Rider Distribution Center IV
Design Review/Case No: 19-00006
City of Perris, Riverside County, California

Preliminary Drainage Study

Prepared for:
IDI Logistics
Attn: Steve Hollis
840 Apollo Street, Suite 343
El Segundo, CA 90245
Tel: (949) 351-7243

Prepared By:
ALBERT A. WEBB ASSOCIATES
3788 McCray Street
Riverside, CA 92506

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DJ Arellano, P.E.
Senior Engineer, Land Development

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SECTION 1 - SUMMARY

PURPOSE

The purpose of this report is to document the hydrologic and hydraulic analyses performed in support of the Rider Distribution Center IV project located in the City of Perris, County of Riverside, California. The project site is located east of Redlands Avenue, south of Morgan Street and west of the Perris Valley Storm Drain Channel. The project proposes to build an industrial warehouse on approximately 26.4 acres of vacant land. This report will summarize the hydrology and hydraulic analyses that were completed to determine the necessary drainage improvements required for the project to safely convey 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.
- Determine the required storm drain facilities, alignment, and sizes required to flood protect the project site.
- Determine the site's water quality volume and corresponding modular wetland size for water quality treatment.
- Preparation of a preliminary report summarizing the hydrology and hydraulic results.

DESCRIPTION OF WATERSHED

As previously described, the project is proposing to construct an industrial warehouse on approximately 26.4 acres. Existing elevations across the site vary from 1446 at the northwest corner to 1444 at the southeast corner (NAVD88 datum). The site is relatively flat and currently slopes at approximately 0.2%. The existing drainage pattern for the site is characterized by sheet flows that follow the approximate slope to the southeast corner of the project site. The sheet flow discharges southeasterly towards the Perris Valley Storm Drain. The project will be constructed after the Perris Valley Storm Drain is widen to its ultimate width. The widening of the PVSD is per a separate project.

The project is located within the Perris Valley Storm Drain Master Drainage Plan (PVSD MDP). Lateral G-2 is the backbone system that conveys flows from the tributary area, which then flows toward the Perris Valley Storm Drain Channel.

PROPOSED CONDITIONS

The project site is impacted by small off-site flows that come from an existing ridgeline located on the south side of the project boundary in Metropolitan Water District (MWD) right-of-way. These off-site flows will impact the area designated for the proposed multi-purpose trail. The area will be landscaped and depressed to conform to water quality standards. Runoff generated from this area will be conveyed into proposed Lateral G-2. Redlands Avenue protects the project site from any runoff that may impact the property on the west. On the north side of the project site, there is a swale that prevents flows from running on-site. To the east of the project, PVSD conveys runoff away from the site.

This project proposes for all on-site runoff to surface flow through the site utilizing ribbon gutters, curb and gutters, grate inlets, and subsurface storm drain systems. The storm drain systems will be used to convey flows into the proposed modular wetland system located on the southeast corner of the project site. Line A and Line B will both drain to this single modular wetland – though they will have different connections to Lateral G-2. For each on-site storm drain mainline, a manhole with an adverse grade pipe downstream will be placed to ensure the tributary water quality volume is retained. The adverse grade will also connect the mainlines to the Lateral G-2 invert. Higher flows will overcome the adverse grade and discharge into lateral G-2.

After the captured flows have been treated by the MWS, they will drain to a proposed pump station that will discharge them into an on-site vault. From the vault, the pumped runoff will gravity flow into Lateral G-2. The pump station will discharge at an appropriate flowrate. The MWS will provide treatment for the entire project site. The treatment model will be MWS-L-8-24-HC from the manufacturer Bio Clean.

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. The land use was assumed to be commercial for the developed as recommended in the hydrology manual. For the small area of offsite flows, the land use was assumed to be undeveloped with good cover due to the proposed landscaping and zero impervious area.

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 utilized to determine the peak flow rates used to size and design the subsurface storm drain systems to convey on-site flows. 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.

