CONFORM TO REQUIREMENTS OF THE STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION (CALTRANS) STANDARD PLANS AND STANDARD SPECIFICATIONS, 2006 CA-MUTCD AND THE SPECIAL PROVISIONS.
- TRAFFIC HANDLING PLAN SHOWN HEREIN IS THE MINIMUM REQUIRED. ADDITIONAL TRAFFIC HANDLING MEASURES MAY BE REQUIRED TO FACILITATE PUBLIC SAFETY AND TRAFFIC FLOW AS DEEMED NECESSARY BY THE CALTRANS REPRESENTATIVE.
- THROUGHOUT EACH WORK PERIOD, THE CONTRACTOR SHALL APPOINT A PERSON TO INSPECT THE TRAFFIC CONTROL DEVICES, SIGNS, BARRICADES, AND DELINEATORS.
- CONTRACTOR SHALL MAINTAIN A 12' MINIMUM LANE WIDTH AT ALL TIMES.
- ALL SIGNS DESIGNATED WITH A NUMBER AND LETTER ARE TO BE PER CALTRANS 2010 CA-MUTCD STANDARDS.
- CONTRACTOR SHALL COVER EXISTING TRAFFIC SIGNS SHOULD SAID SIGNS CONFLICT WITH TRAFFIC CONTROL AND AS DIRECTED BY THE CALTRANS REPRESENTATIVE.
- TEMPORARY PAVEMENT DELINEATION; IF ANY, SHALL BE FURNISHED, PLACED, MAINTAINED AND REMOVED IN ACCORDANCE WITH THE PROVISIONS IN SECTION 12-3.01, "GENERAL," OF THE STANDARD SPECIFICATIONS.
- WHENEVER THE WORK CAUSES OBLITERATION OF PAVEMENT DELINEATION, TEMPORARY OR PERMANENT PAVEMENT DELINEATION SHALL BE IN PLACE PRIOR TO OPENING THE TRAVELED WAY TO PUBLIC TRAFFIC. LANELINES AND CENTERLINE PAVEMENT DELINEATION SHALL BE PROVIDED AT ALL TIMES FOR TRAVELED WAYS OPEN TO PUBLIC TRAFFIC.
- CONTRACTOR SHALL OBTAIN AN ENCROACHMENT PERMIT FROM CALTRANS BEFORE BEGINNING ANY WORK IN THE STATE RIGHT-OF-WAY.
- ALL WORK WITHIN THE STATE RIGHT-OF-WAY SHALL CONFORM TO THE LATEST STANDARD PLANS AND SPECIFICATIONS OR AS DIRECTED BY THE CALTRANS REPRESENTATIVE. USE OF ANY STANDARD OTHER THAN STATE STANDARDS MUST BE PRE-APPROVED AND JUSTIFIED.
- NO EQUIPMENT OR MATERIAL SHALL BE STORED IN THE STATE RIGHT-OF-WAY.
- THE CONTRACTOR SHALL MAINTAIN ON A 24-HOUR BASIS ALL SIGNS, DELINEATORS, BARRICADES, ETC., TO ENSURE PROPER FLOW AND SAFETY OF TRAFFIC.
- ANY REVISIONS TO THESE DRAWINGS SHALL BE APPROVED IN ADVANCE AND IN WRITING BY THE ENGINEER OF RECORD AND THE AGENCY HAVING JURISDICTION.
- CONTRACTOR SHALL INSTALL TEMPORARY RAILING (TYPE K) BETWEEN A LANE OPEN TO PUBLIC TRAFFIC AND AN EXCAVATION PER PROVISIONS IN SECTION 7-1.09, "PUBLIC SAFETY", OF THE STANDARD SPECIFICATIONS.
- THE CONTRACTOR SHALL CALL THE CALTRANS REPRESENTATIVE FOR INSPECTION AT LEAST SEVEN (7) DAYS IN ADVANCE OF TRAFFIC CONTROL DEVICE SET UP.

CALTRANS REFERENCE NO. 08-10-N-DD-0257



BENCH MARK: ELEVATION = 674.773'
RIVERSIDE COUNTY BENCHMARK, BM ML 15-64
ESTABLISHED 4/1964
DATUM = NGVD29 (USC & GS)
BASIS OF BEARINGS: THE CENTERLINE OF SCHLEISHMAN ROAD PER RECORD OF SURVEY 110/68 TAKEN AS NORTH 89°35'55"E

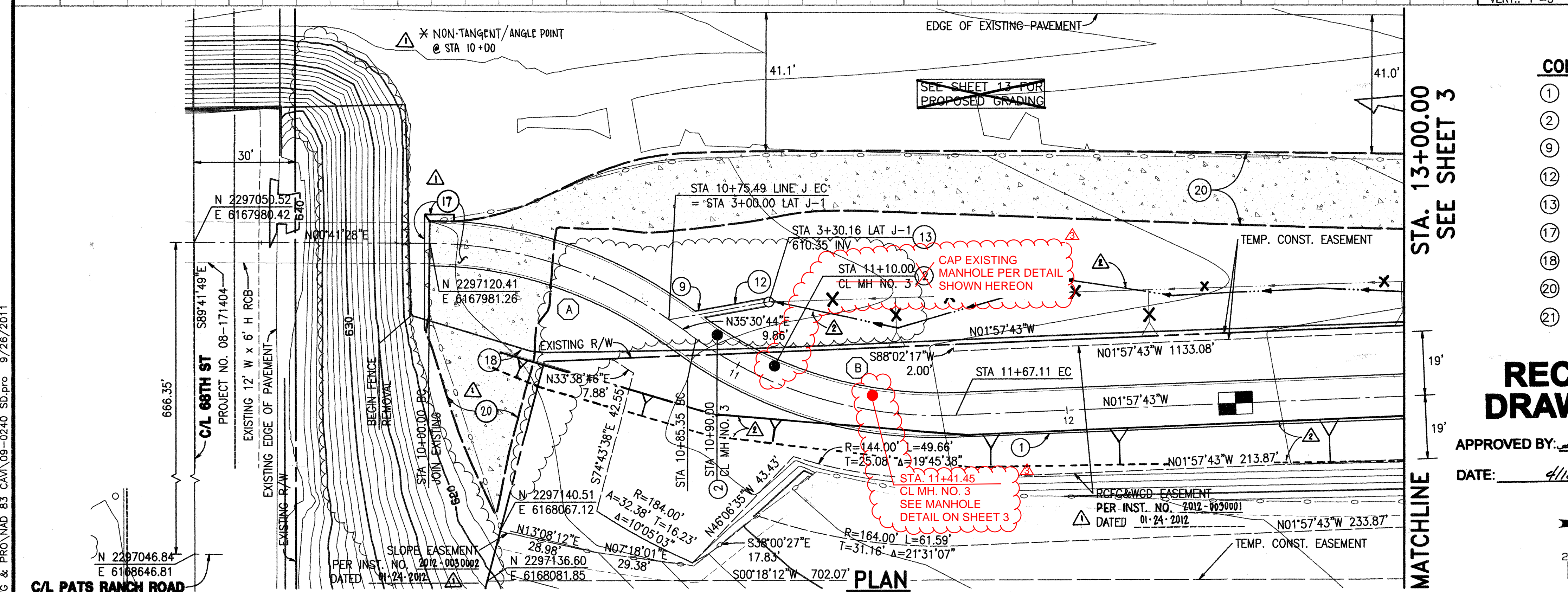
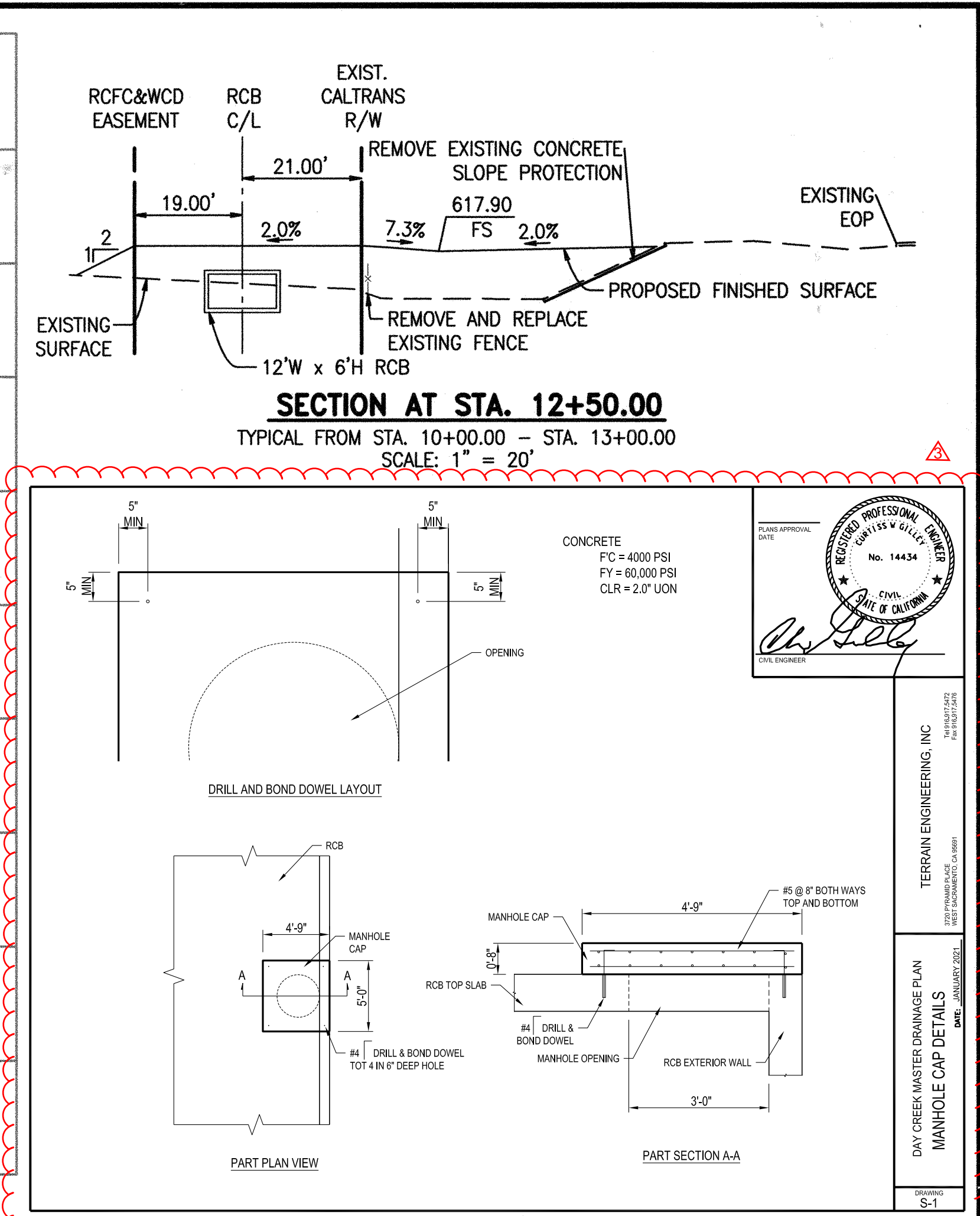
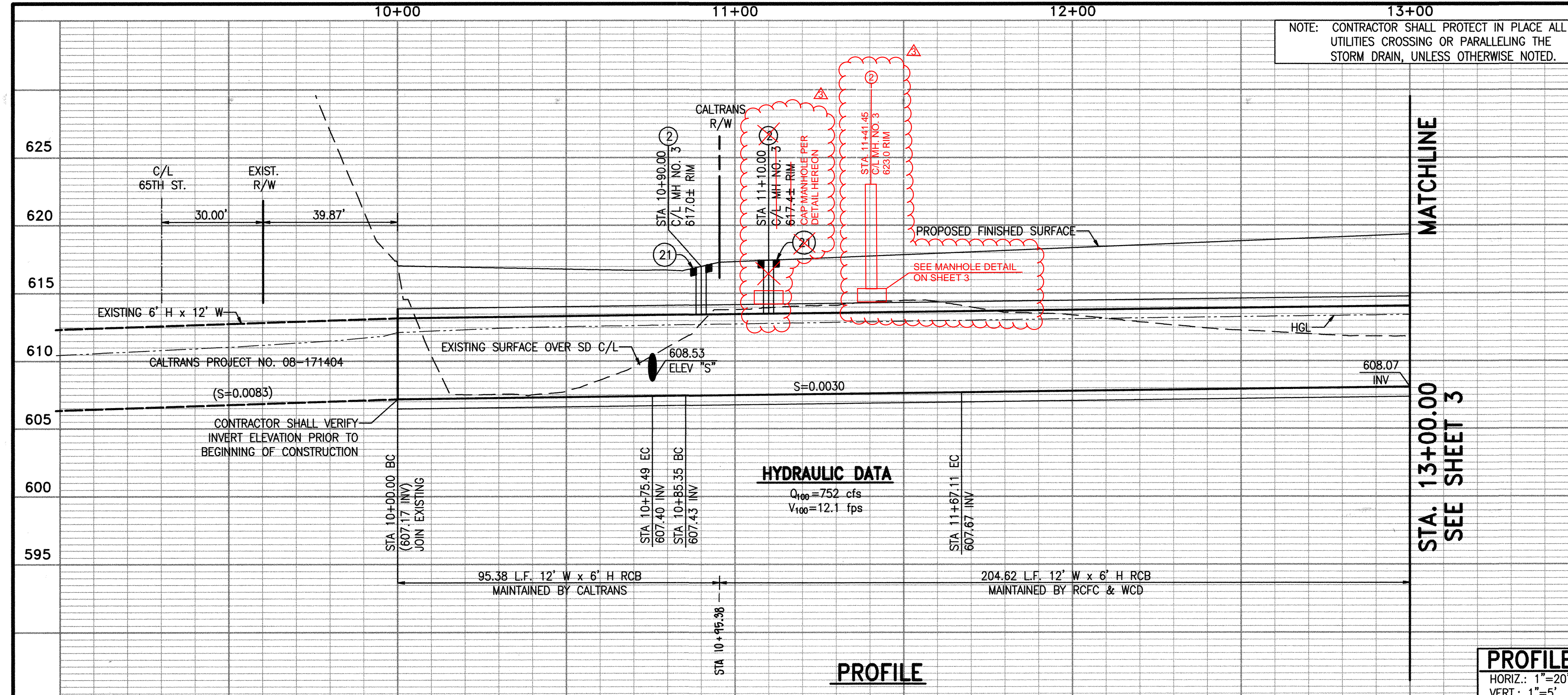
REVISIONS		DATE
1	ADDED INFORMATION	4/18/13
2	RECORD DRAWINGS	4/18/13
3	ADDITION OF MANHOLE CAP AND MANHOLE	4/18/13
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ALBERT A. WEBB ASSOCIATES
3788 McCRAV STREET, RIVERSIDE, CA. 92506
PH. (951) 686-1070 FAX (951) 788-1256
DESIGNED BY: MLA
DRAWN BY: MLA
CHECKED BY: JCC
PREPARED BY: *[Signature]* DATE: 2-27-11
R.C.E. NO. C67239 EXP. DATE 9-30-12

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED BY: *[Signature]*
PLANNING ENGINEER
DATE: 10/4/2011
APPROVED BY: *[Signature]*
CHIEF ENGINEER
DATE: 10/5/11

DAY CREEK
MASTER DRAINAGE PLAN
LINE J STAGE 2
TITLE SHEET
PROJECT NO. 2-0-00272-02
DRAWING NO. 1-695
SHEET NO. 1 OF 15



CONSTRUCTION NOTES

1. CONSTRUCT 12'W x 6'H SINGLE CELL RCB (CAST-IN-PLACE) PER CALTRANS STD. NO. D80
2. CONSTRUCT MANHOLE NO. 3 PER R.C.F.C & W.C.D. STD. MH253
9. CONSTRUCT JUNCTION STRUCTURE NO. 3 PER R.C.F.C. & W.C.D. STD. JS228
12. INSTALL 24" RCP (D-LOAD PER PLAN). SEE SHEET 8
13. CONSTRUCT STEEL PIPE INLET TYPE OMP PER CALTRANS STD. D75A
17. CONNECT TO EXISTING RCB PER CALTRANS STD. D82, DETAIL A AND REMOVE EXIST. HEADWALL AND APRON.
18. REMOVE EXISTING FENCE AND REPLACE WITH NEW FENCE PER CALTRANS STD. A85
20. REMOVE EXISTING CONCRETE SLOPE PROTECTION
21. CONSTRUCT 6' x 6' x 6" THICK PCC PAD W/ #4 @ 18" O.C. CENTERED ON MANHOLE

RECORD DRAWINGS

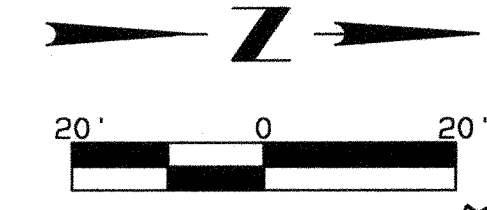
APPROVED BY: *[Signature]*
DATE: 4/18/13

A CURVE DATA

B CURVE DATA

A=34°36'12"
R=125.00'
L=75.49'
T=38.94'
BC=STA 10+00.00
EC=STA 10+75.49
PI= N 2297159.32, E 6167981.88

B=37°28'28"
R=125.00'
L=81.76'
T=42.40'
BC=STA 10+85.35
EC=STA 11+67.11
PI= N 2297233.56, E 6168034.85



Don't Dig...Until You Call U.S.A. Toll Free 1-800-227-2600 for the location of buried utility lines. Don't disrupt vital services. TWO WORKING DAYS BEFORE YOU DIG

BENCH MARK: ELEVATION = 674.773'
RIVERSIDE COUNTY BENCHMARK, BM ML 15-64
ESTABLISHED 4/1964
DATUM = NGVD29 (USC & GS)
BASIS OF BEARINGS: THE CENTERLINE OF SCHLEISHMAN ROAD PER RECORD OF SURVEY 110/68 TAKEN AS NORTH 89°35'55"E

REVISIONS	
1	ADDED INFORMATION
2	ACTUAL SLOPE AND ACTUAL FLOW LINE OF GRADE
3	ADDITION OF MANHOLE CAP AND MANHOLE
REF.	DESCRIPTION

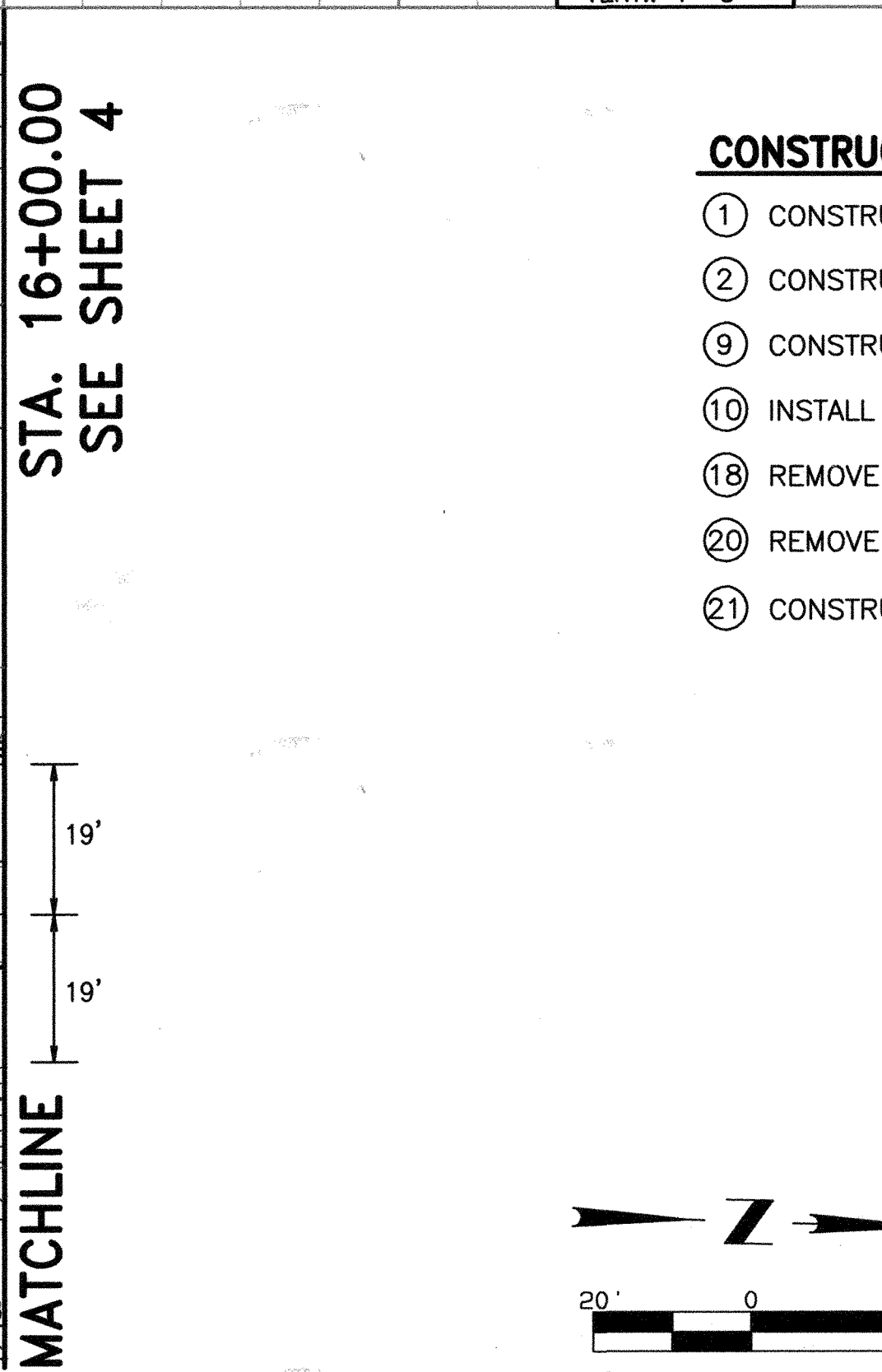
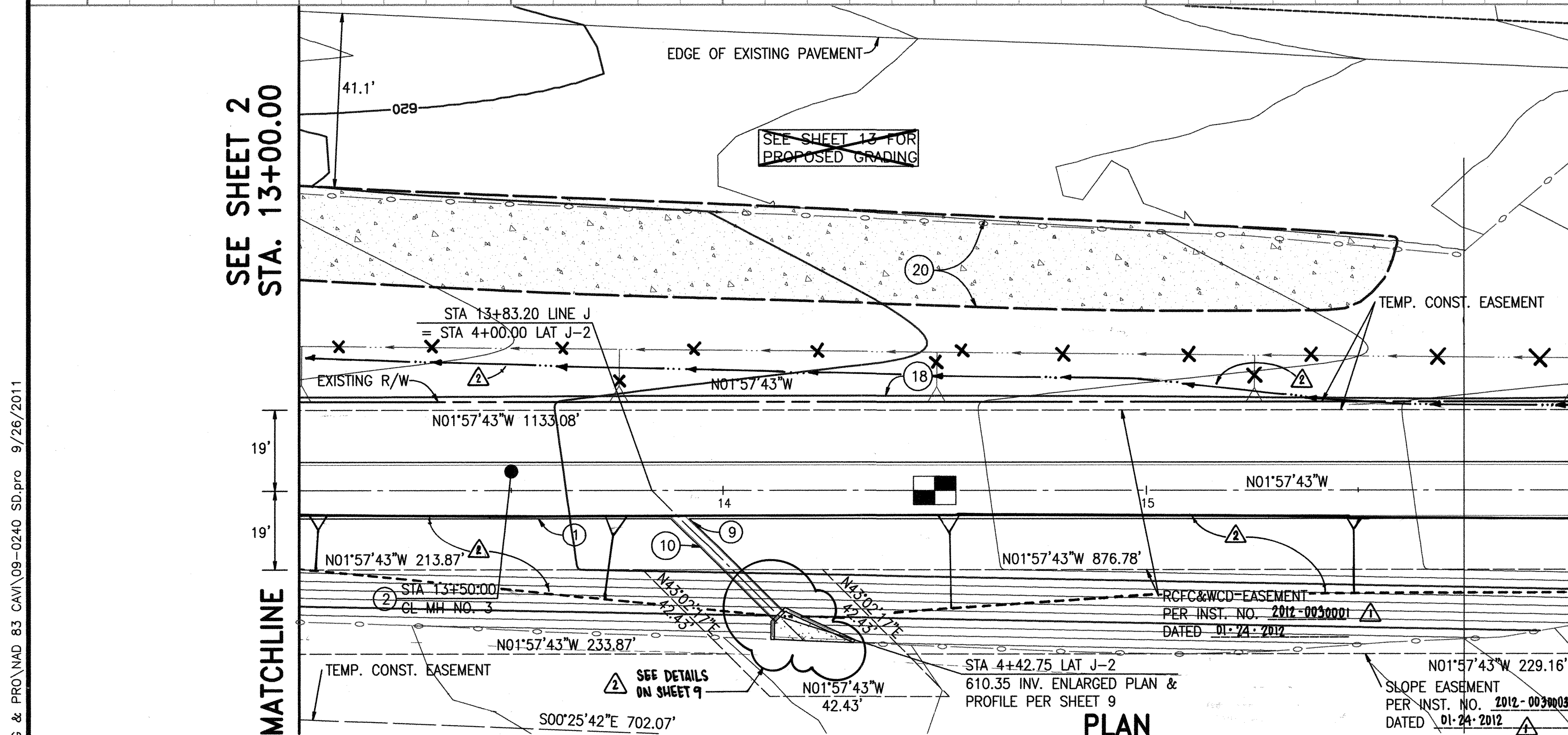
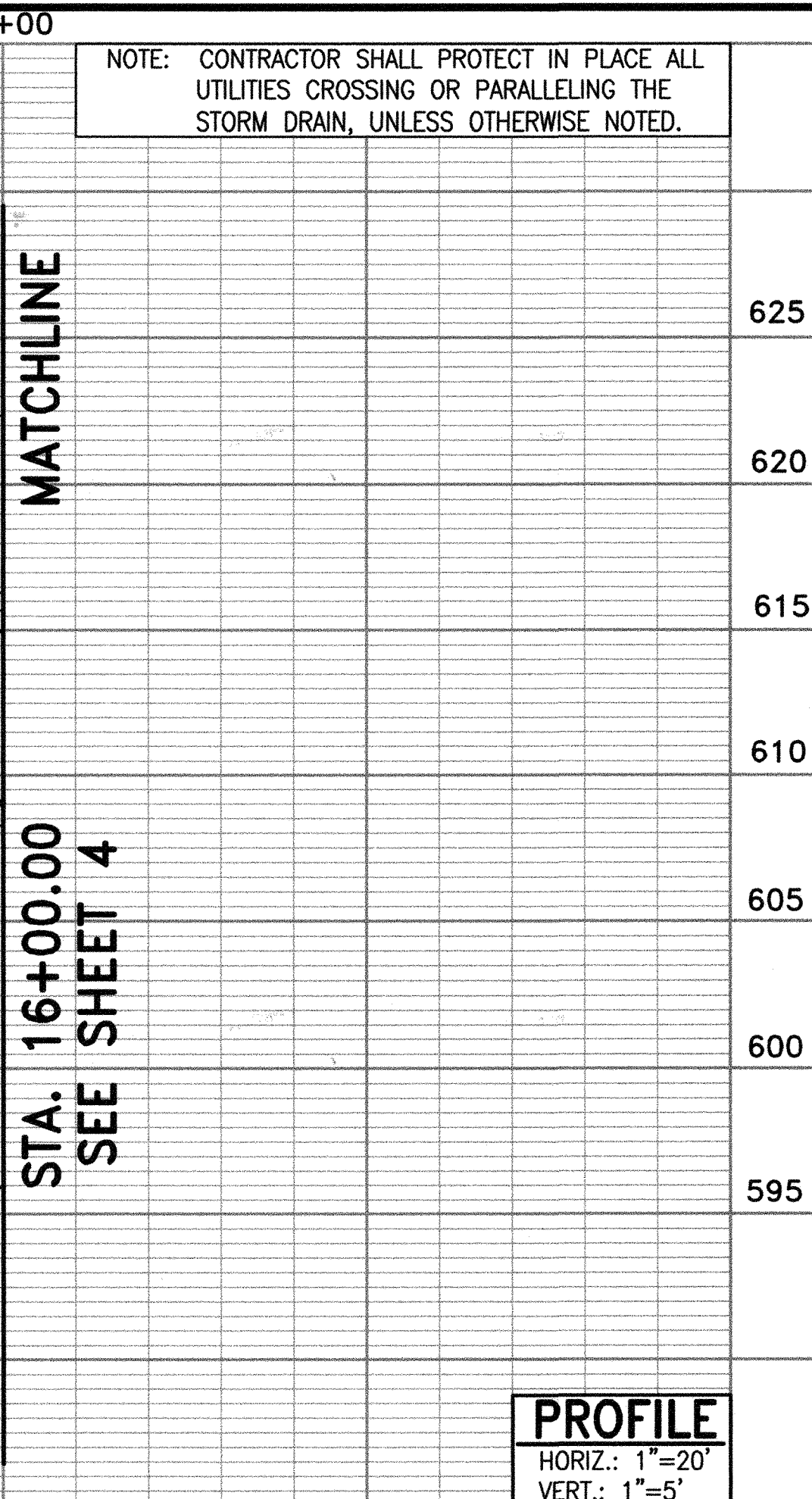
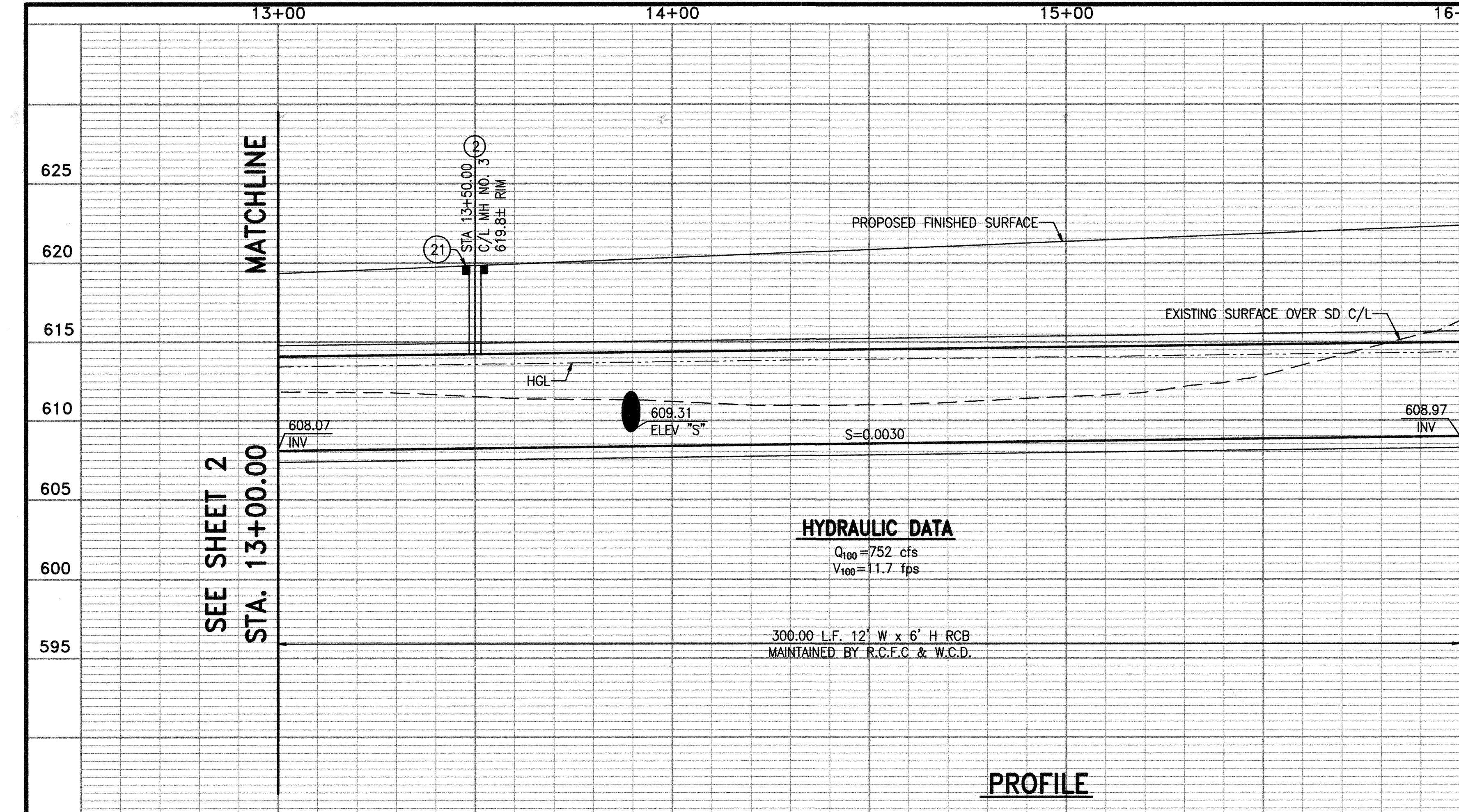


ALBERT A. WEBB ASSOCIATES
3788 McCRAY STREET, RIVERSIDE, CA. 92506
PH. (951) 686-1070 FAX (951) 788-1256
DESIGNED BY: MLA
DRAWN BY: MLA
CHECKED BY: JCC
PREPARED BY: *[Signature]* DATE: 9-27-11
R.C.E. NO. C67239 EXP. DATE 9-30-12

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED BY: *[Signature]* 10/3/2011
APPROVED BY: *[Signature]* 10/4/2011
DATE: 10/4/2011

DAY CREEK MASTER DRAINAGE PLAN
LINE J STAGE 2
STA. 10+00.00 - STA. 13+00.00

PROJECT NO. 2-0-00272-02
DRAWING NO. 1-695
SHEET NO. 2 OF 15



CONSTRUCTION NOTES

- 1) CONSTRUCT 12'W x 6'H SINGLE CELL RCB (CAST-IN-PLACE) PER CALTRANS STD. NO. D80
- 2) CONSTRUCT MANHOLE NO. 3 PER R.C.F.C. & W.C.D. STD. MH253
- 9) CONSTRUCT JUNCTION STRUCTURE NO. 3 PER R.C.F.C. & W.C.D. STD. JS228
- 10) INSTALL 30" RCP (D-LOAD PER PLAN)
- 18) REMOVE EXISTING FENCE AND REPLACE WITH NEW FENCE PER CALTRANS STD. A85
- 20) REMOVE EXISTING CONCRETE SLOPE PROTECTION
- 21) CONSTRUCT 6' x 6' x 6" THICK PCC PAD W/ #4 @ 18" O.C. CENTERED ON MANHOLE

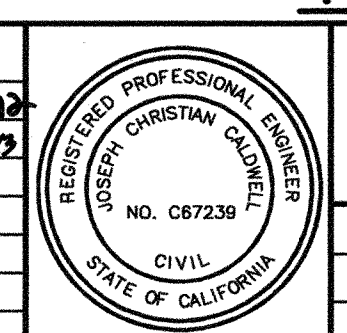
RECORD DRAWINGS

APPROVED BY: *[Signature]*
DATE: 4/18/13

Don't Dig...Until You Call U.S.A. Toll Free 1-800-227-2600 for the location of buried utility lines. Don't disrupt vital services. TWO WORKING DAYS BEFORE YOU DIG

BENCH MARK: ELEVATION = 674.773'
RIVERSIDE COUNTY BENCHMARK, BM ML 15-64
ESTABLISHED 4/1964
DATUM = NGVD29 (USC & GS)
BASIS OF BEARINGS: THE CENTERLINE OF SCHLEISHMAN ROAD PER RECORD OF SURVEY 110/68 TAKEN AS NORTH 89°35'55"E

REVISIONS		DATE
1	ADDED INFORMATION	4/18/13
2	ACTUAL SLOPE AND ACTUAL FLOW LINE OF GRADE	4/18/13
3	ADDITION OF MANHOLE CAP AND MANHOLE	4/18/13
REF.	DESCRIPTION	APPR.