HYDRAULICS

Based on the results from the Rational Method Hydrology, a steady state hydraulic analysis of the storm drain system was performed to size/ analyze on-site subsurface storm drain systems. The facilities were analyzed under the established 100-year flow rates – it was assumed that the inlets on grade captured all of their tributary flow. The computer program, Water Surface and Pressure Gradient (WSPG) from CivilDesign, Corp. Version 14.06 (originally Los Angeles County Flood Control District Program F0515P) was used to analyze the system. For additional information and results, see Appendix B.

Normal depth calculations and inlet calculations were performed using the Hydraulic Toolbox 4.4 Software developed by Federal Highway Administration (FHWA) in cooperation with Aquaveo. For results, see Appendix B.

Water quality calculations were performed using spreadsheets that were created by RCFC&WCD. Preliminary calculations and additional details can be found in the Preliminary WQMP (P-WQMP). In addition, copies of the P-WQMP calculations and modular wetland specifications have been included in Appendix B.

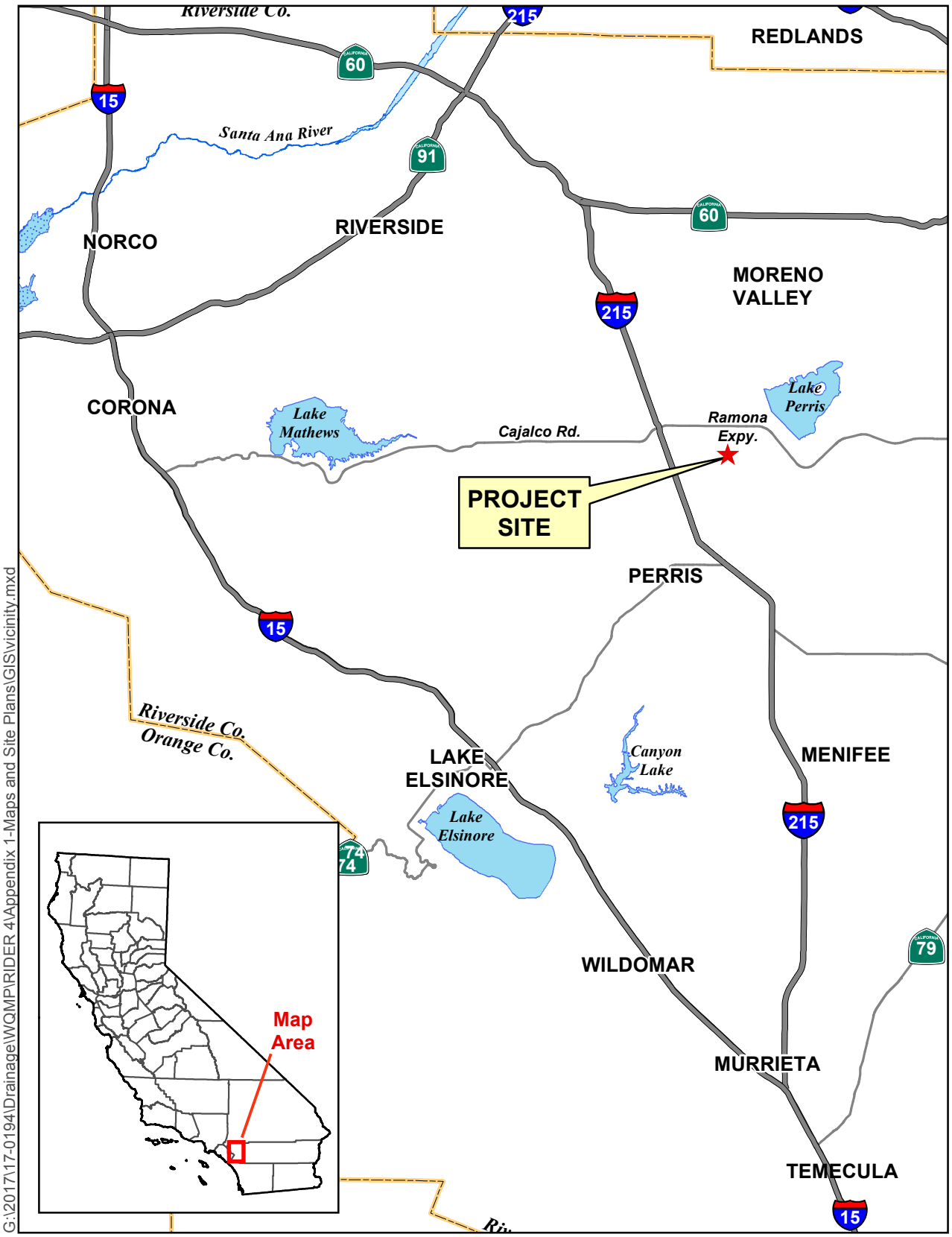

Figure 1. Vicinity Map

0 2.5 5 Miles

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Sources: ESRI / USGS 7.5min Quad
DRGs: PERRIS