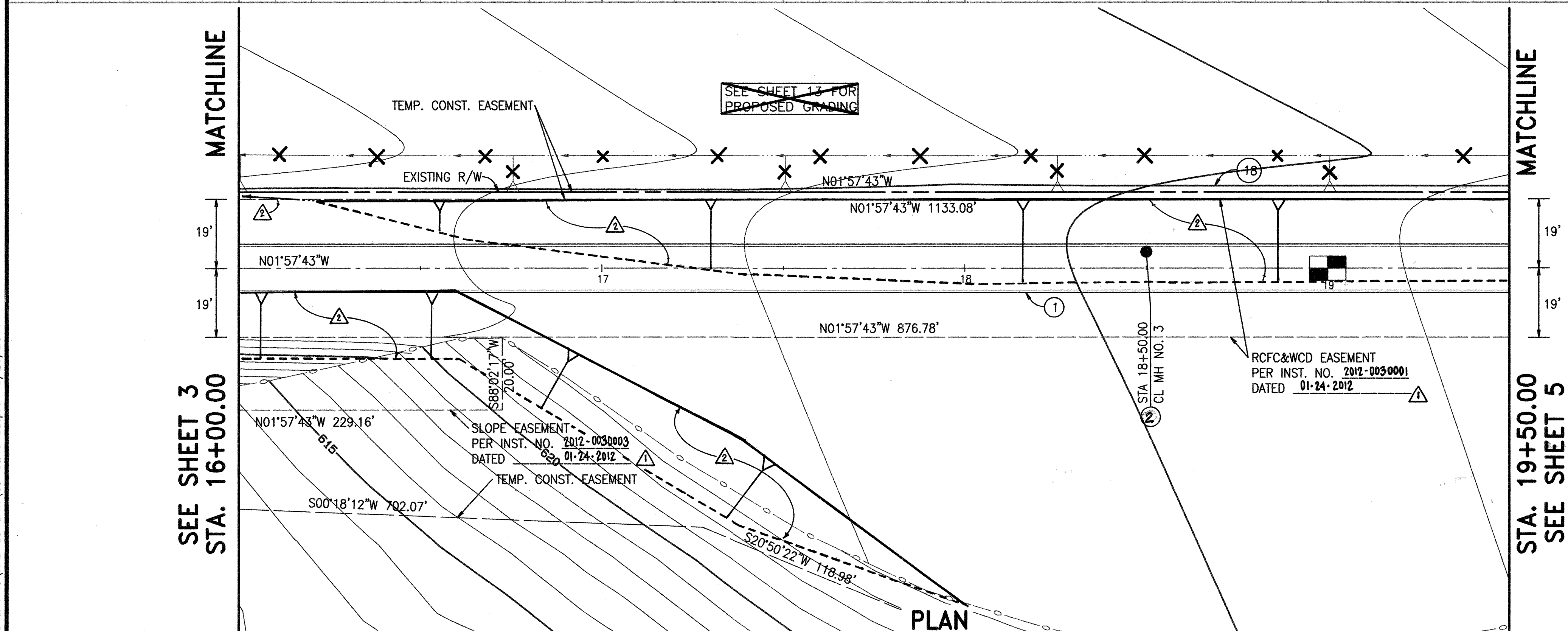
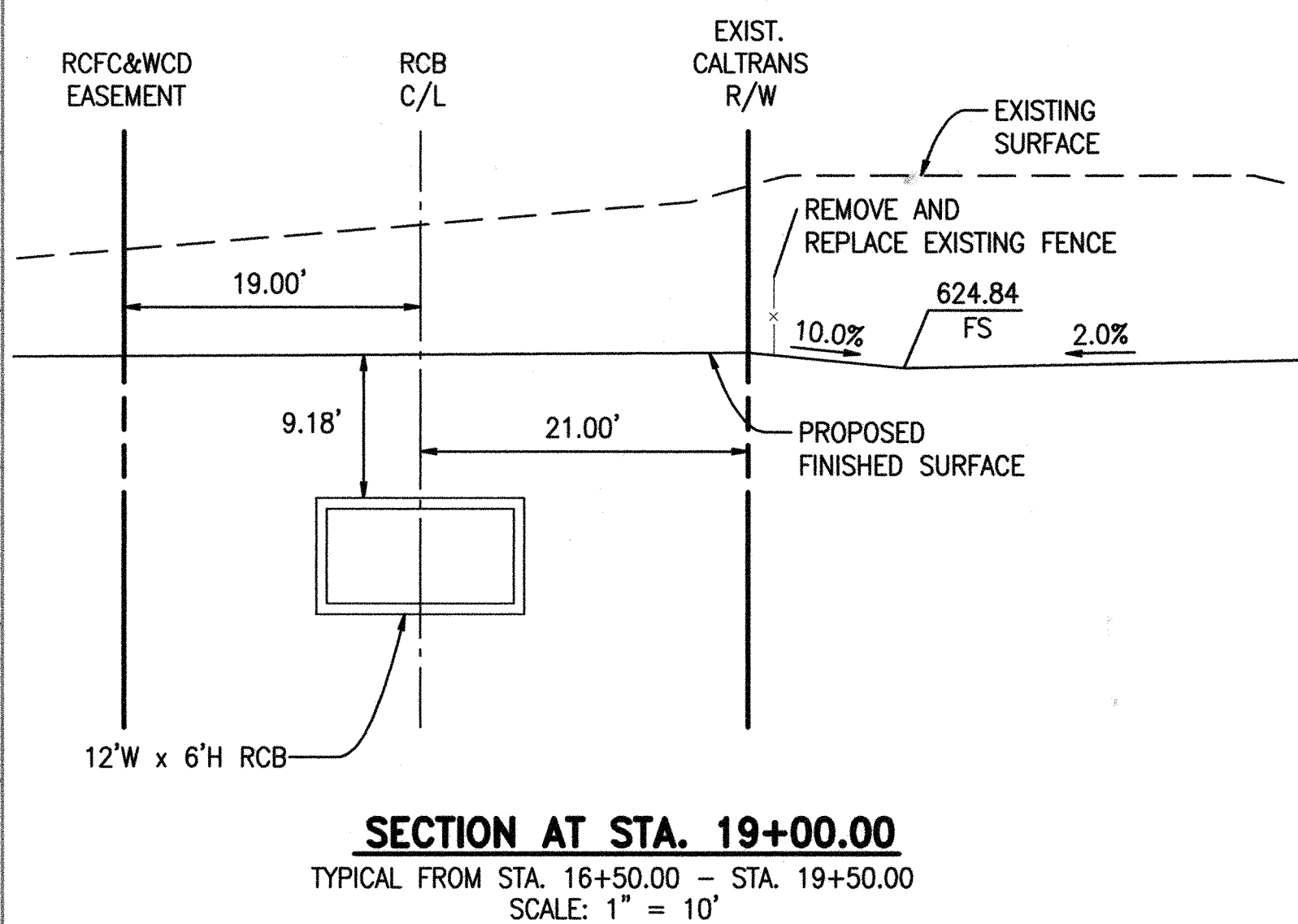
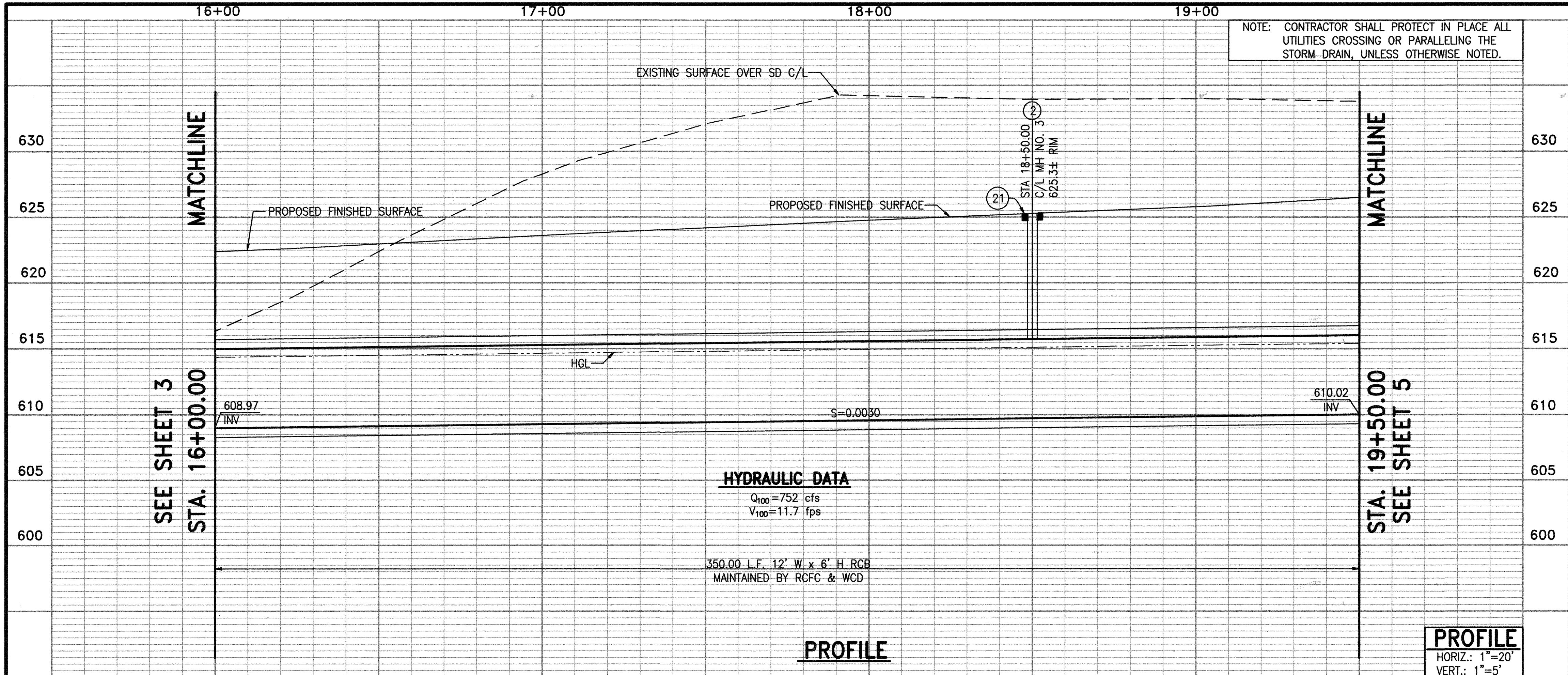


ALBERT A. WEBB ASSOCIATES
3788 MCCRAY STREET, RIVERSIDE, CA. 92506
PH. (951) 686-1070 FAX (951) 788-1256
DESIGNED BY: MLA
DRAWN BY: MLA
CHECKED BY: JCC
PREPARED BY: *[Signature]* DATE: 4-23-11
R.C.E. NO. C67239 EXP. DATE 9-30-12

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED BY: *[Signature]*
APPROVED BY: *[Signature]*
DATE: 10/3/2011
DATE: 10/4/2011

DAY CREEK MASTER DRAINAGE PLAN
LINE J STAGE 2
STA. 13+00.00 - STA. 16+00.00

PROJECT NO. 2-0-00272-02
DRAWING NO. 1-695
SHEET NO. 3 OF 15



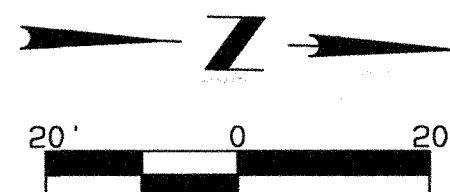
CONSTRUCTION NOTES

- CONSTRUCT 12'W x 6'H SINGLE CELL RCB (CAST-IN-PLACE) PER CALTRANS STD. NO. D80
- CONSTRUCT MANHOLE NO. 3 PER R.C.F.C & W.C.D. STD. MH253
- REMOVE EXISTING FENCE AND REPLACE WITH NEW FENCE PER CALTRANS STD. A85
- CONSTRUCT 6' x 6' x 6" THICK PCC PAD W/ #4 @ 18" O.C. CENTERED ON MANHOLE

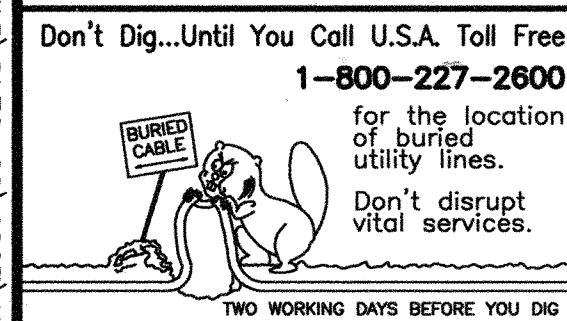
RECORD DRAWINGS

APPROVED BY: *[Signature]*

DATE: 4/18/12



08-10-N-DD-0257



BENCH MARK: ELEVATION = 674.773'

RIVERSIDE COUNTY BENCHMARK, BM ML 15-64 ESTABLISHED 4/1964 DATUM = NGVD29 (USC & GS)

BASIS OF BEARINGS: THE CENTERLINE OF SCHLEISHMAN ROAD PER RECORD OF SURVEY 110/68 TAKEN AS NORTH 89°35'55"E

REVISIONS		
1	ADDED INFORMATION	3 5-1-12
2	ACTUAL SLOPE AND ACTUAL FLOW LINE OF GRADE	4/18/12
REF.	DESCRIPTION	APPR. DATE



ALBERT A. WEBB ASSOCIATES

3788 MCCRAY STREET, RIVERSIDE, CA. 92506

PH. (951) 686-1070 FAX (951) 788-1256

DESIGNED BY: MLA

DRAWN BY: MLA

CHECKED BY: JCC

PREPARED BY: *[Signature]* DATE: 9-27-11

R.C.E. NO. C67239 EXP. DATE 9-30-12

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

RECOMMENDED BY: *[Signature]*

APPROVED BY: Mark H. Wills

DATE: 10/3/2011

DATE: 10/4/2011

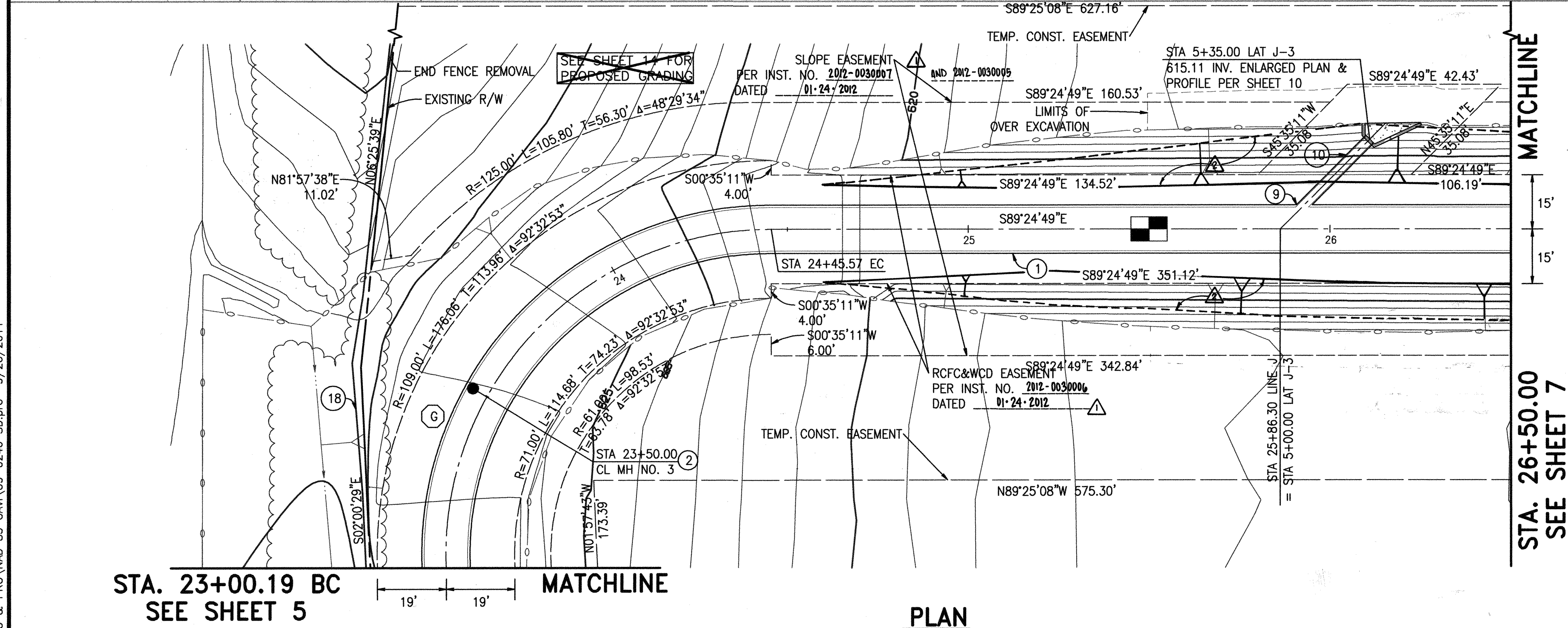
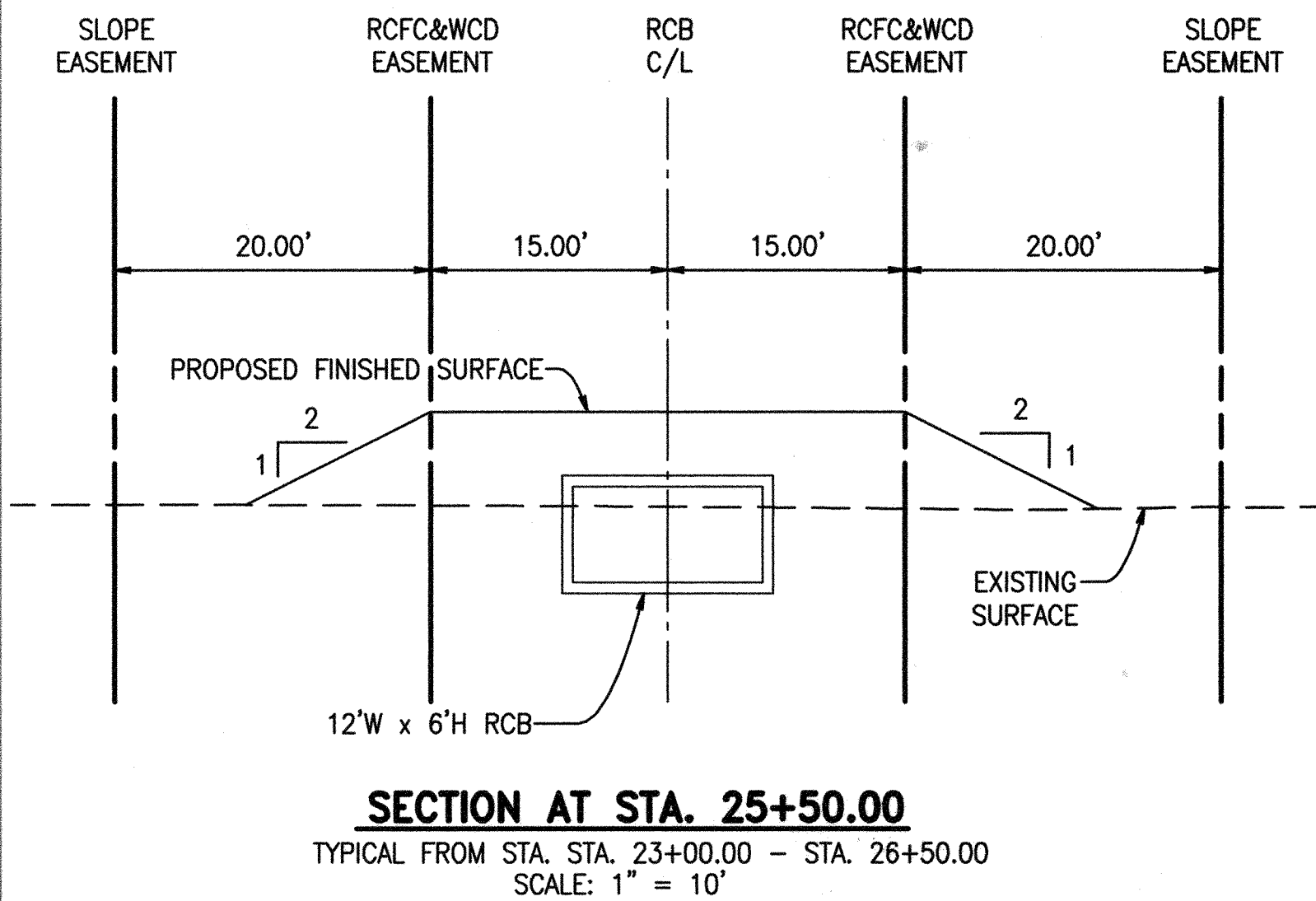
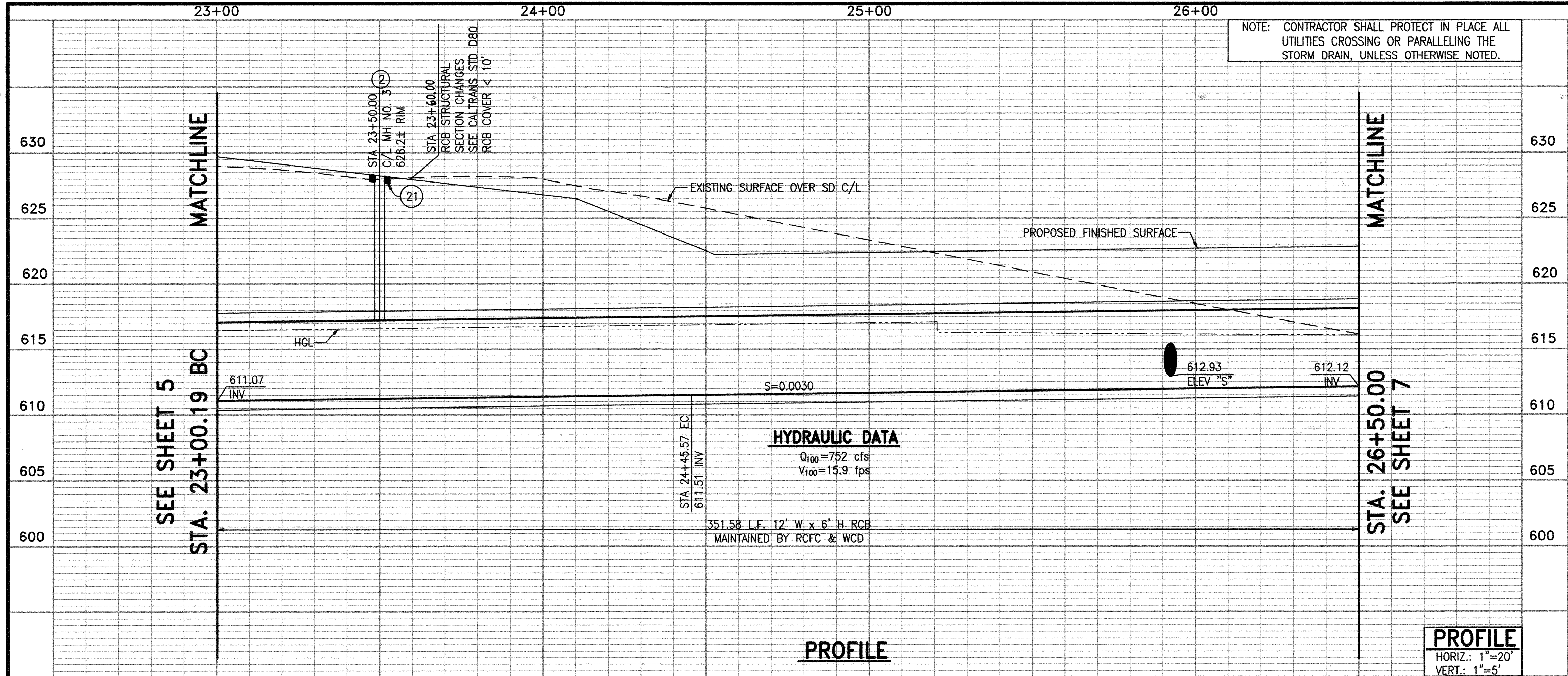
DAY CREEK MASTER DRAINAGE PLAN LINE J STAGE 2

STA. 16+00.00 - STA. 19+50.00

PROJECT NO. Z-0-00272-02

DRAWING NO. 1-695

SHEET NO. 4 OF 15



CONSTRUCTION NOTES

- ① CONSTRUCT 12'W x 6'H SINGLE CELL RCB (CAST-IN-PLACE) PER CALTRANS STD. NO. D80
- ② CONSTRUCT MANHOLE NO. 3 PER R.C.F.C. & W.C.D. STD. MH253
- ⑨ CONSTRUCT JUNCTION STRUCTURE NO. 3 PER R.C.F.C. & W.C.D. STD. JS228
- ⑩ INSTALL 30" RCP (D-LOAD PER PLAN)
- ⑬ REMOVE EXISTING FENCE AND REPLACE WITH NEW FENCE PER CALTRANS STD. A85
- ⑳ CONSTRUCT 6' x 6' x 6" THICK PCC PAD W/ #4 @ 18" O.C. CENTERED ON MANHOLE

CURVE DATA

Δ=92°32'53"
 R=90.00'
 L=145.37'
 T=94.09'
 BC=STA 23+00.19
 EC=STA 24+45.57
 PI: N 229°50'2.39", E 616°79'1.39"

RECORD DRAWINGS

APPROVED BY: *[Signature]*

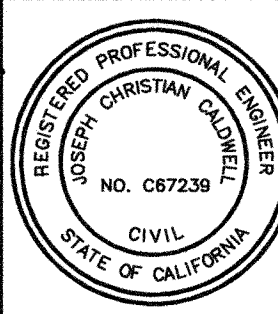
DATE: 4/18/13

08-10-N-DD-0257

Don't Dig...Until You Call U.S.A. Toll Free 1-800-227-2600 for the location of buried utility lines. Don't disrupt vital services. TWO WORKING DAYS BEFORE YOU DIG

BENCH MARK: ELEVATION = 674.773'
 RIVERSIDE COUNTY BENCHMARK, BM ML 15-64
 ESTABLISHED 4/1964
 DATUM = NGVD29 (USC & GS)
 BASIS OF BEARINGS: THE CENTERLINE OF SCHLEISHMAN ROAD PER RECORD OF SURVEY 110/68 TAKEN AS NORTH 89°35'55"E