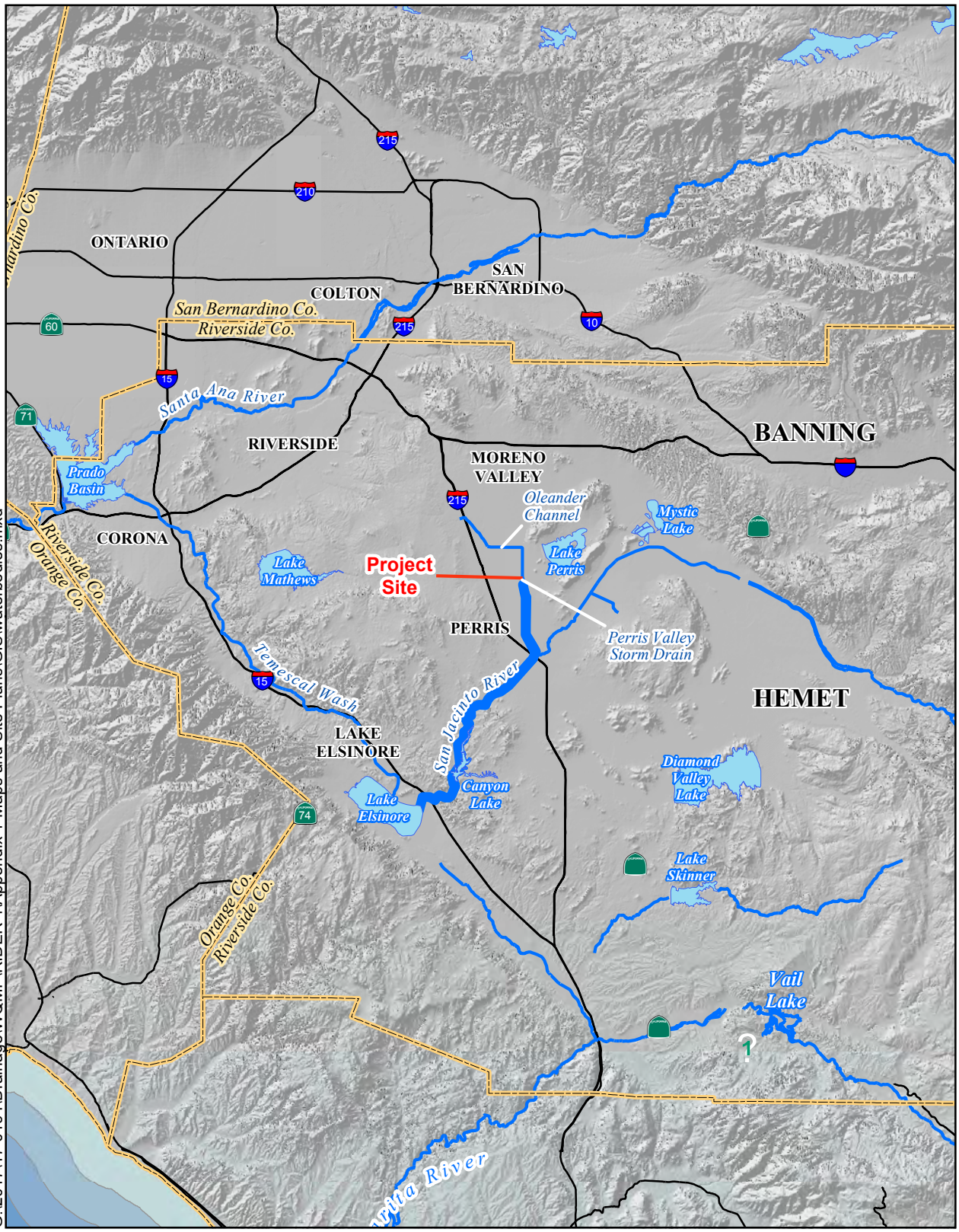
Figure 2. USGS Topography Map

0 1,000 2,000
Feet

Sources: County of Riverside GIS, 2013; Eagle Aerial, April 2012.

Figure 3. Aerial Photograph

0 400 800 Feet



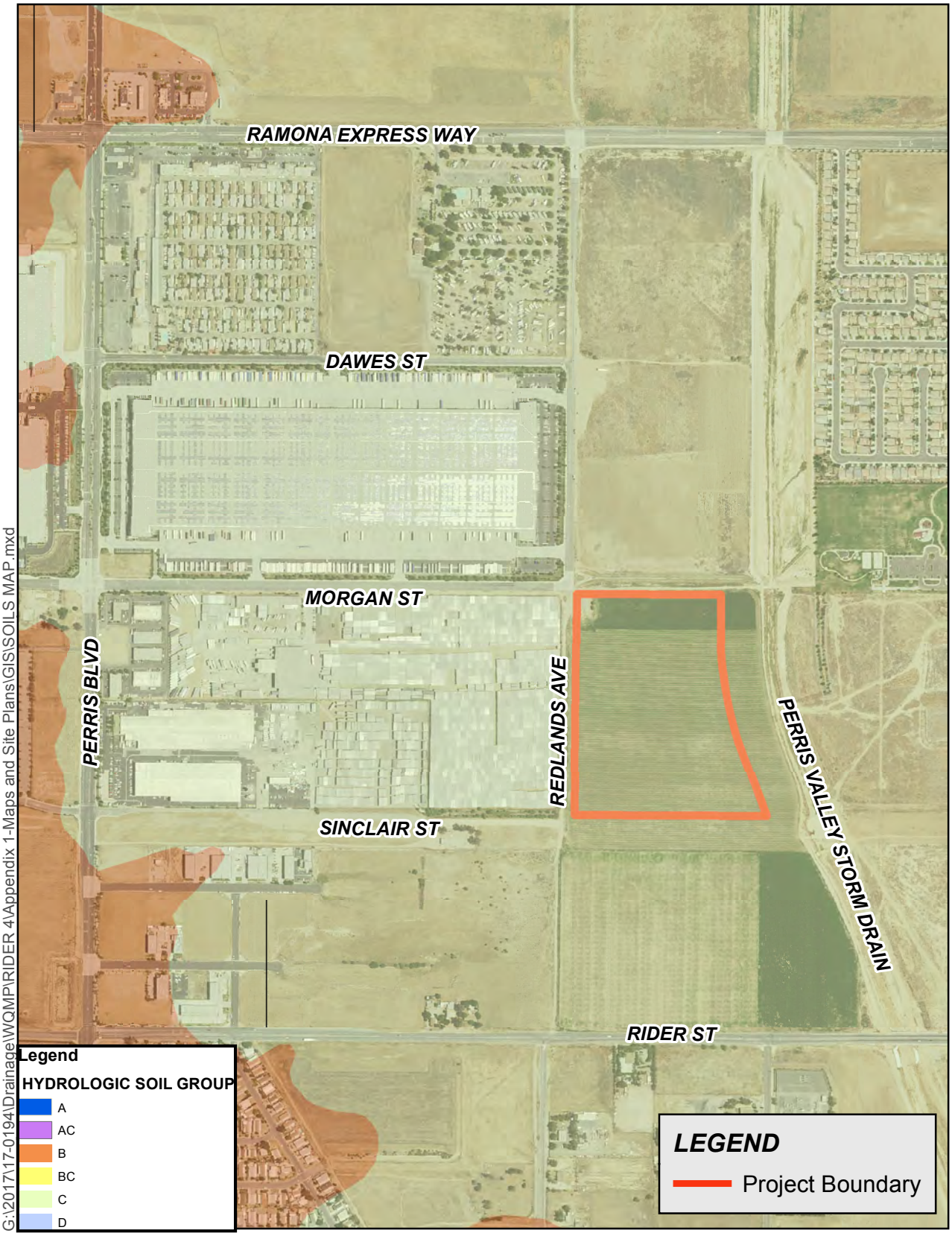
G:\2017\17-0194\Drainage\WQMP\RIDER 4\Appendix 1-Maps and Site Plans\GIS\waterbodies.mxd