REVISIONS	
Δ	ADDED INFORMATION
△	ACTUAL SLOPE
REF.	DESCRIPTION
APPR.	DATE

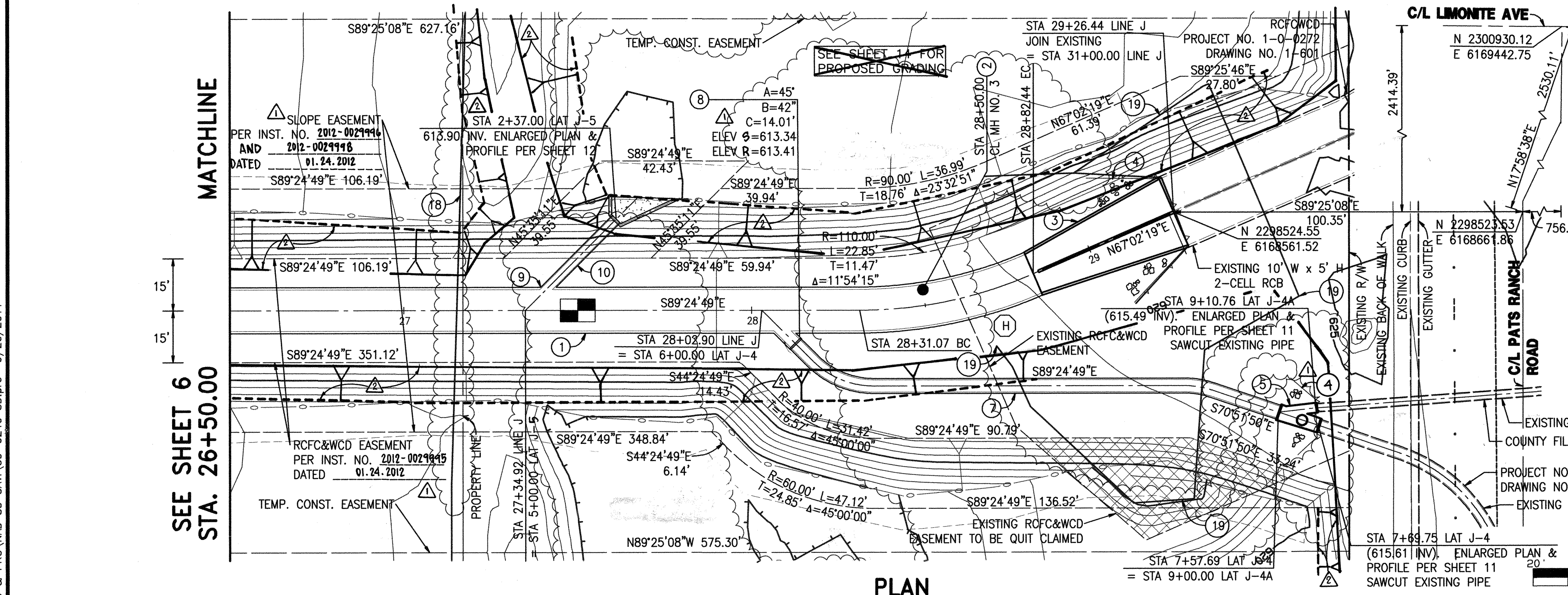
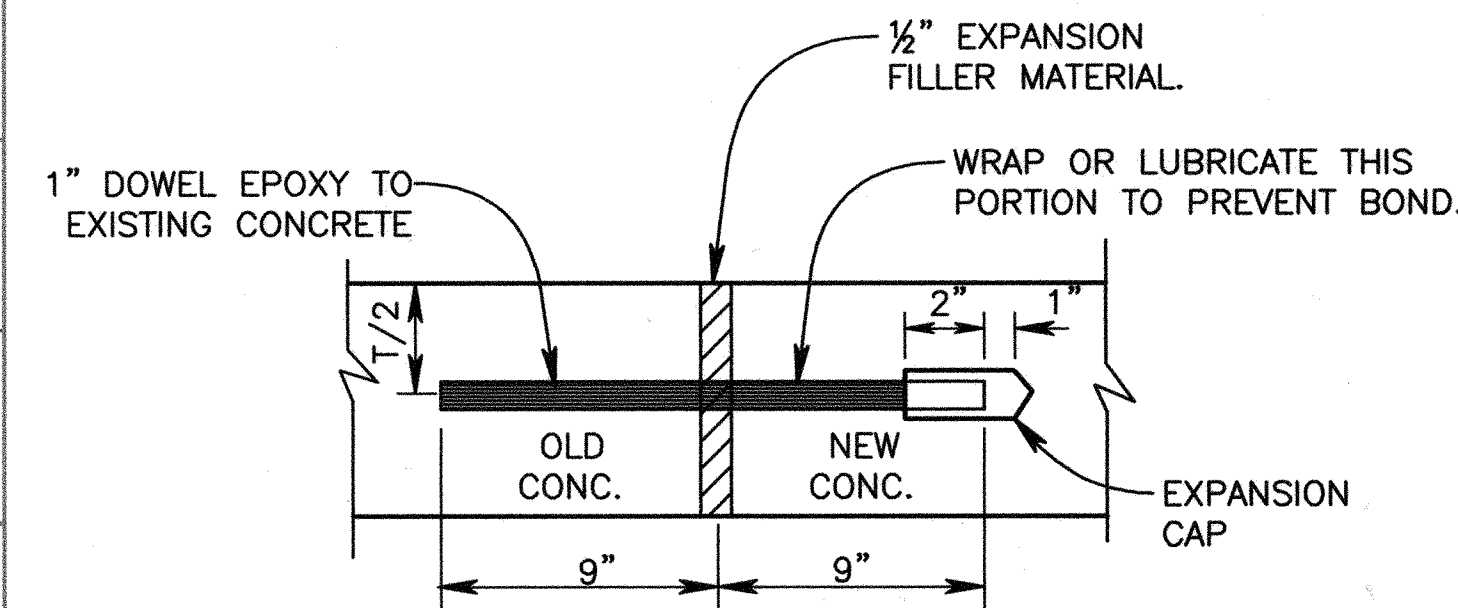
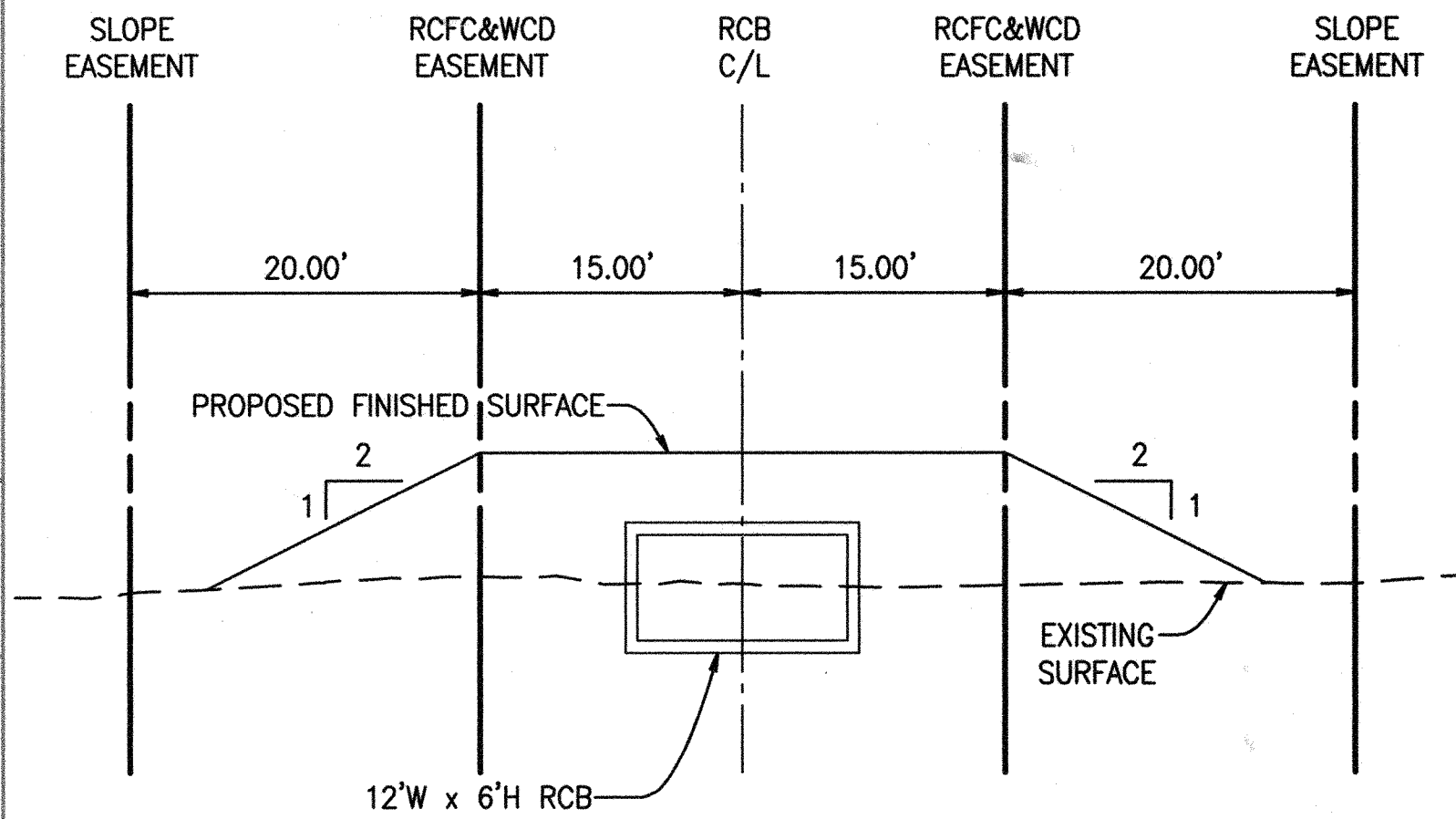
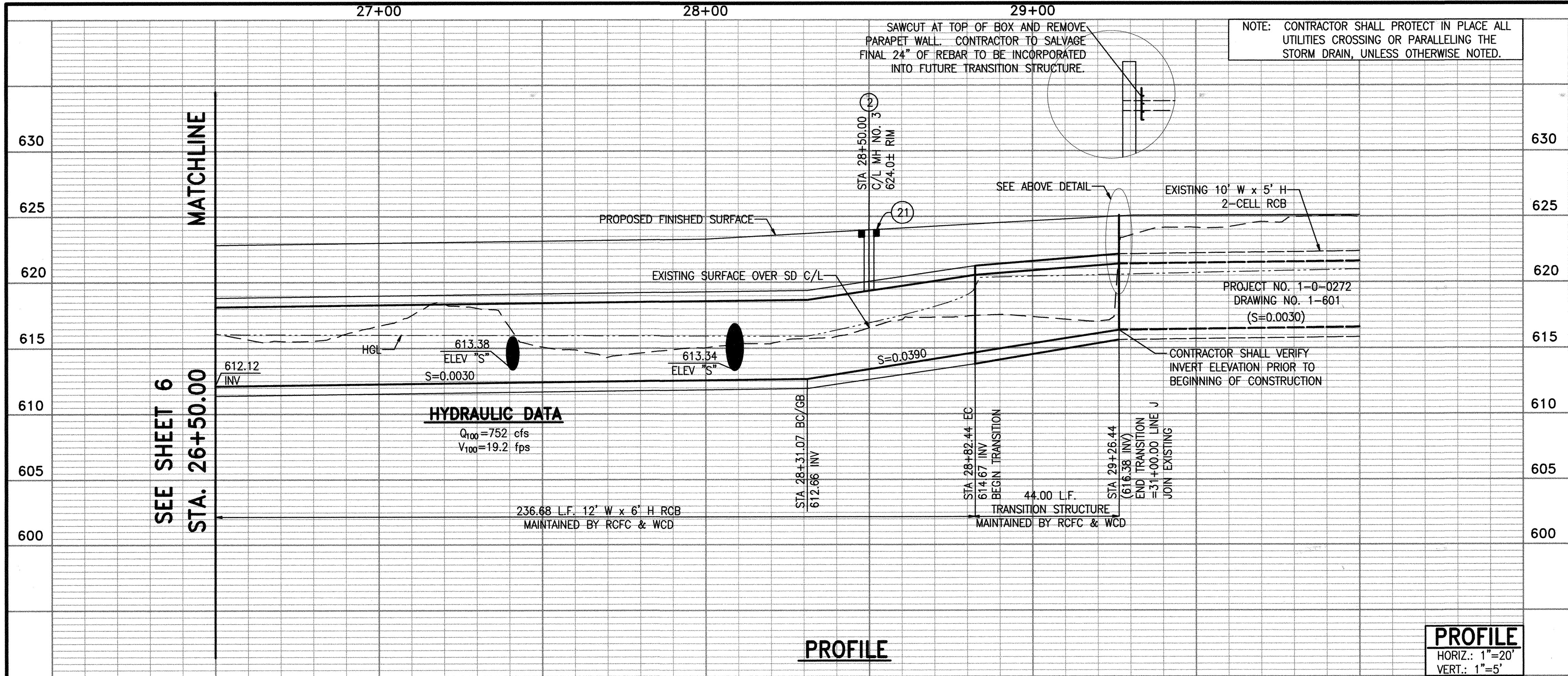


ALBERT A. WEBB ASSOCIATES
 3788 MCCRAY STREET, RIVERSIDE, CA. 92506
 PH. (951) 686-1070 FAX (951) 788-1256
 DESIGNED BY: MLA
 DRAWN BY: MLA
 CHECKED BY: JCC
 PREPARED BY: *[Signature]* DATE: 9-27-11
 R.C.E. NO. C67239 EXP. DATE 9-30-12

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
 RECOMMENDED BY: *[Signature]* DATE: 10/2/2011
 APPROVED BY: *[Signature]* DATE: 10/4/2011

DAY CREEK
 MASTER DRAINAGE PLAN
 LINE J STAGE 2
 STA. 23+01.30 - STA. 26+50.00

PROJECT NO. 2-0-00272-02
 DRAWING NO. 1-695
 SHEET NO. 6 OF 15



CONSTRUCTION NOTES

- CONSTRUCT 12' W x 6' H SINGLE CELL RCB (CAST-IN-PLACE) PER CALTRANS STD. NO. D80
- CONSTRUCT MANHOLE NO. 3 PER RCFC & WCD STD. MH253
- CONSTRUCT TRANSITION STRUCTURE NO. 4 PER RCFC & WCD STD. TS304 CONNECT TO EXISTING RCB PER DETAIL A ABOVE. REINFORCING STEEL SHALL BE IN THE CONFIGURATION OF A CALTRANS BOX SECTION FOR 12' W x 6' H RCB (STD D80).
- REMOVE EXISTING FENCE, PARAPET WALL, WINGWALLS, RIP RAP, AND WALL
- CONSTRUCT MANHOLE NO. 4 PER RCFC & WCD STD. MH254
- INSTALL 42" RCP (D-LOAD PER PLAN)
- CONSTRUCT JUNCTION STRUCTURE NO. 1 PER RCFC & WCD STD. JS226
- CONSTRUCT JUNCTION STRUCTURE NO. 3 PER R.C.F.C. & W.C.D. STD. JS228
- INSTALL 30" RCP (D-LOAD PER PLAN)
- REMOVE EXISTING FENCE AND REPLACE WITH NEW FENCE PER CALTRANS STD. A85
- REMOVE EXISTING FENCE
- CONSTRUCT 6' x 6' x 6" THICK PCC PAD W/ #4 @ 18" O.C. CENTERED ON MANHOLE

CURVE DATA

Δ=23°32'51"
 R=125.00'
 L=51.37'
 T=26.05'
 BC=STA 28+31.07
 EC=STA 28+82.44
 PI: N 2298497.22, E 6168497.01

RECORD DRAWINGS

APPROVED BY: *[Signature]*
 DATE: 4/18/11

Don't Dig...Until You Call U.S.A. Toll Free 1-800-227-2600 for the location of buried utility lines. Don't disrupt vital services. TWO WORKING DAYS BEFORE YOU DIG

BENCH MARK: ELEVATION = 674.773'
 RIVERSIDE COUNTY BENCHMARK, BM ML 15-64
 ESTABLISHED 4/1964
 DATUM = NGVD29 (USC & GS)
 BASIS OF BEARINGS: THE CENTERLINE OF SCHLEISHMAN ROAD PER RECORD OF SURVEY 110/68 TAKEN AS NORTH 89°35'55"E

REVISIONS		
Δ	ADDED INFORMATION	
Δ	ACTUAL SLOPE	
REF.	DESCRIPTION	APPR. DATE

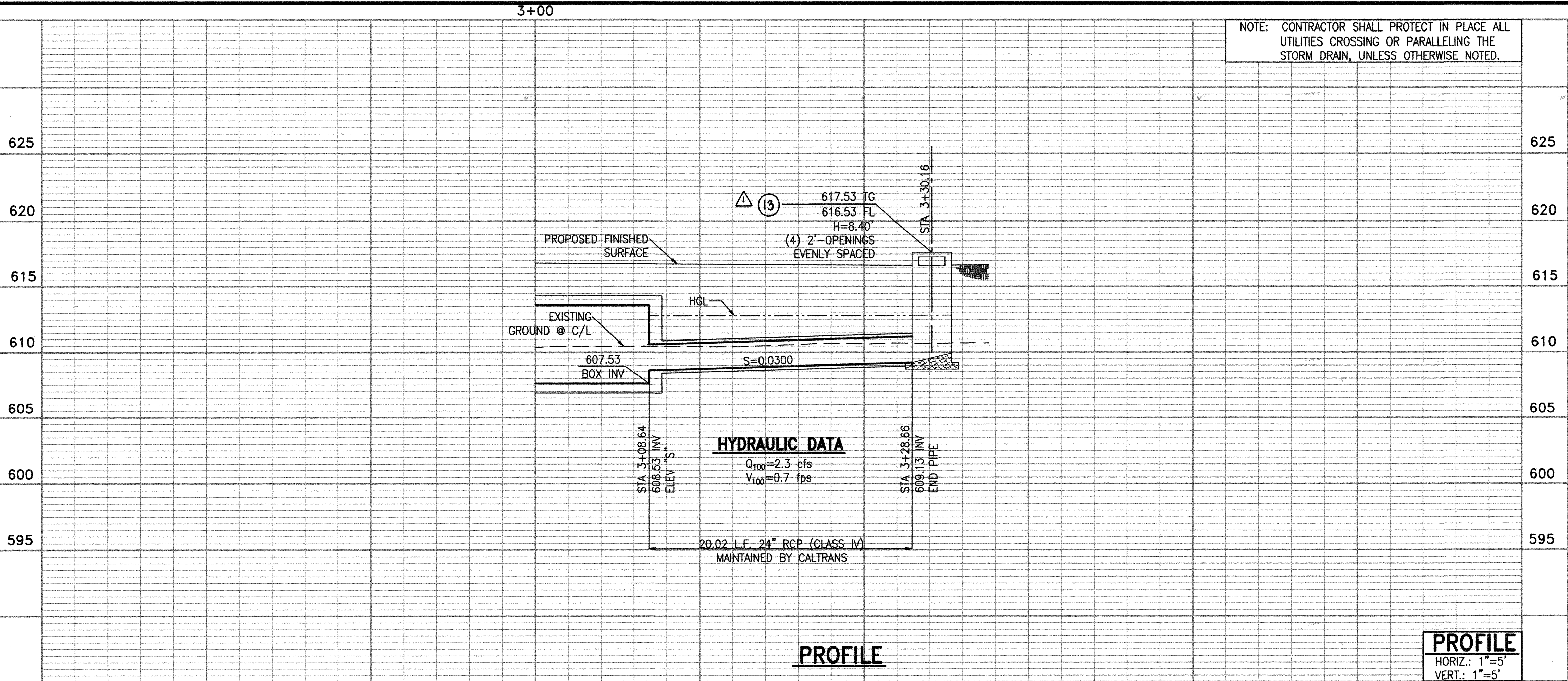


ALBERT A. WEBB ASSOCIATES
 3788 McCray Street, Riverside, CA. 92506
 PH. (951) 686-1070 FAX (951) 788-1256
 DESIGNED BY: MLA
 DRAWN BY: MLA
 CHECKED BY: JCC
 PREPARED BY: *[Signature]* DATE: 9-27-11
 R.C.E. NO. C67239 EXP. DATE 9-30-12

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
 RECOMMENDED BY: *[Signature]*
 APPROVED BY: *[Signature]*
 DATE: 10/3/2011

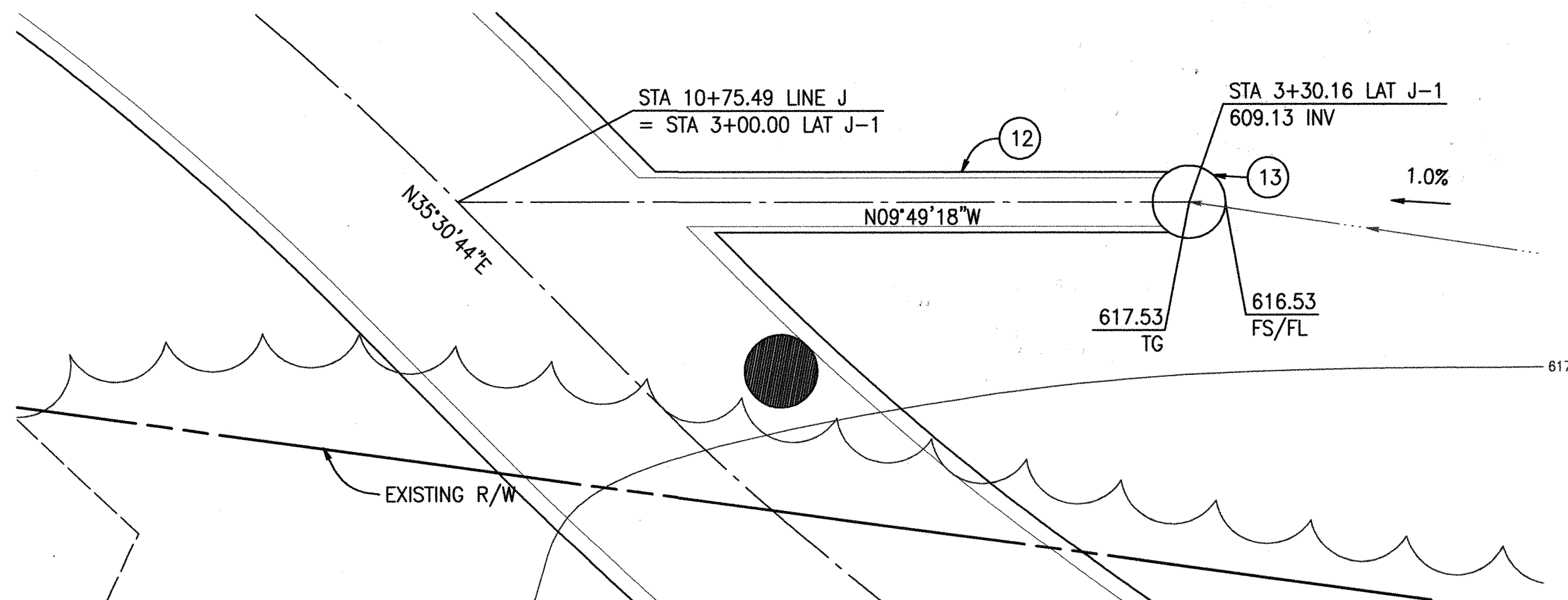
DAY CREEK MASTER DRAINAGE PLAN LINE J STAGE 2
 STA. 26+50.00 - STA. 29+26.44