Sources: USGS 30 Meter DEM;
USGS Digital Line Graph

Figure 4. Receiving Waterbodies

0 2 4 6
Miles

Flowpath



G:\2017\17-0194\Drainage\WQMP\RIDER 4\Appendix 1-Maps and Site Plans\GIS\SOILS MAP.mxd

Eagle Aerial, April 2010;
Riverside County GIS, 2012
RCFC&WCD Hydology Manual Plate C-1.30

N
W E
S

0 500 1,000
Feet

Soils Map

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 standard intensity-duration curve for Perris Valley from the manual (Plate D-4.1):

Table 1 – Precipitation Values

	Duration
Storm Event	1-Hour (inches)
10-Year	0.78
100-Year	1.12

The value for slope of intensity was determined to be 0.49. This was also found from the standard intensity-duration curve for Perris Valley from the manual (Plate D-4.1). It has been included in Appendix A.

Based on the Plate C-1.30 (Perris) in the RCFC&WCD Hydrology Manual, the project site is comprised of soil type C. The soils map is included in Appendix A.

The cover type was determined based on the proposed use of the site and utilizing Plates D-5.5 and D-5.6 from the Hydrology Manual. The commercial landscaping cover type was used to represent the developed condition. The table below summarizes the runoff index values and recommended values for percentage each category of impervious cover:

Table 2 – Cover Type

Cover Type	Soil Group A	Soil Group B	Soil Group C	Soil Group D	Percentage of Impervious Cover
Undeveloped Poor Cover	67	78	86	89	0%
Commercial Landscaping	32	56	69	75	90%
Undeveloped Good Cover	38	61	74	80	0%

ON-SITE RATIONAL METHOD HYDROLOGY

The rational method was used to determine peak flow rates in order to adequately size the proposed subsurface storm drain and associated inlets used to convey on-site flows to the proposed Lateral G-2. The project site is separated into two drainage areas which are further divided into sub-areas.

The following table summarizes the rational method results at key points:

Table 3 – Rational Method Results

Point of Interest	10-Year Peak Flow Rate (cfs)	100-Year Peak Flow Rate (cfs)
Node 105 Runoff generated from Areas-A1 to A5, Project East Side	21.5	31.4
Node 204 Runoff generated from Area-B1 to B4, Project West Side	17.0	24.8
Node 2 Runoff generated from OS-1, Offsite Southerly landscape trail	1.1	1.8

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

ON-SITE UNIT HYDROGRAPH METHOD HYDROLOGY

There was no unit hydrograph analysis completed in this preliminary report since basin routing is not required. A unit hydrograph analysis will be included in the final report. It will be needed for a truck court ponding investigation.

SECTION 3 - HYDRAULIC ANALYSIS

ON-SITE STORM DRAIN FACILITIES

A brief summary of each system has been provided and the results of the hydraulic analyses are included in Appendix B. The peak flow rates determined during the 100-year rational method on-site hydrology analysis were utilized to evaluate the proposed storm drain systems.