PROJECT NO. 2-0-00272-02
 DRAWING NO. 1-695
 SHEET NO. 7 OF 15



CONSTRUCTION NOTES

- (12) INSTALL 24" RCP (D-LOAD PER PLAN)
- (13) CONSTRUCT STEEL PIPE INLET TYPE OMP PER CALTRANS STD. D75A



RECORD DRAWINGS

APPROVED BY: *[Signature]*

DATE: 4/18/13

08-10-N-DD-0257

Don't Dig...Until You Call U.S.A. Toll Free 1-800-227-2600 for the location of buried utility lines. Don't disrupt vital services. TWO WORKING DAYS BEFORE YOU DIG

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ESTABLISHED 4/1964
DATUM = NGVD29 (USC & GS)
BASIS OF BEARINGS: THE CENTERLINE OF SCHLEISHMAN ROAD PER RECORD OF SURVEY 110/68 TAKEN AS NORTH 89°35'55"E

REVISIONS		
△	ADDED INFORMATION	5-1-12
△	RECORD DRAWINGS	4/18/13
REF.	DESCRIPTION	APPR. DATE

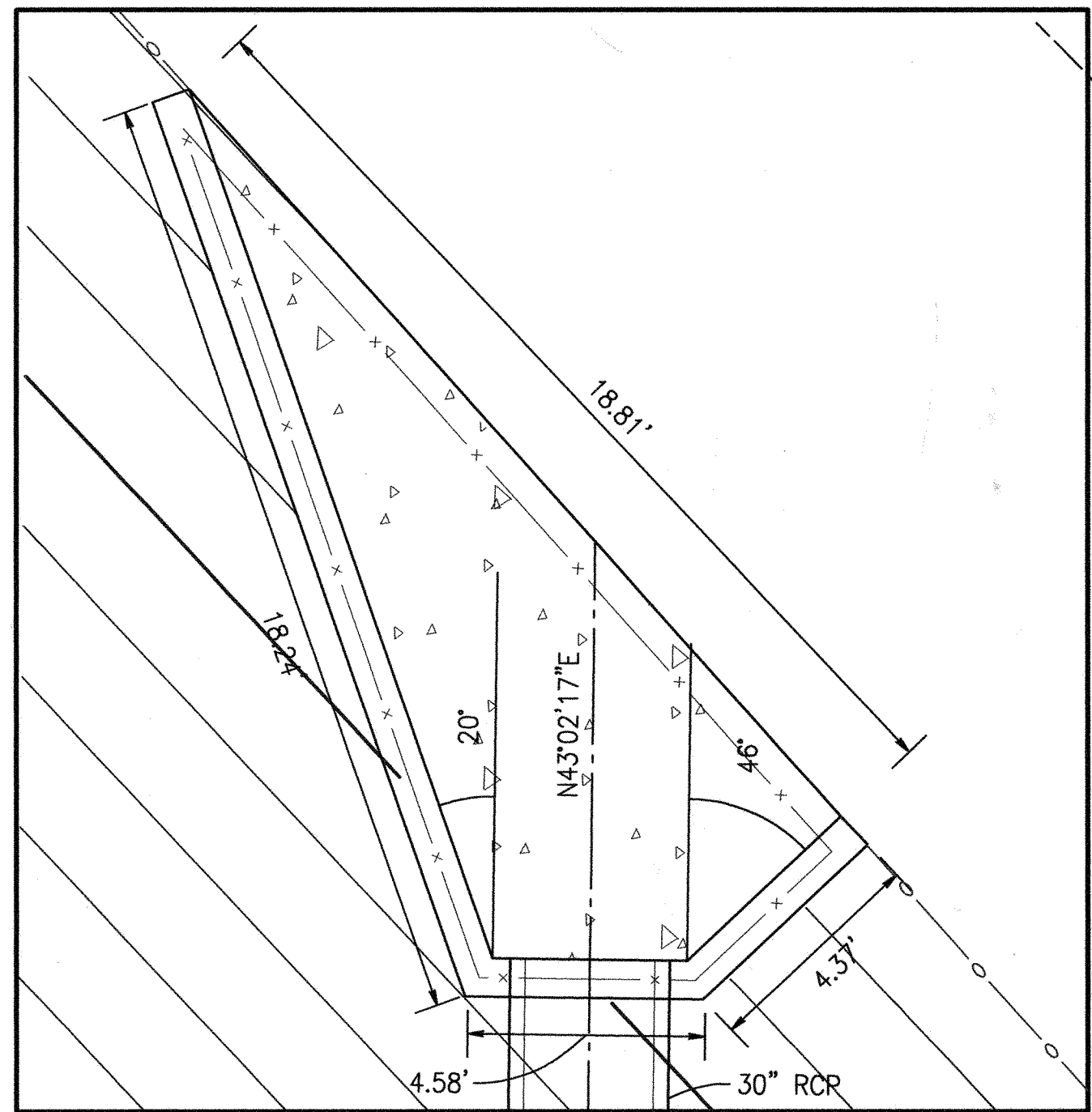
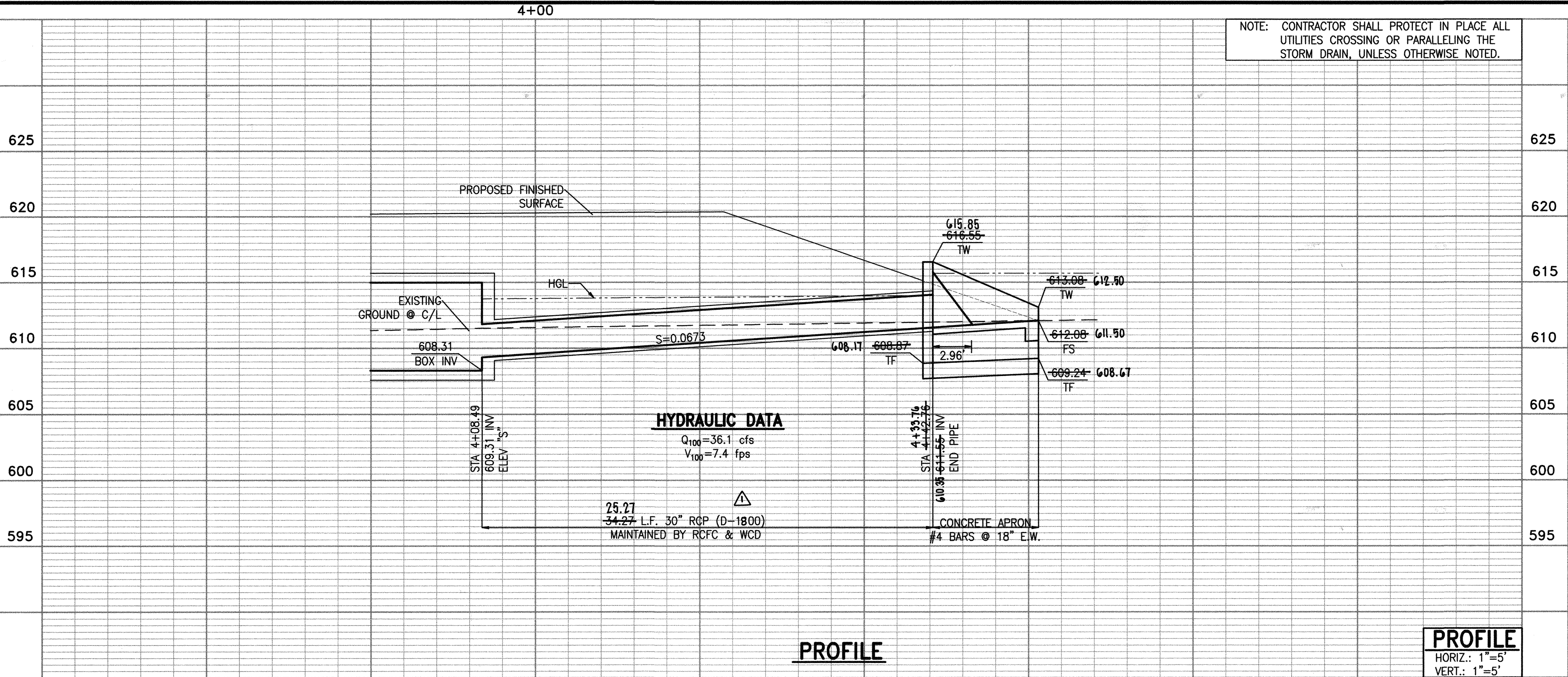


ALBERT A. WEBB ASSOCIATES
3788 MCCRAY STREET, RIVERSIDE, CA. 92506
PH. (951) 686-1070 FAX (951) 788-1256
DESIGNED BY: MLA
DRAWN BY: MLA
CHECKED BY: JCC
PREPARED BY: *[Signature]* DATE: 9-27-11
R.C.E. NO. C67239 EXP. DATE 9-30-12

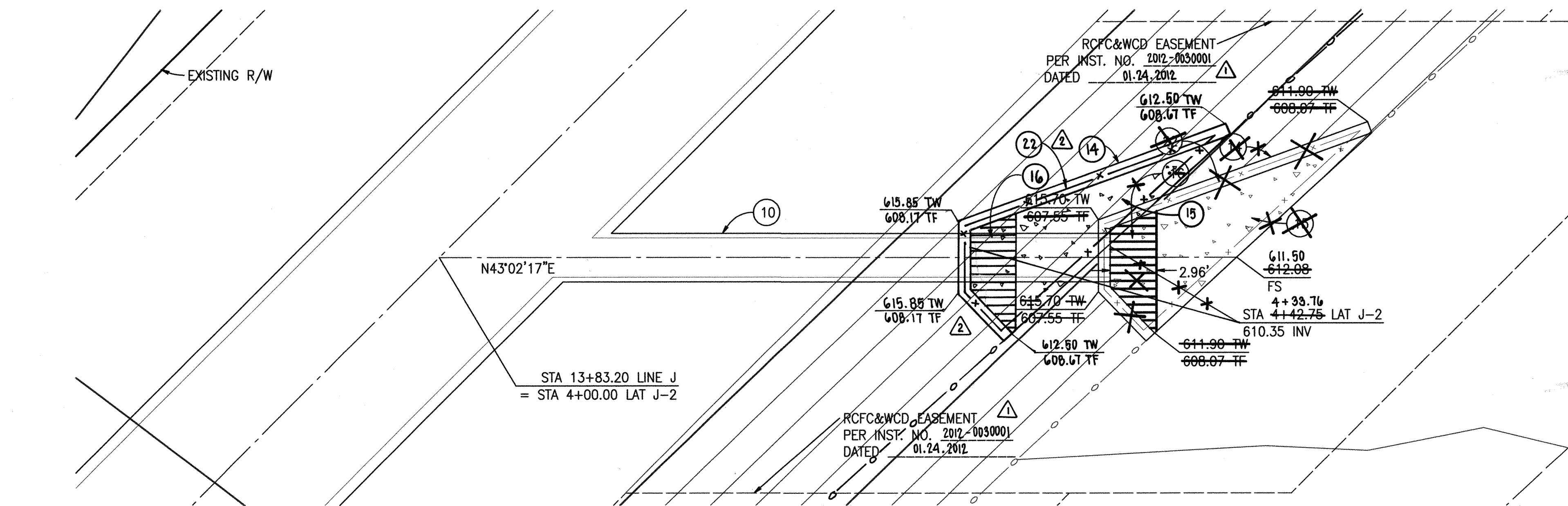
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
RECOMMENDED BY:	APPROVED BY:
DATE:	DATE:

DAY CREEK
MASTER DRAINAGE PLAN
LATERAL J-1
LATERAL DETAILS
STA 10+75.49

PROJECT NO. 2-0-00272-02
DRAWING NO. 1-695
SHEET NO. 8 OF 15

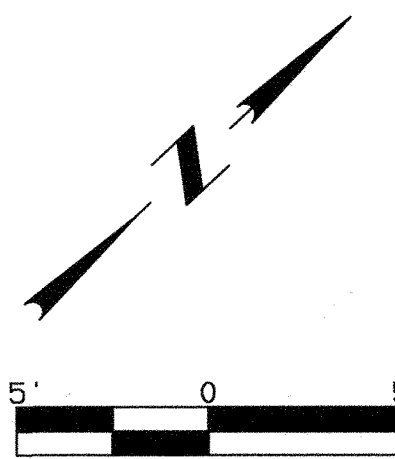


HEADWALL DETAILS



CONSTRUCTION NOTES

- 10 INSTALL 30" RCP (D-LOAD PER PLAN)
- 14 CONSTRUCT HEADWALL PER CALTRANS STD. D90 PER DETAILS HEREON
- 15 CONSTRUCT 6" CONCRETE APRON W/ #4 BARS @ 18" E.W. AND 12" THICK BY 18" DEEP CONCRETE CUTOFF WALL W/ (1) #4 BAR TOP AND BOTTOM
- 16 INSTALL TRASH RACK PER APWA STD. 361-2
- 22 CONSTRUCT 6' CALTRANS STD. A85 FENCE



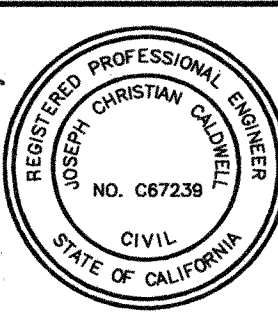
RECORD DRAWINGS

APPROVED BY: *[Signature]*
 DATE: 4/18/13

Don't Dig...Until You Call U.S.A. Toll Free 1-800-227-2600 for the location of buried utility lines. Don't disrupt vital services. TWO WORKING DAYS BEFORE YOU DIG

BENCH MARK: ELEVATION = 674.773'
 RIVERSIDE COUNTY BENCHMARK, BM ML 15-64 ESTABLISHED 4/1964 DATUM = NGVD29 (USC & GS)
 BASIS OF BEARINGS: THE CENTERLINE OF SCHLEISHMAN ROAD PER RECORD OF SURVEY 110/68 TAKEN AS NORTH 89°35'55"E

REVISIONS			
1	ADDED INFORMATION	3	5-1-12
2	ACTUAL LOCATION OF APRON AND HEADWALL	4	4/18/13
REF.	DESCRIPTION	APPR.	DATE



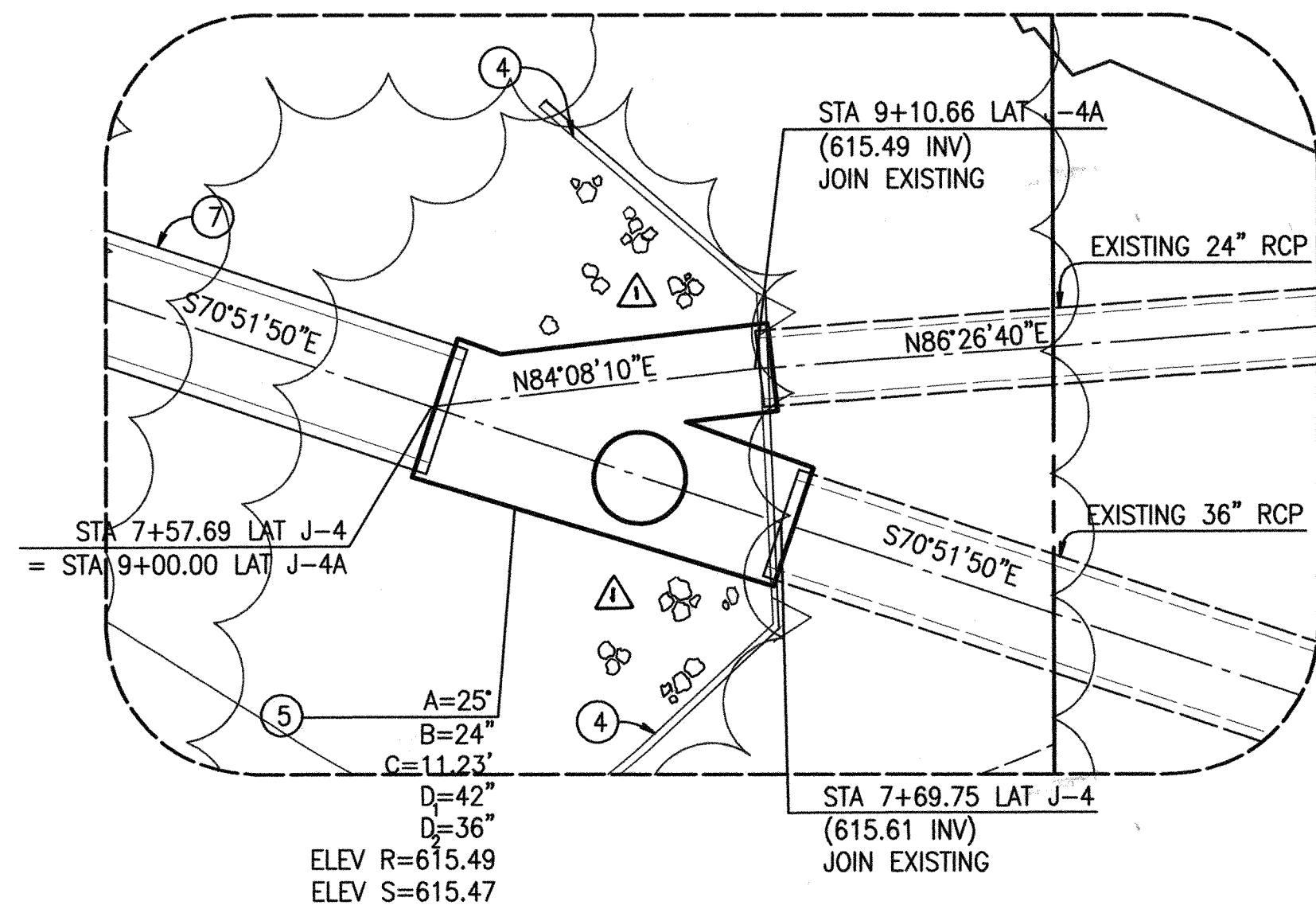
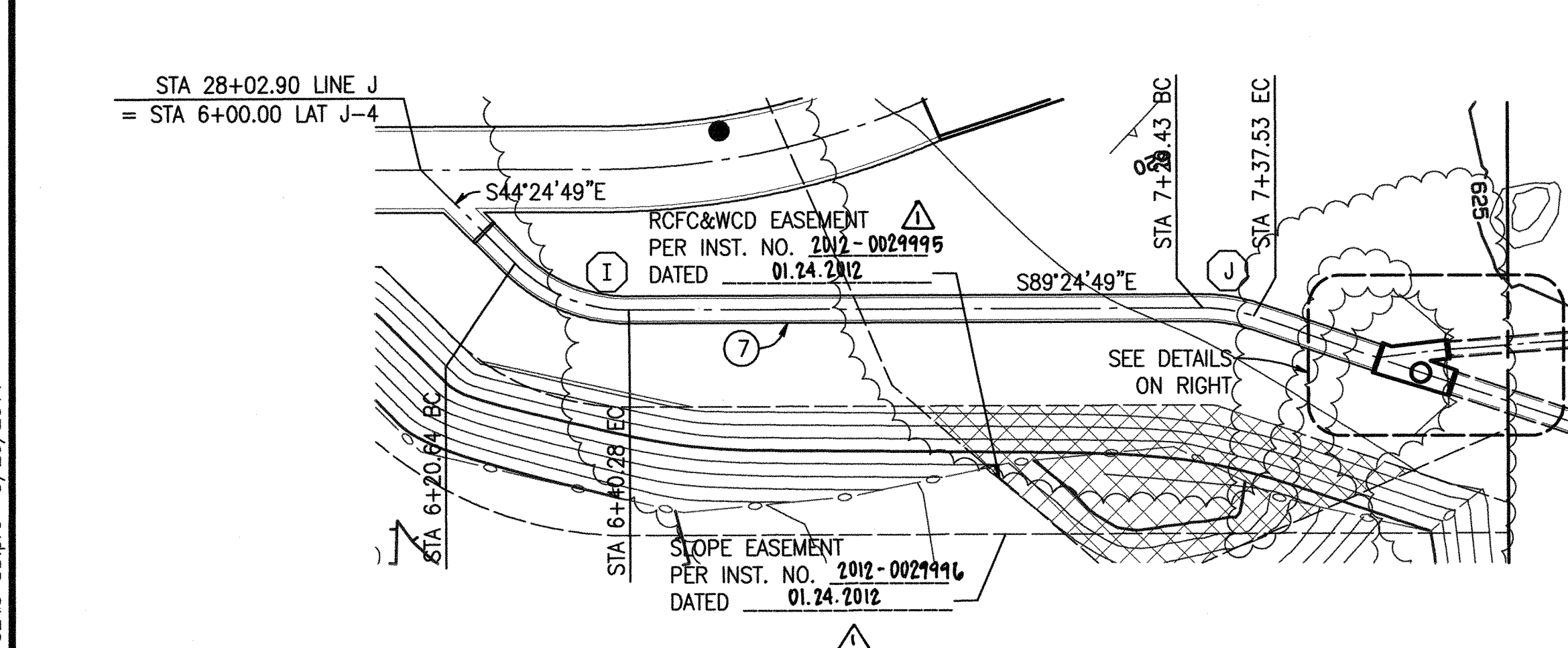
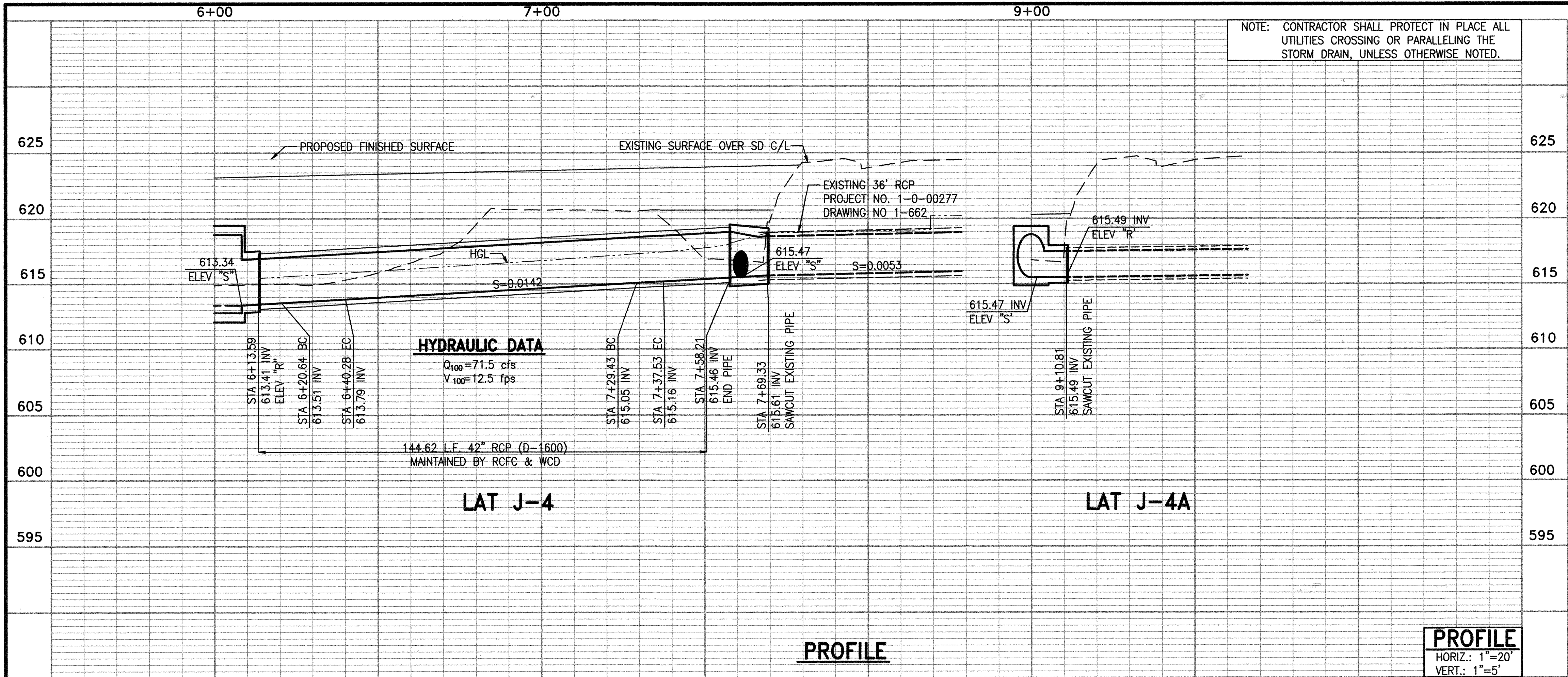
ALBERT A. WEBB
 ASSOCIATES
 3788 McCRAY STREET, RIVERSIDE, CA. 92506
 PH. (951) 686-1070 FAX (951) 788-1256
 DESIGNED BY: MLA
 DRAWN BY: MLA
 CHECKED BY: JCC
 PREPARED BY: *[Signature]* DATE: 9-27-11
 R.C.E. NO. C67239 EXP. DATE 9-30-12

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
 RECOMMENDED BY: *[Signature]*
 APPROVED BY: *[Signature]*
 DATE: 10/3/2011 DATE: 10/4/2011

DAY CREEK MASTER DRAINAGE PLAN LATERAL J-2
 LATERAL DETAILS
 STA 13+83.20

PROJECT NO. 2-0-00272-02
 DRAWING NO. 1-695
 SHEET NO. 9 OF 15

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CONSTRUCTION NOTES

- REMOVE EXISTING HEADWALL, WINGWALLS, AND RIP RAP
- CONSTRUCT MANHOLE NO. 4 PER RCFC & WCD STD. MH254
- INSTALL 42" RCP (D-LOAD PER PLAN)

RECORD DRAWINGS

APPROVED BY: [Signature]

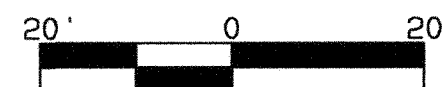
DATE: 4/18/10

I C CURVE DATA

Δ=45°00'00"
R=25.00'
L=19.63'
T=10.36'
BC=STA 6+20.64
EC=STA 6+40.28
PI: N 2298475.63, E 6168464.49

J C CURVE DATA

Δ=18°33'00"
R=25.00'
L=8.09'
T=4.08'
BC=STA 7+29.43
EC=STA 7+37.53
PI: N 2298474.57, E 6168568.07



MDC

Don't Dig...Until You Call U.S.A. Toll Free 1-800-227-2600 for the location of buried utility lines. Don't disrupt vital services. TWO WORKING DAYS BEFORE YOU DIG

BENCH MARK: ELEVATION = 674.773'
RIVERSIDE COUNTY BENCHMARK, BM ML 15-64
ESTABLISHED 4/1964
DATUM = NGVD29 (USC & GS)
BASIS OF BEARINGS: THE CENTERLINE OF SCHLEISHMAN ROAD PER RECORD OF SURVEY 110/68 TAKEN AS NORTH 89°35'55"E

REF.	DESCRIPTION	APPR.	DATE

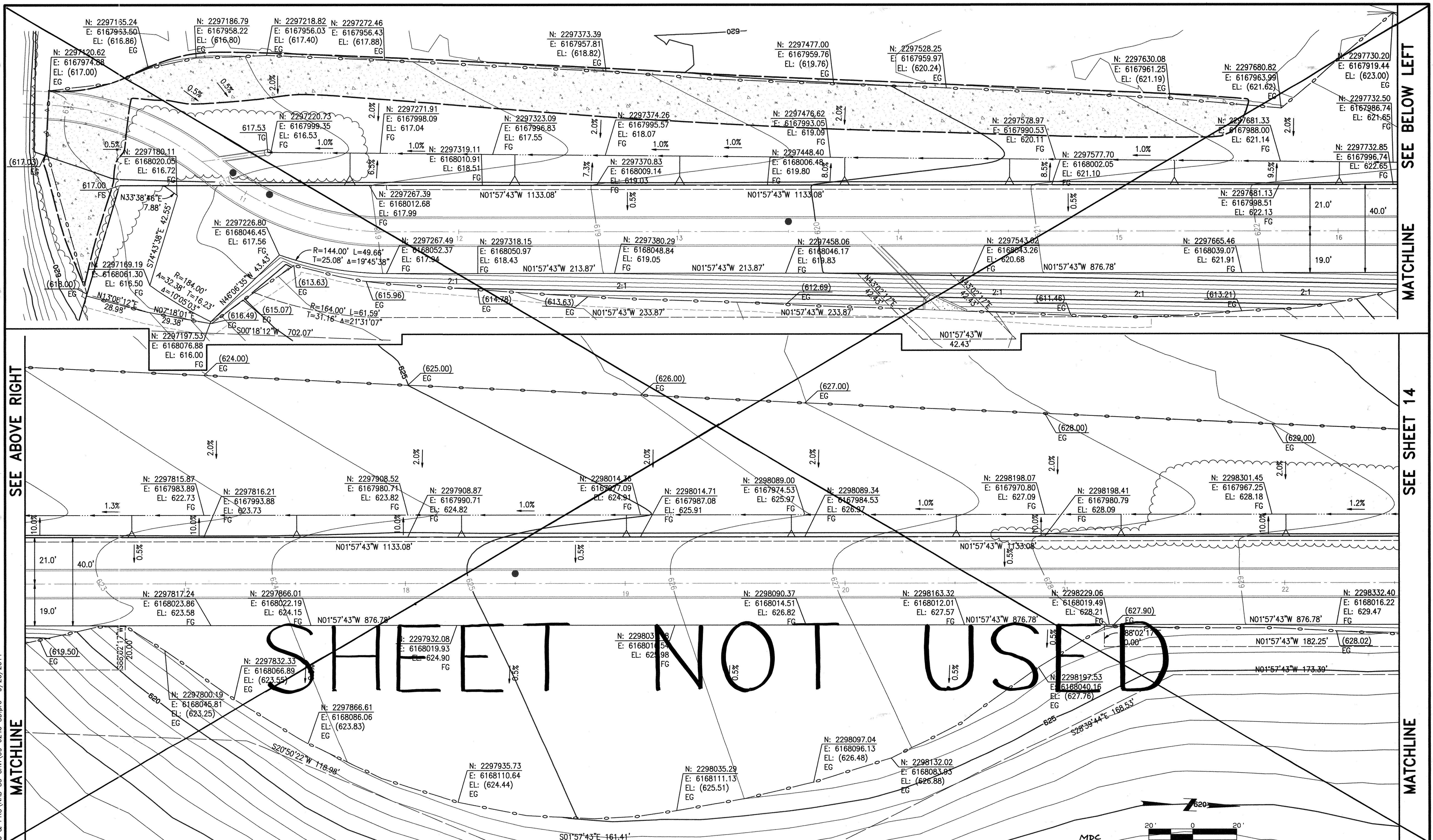


ALBERT A. WEBB ASSOCIATES
3788 McCRAV STREET, RIVERSIDE, CA. 92506
PH. (951) 686-1070 FAX (951) 788-1256
DESIGNED BY: MLA
DRAWN BY: MLA
CHECKED BY: JCC
PREPARED BY: JMC
DATE: 9-27-11
R.C.E. NO. C67239
EXP. DATE 9-30-12


RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED BY: [Signature]
APPROVED BY: [Signature]
DATE: 10/3/2011
DATE: 10/4/2011

DAY CREEK
MASTER DRAINAGE PLAN
LATERAL J-4 & J-4A
LATERAL DETAILS
STA 28+02.90

PROJECT NO. 2-0-00272-02
DRAWING NO. 1-695
SHEET NO. 11 OF 15



Don't Dig...Until You Call U.S.A. Toll Free
1-800-227-2500
for the location
of buried
utility lines.
Don't disrupt
vital services.

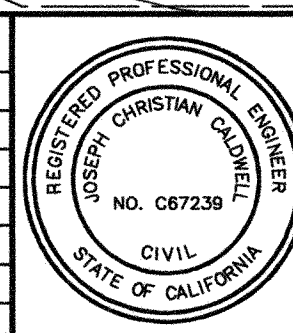


TWO WORKING DAYS BEFORE YOU DIG

BENCH MARK: ELEVATION = 674.773'
RIVERSIDE COUNTY BENCHMARK, BM ML 15-64
ESTABLISHED 4/1964
DATUM = NGVD29 (USC & GS)

BASIS OF BEARINGS: THE CENTERLINE OF
SCHLEISHMAN ROAD PER RECORD OF SURVEY
110/68 TAKEN AS NORTH 89°35'55"E

REVISIONS			
△	SHEET NOT USED. FOR GRADING, SEE SHEETS NO. 2, 3, 4, AND 5.		
REF.	DESCRIPTION	APPR.	DATE



ALBERT A.
WEBB
ASSOCIATES

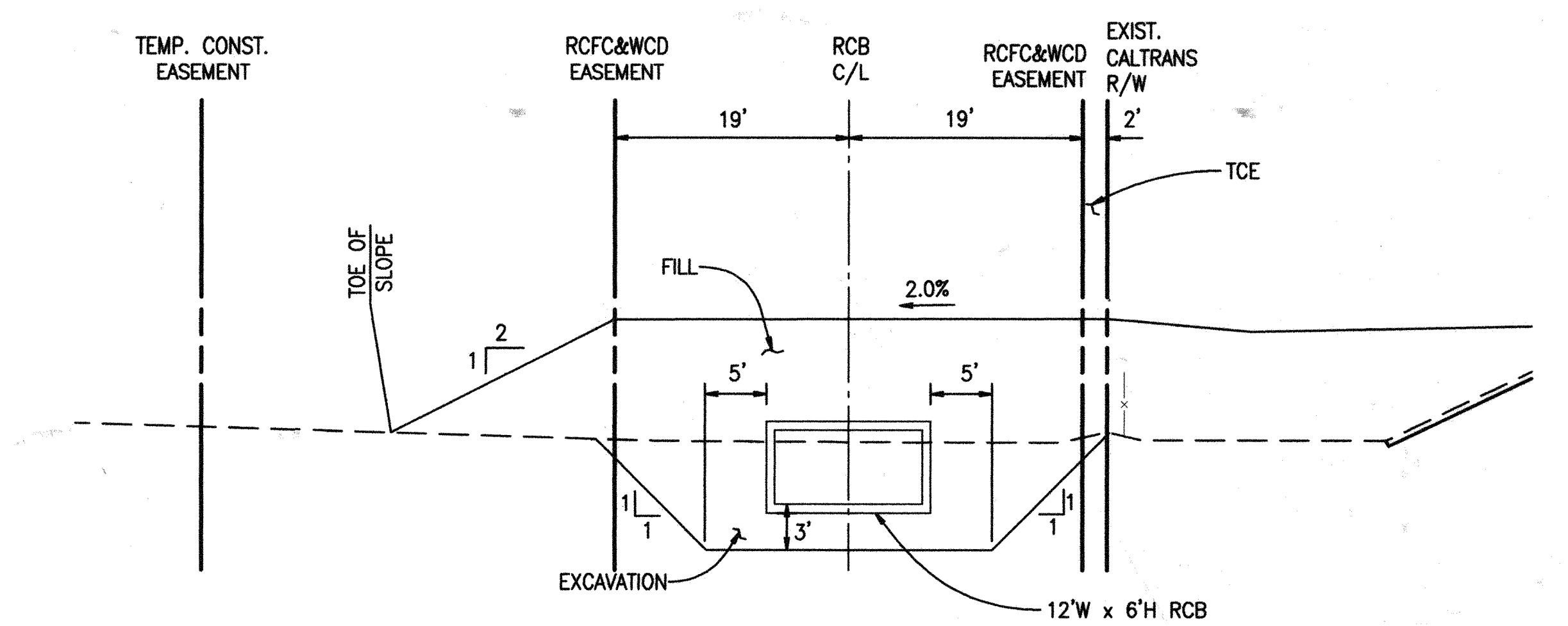
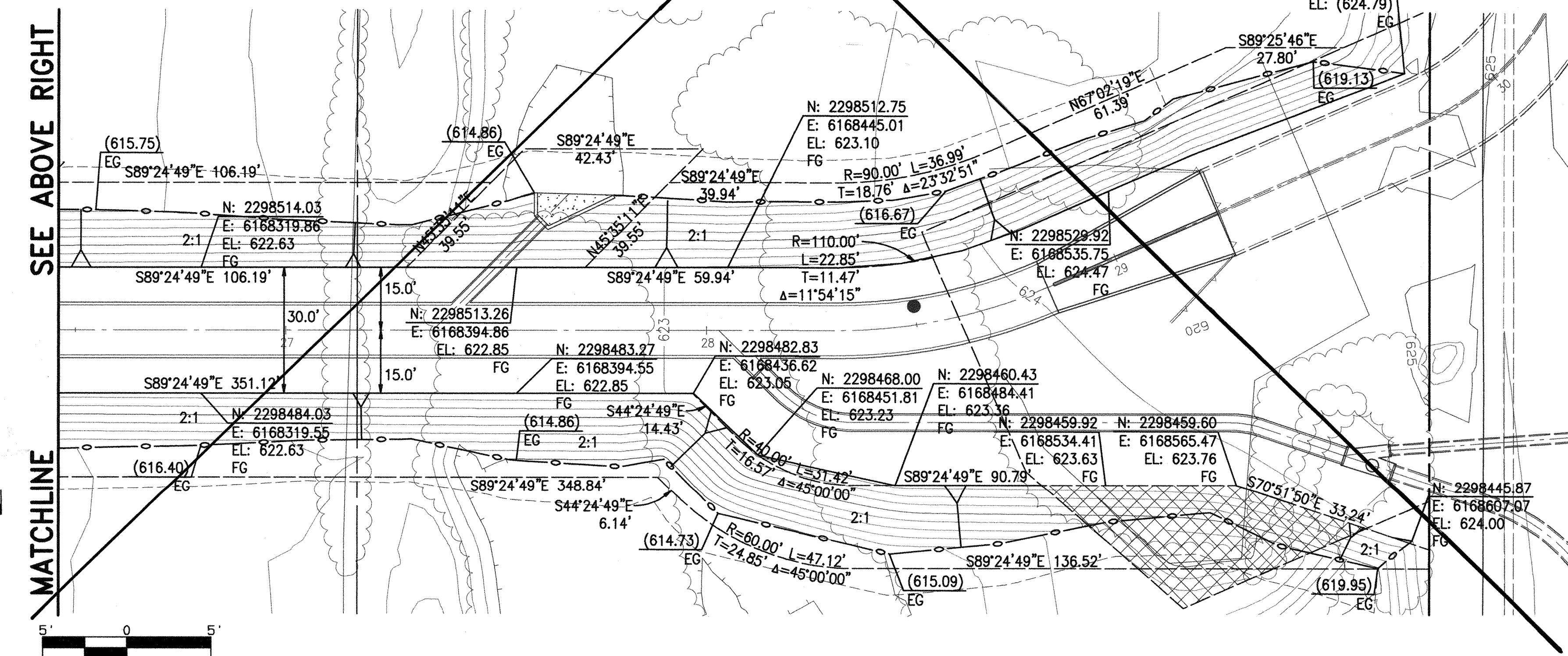
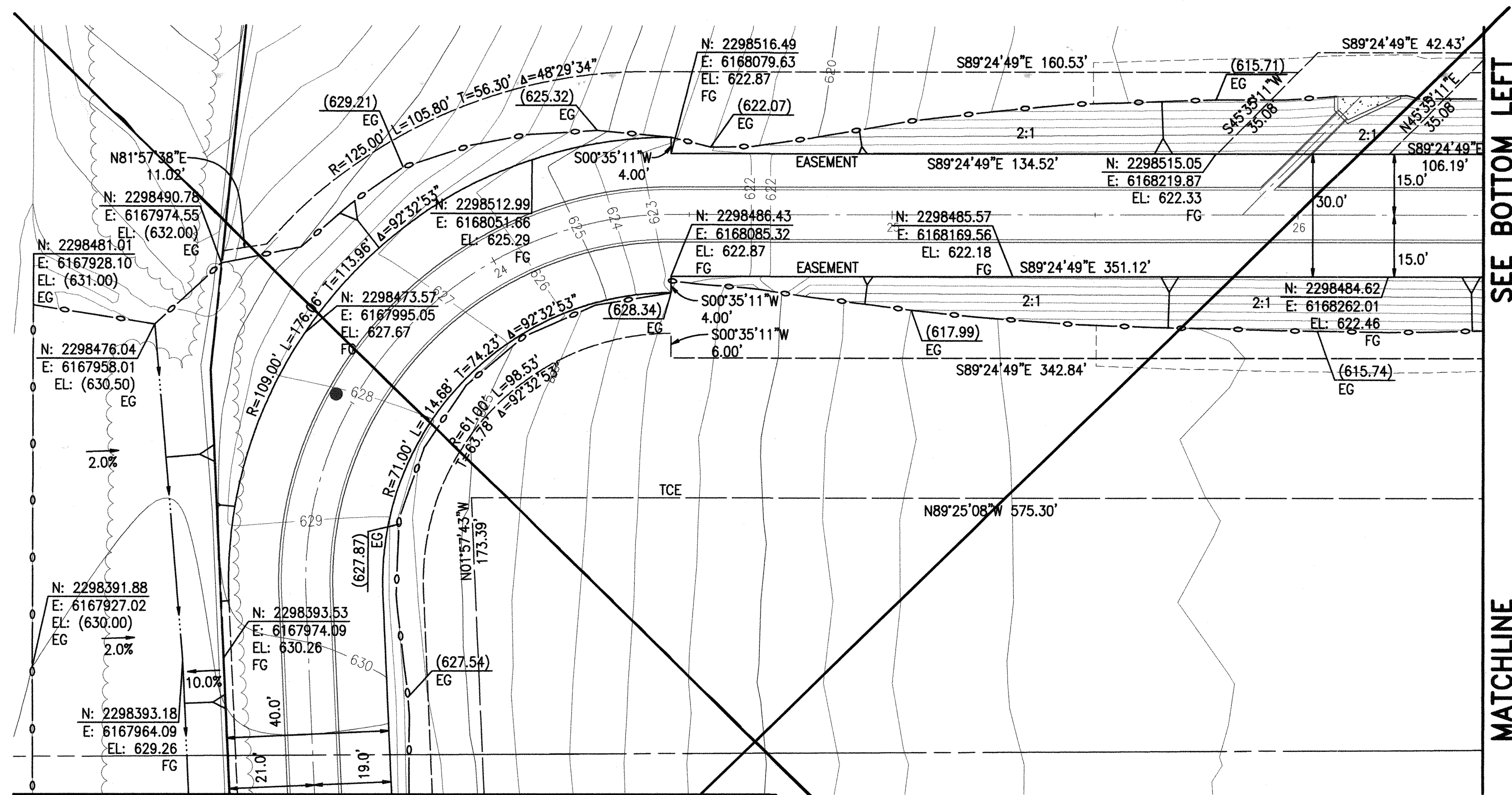
3788 McCRAY STREET, RIVERSIDE, CA. 92506

PH. (951) 686-1070 FAX (951) 788-1250

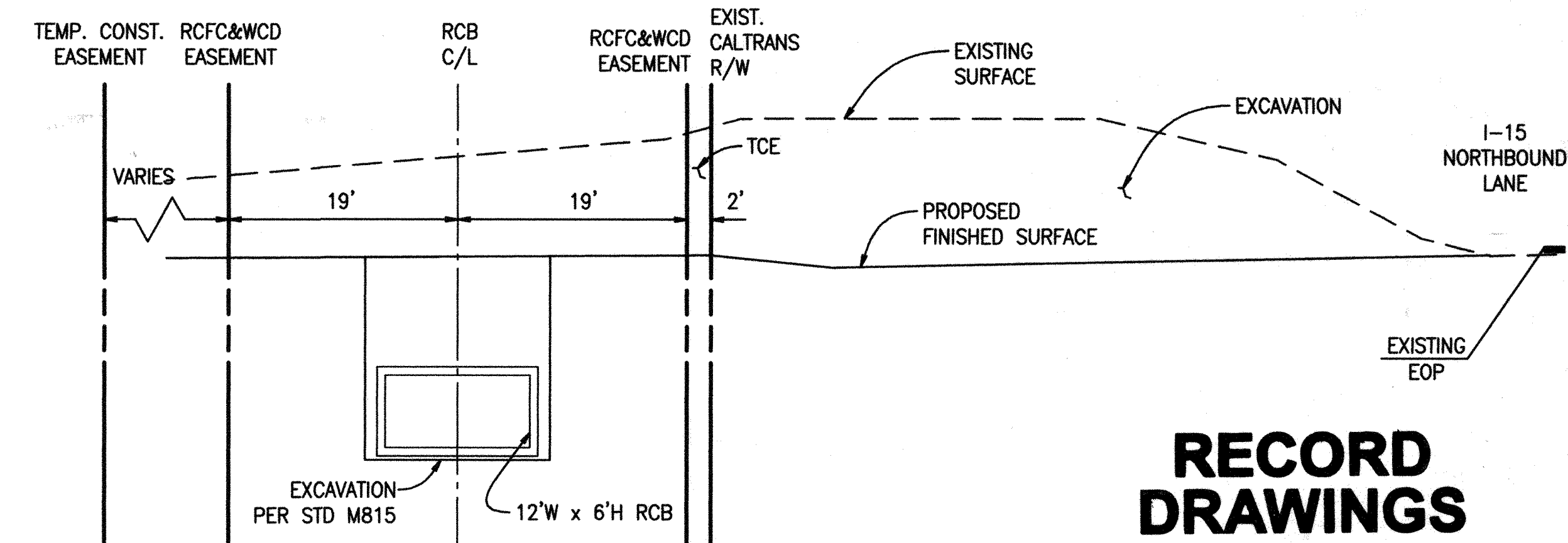
DESIGNED BY: MLA	PREPARED BY: <i>Jim C. [Signature]</i>	DATE: 9-27-1
DRAWN BY: MLA	R.C.E. NO. C67239	EXP. DATE 9-30-12
CHECKED BY: JCC		

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
RECOMMENDED BY: <i>[Signature]</i> DATE: <i>10/3/2011</i>	APPROVED BY: <i>[Signature]</i> DATE: <i>10/4/2011</i>

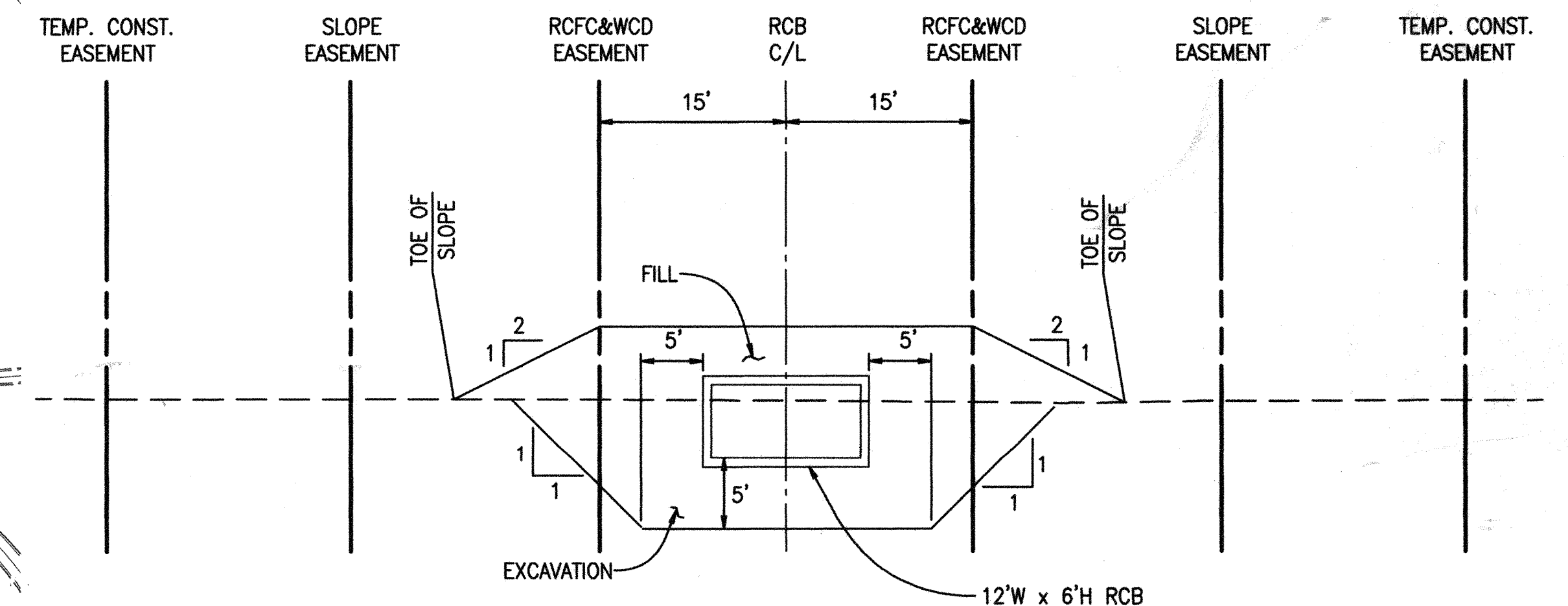
	<p align="center">DAY CREEK MASTER DRAINAGE PLAN</p> <p align="center">GRADING PLANS</p>	PROJECT NO. 2-0-00272-02
		DRAWING NO. 1-695
		SHEET NO. 13 OF 15



EXCAVATION DETAIL
TYPICAL FROM STA. 11+00.00 - STA. 15+75.00
N.T.S.



EXCAVATION DETAIL
TYPICAL FROM STA. 15+75.00 - STA. 25+50.00
N.T.S.



EXCAVATION DETAIL
TYPICAL FROM STA. 25+50.00 - STA. 29+26.44 (END)
N.T.S.

RECORD DRAWINGS

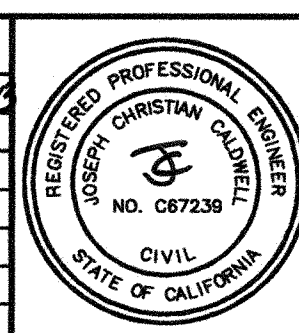
APPROVED BY: *[Signature]*
DATE: 4/18/13

G:\2009\09-0240.DWG & PROJ\NAD 83 CAVI\09-0240 SD.pro 9/26/2011

Don't Dig...Until You Call U.S.A. Toll Free
1-800-227-2600
for the location of buried utility lines.
Don't disrupt vital services.
TWO WORKING DAYS BEFORE YOU DIG

BENCH MARK: ELEVATION = 674.773'
RIVERSIDE COUNTY BENCHMARK, BM ML 15-64
ESTABLISHED 4/1964
DATUM = NAD83 (USC & GS)
BASIS OF BEARINGS: THE CENTERLINE OF
SCHLEISHMAN ROAD PER RECORD OF SURVEY
110/68 TAKEN AS NORTH 89°35'55"E

REVISIONS			
1	FOR GRADING, SEE SHEETS NO. 6 AND 7	4/18/13	
REF.	DESCRIPTION	APPR.	DATE



WEBB ASSOCIATES
4378 McCRAV STREET, RIVERSIDE, CA. 92506
PH. (951) 686-1070 FAX (951) 788-1256
DESIGNED BY: *MLA* PREPARED BY: *[Signature]* DATE: 2-24-12
DRAWN BY: *MLA* R.C.E. NO. C67236 EXP. DATE 9-30-12
CHECKED BY: *JCC*

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED BY: *[Signature]*
APPROVED BY: *Mark A. Willa*
DATE: 5/14/2012 DATE: 5/16/2012

DAY CREEK MASTER DRAINAGE PLAN
GRADING PLANS
PROJECT NO. 2-0-00272-02
DRAWING NO. 1-695
SHEET NO. 14 OF 15