On-site Line A

Line A will convey flow from the eastern side of the site – the side nearest the Perris Valley Storm Drain Channel. Runoff starts at a high point in the northern drive aisle and continues into the easterly truck court. It drains into a series of inlets on grade before reaching a low point and inlet in sag in the south of the eastern truck court. All inlets in the east side drain to Line A. Preliminary sizing of Line A can be found in the Rational Method output in Appendix A. These pipes will need to be oversized which will minimize ponding in the truck court and reduce head loss in the pipe during high flow events – the lower head loss promotes a greater efficiency of outflow into Lateral G-2. A hydraulic analysis using WSPGW was used to analyze this scenario. The preliminary oversizing of Line A resulted in pipes with diameters of 30-inches upstream to 48-inches downstream. It was assumed that the inlets captured all tributary flows found from the rational method. See Appendix B for WSPGW output.

A short distance after the Line A confluence with the sag inlet lateral, Line A connects to a low flow manhole. After this low flow manhole, Line A begins to gain elevation from an adverse grade before connecting to another manhole. After the second manhole, Line A gravity flows into Lateral G-2. The low flow manhole and adverse grade allow treatment flows to be captured and conveyed to an on-site modular wetland before being pumped into an on-site vault. From the vault, runoff is gravity fed into Lateral G-2.

On-site Line B

Line B will convey flow from the western side of the site – the side nearest Redlands Avenue. Runoff starts at a high point in the northern drive aisle and continues into the westerly truck court. It drains into a series of inlets on grade before reaching a low point and inlet in sag in the south of the western truck court. All inlets in the west side drain to Line B. Preliminary sizing of Line A can be found in the Rational Method output in Appendix A. These pipes will need to be oversized which will minimize ponding in the truck court and reduce head loss in the pipe during high flow events – the lower head loss promotes a greater efficiency of outflow into Lateral G-2. A hydraulic analysis using WSPGW was used to analyze this scenario. The preliminary oversizing of Line B resulted in pipes with diameters of 30-inches upstream to 48-inches downstream. It was assumed that the inlets captured all tributary flows found from the rational method. See Appendix B for WSPGW output.

A short distance after the Line B confluence with the sag inlet lateral, Line B connects to a low flow manhole. After this low flow manhole, Line B begins to gain elevation from an adverse grade before connecting to another manhole. After the second manhole, Line B gravity flows into Lateral G-2. The low flow manhole and adverse grade allow treatment flows to be captured and conveyed to an on-site modular wetland with before being pumped into an on-site vault. From the vault, runoff is gravity fed into Lateral G-2.

The low flows from Line A and B comingle before entering the modular wetland.

Inlets

The preliminary sizing of the inlets were found by taking a worst case scenario approach in terms of tributary flows; final sizing were be more detailed. The design philosophy of the inlets on grade is to have high capture efficiencies which will increase the amount of head in the on-site mainlines; this will allow the runoff to efficiently overcome the adverse grade during high flow events. The inlets in sag will be designed to have low entrance flow depths to minimize water in the truck courts.

The inlets on grade were preliminarily designed with a worst case tributary flow of 6.6 cfs (Node 201). Using the SSPWC standard for transverse grating catch basins, a five grate catch basin – 3.0 feet wide and 10.8 feet long – has a capture efficiency of 93%. This is more than enough since the downstream tributary areas produce much less runoff.

The inlets in sag were preliminarily designed with a worst case tributary flow of 13.5 cfs. It accounts for the worst case tributary flowrate for a sump inlet (Node 105) plus 10% assumed as bypass flow from the upstream flow-by inlets. Using the SSPWC standard for transverse grating catch basins, a five grate catch basin – 3.0 feet wide and 10.8 feet long – creates a ponding depth of 0.36 feet. This is determined to be well within normal parameters.

Though this preliminary analysis shows minimal ponding, a truck court ponding study will be completed during final design. It will incorporate hydraulic grade lines in Lateral G-2, available truck court storage volumes and runoff flow rates to gauge the ponding potential of the system as a whole.

Water Quality Discharge System

The proposed water quality discharge system will be further analyzed during final design.

Lateral G-2

The Perris Valley Master Drainage Plan (MDP) currently shows the proposed Lateral G-2 section along the property southern property line as a 5 foot deep trapezoidal concrete channel with a 0.1% slope. It proposes a peak flowrate of 301 cfs. A more in depth analysis will be completed during final design.

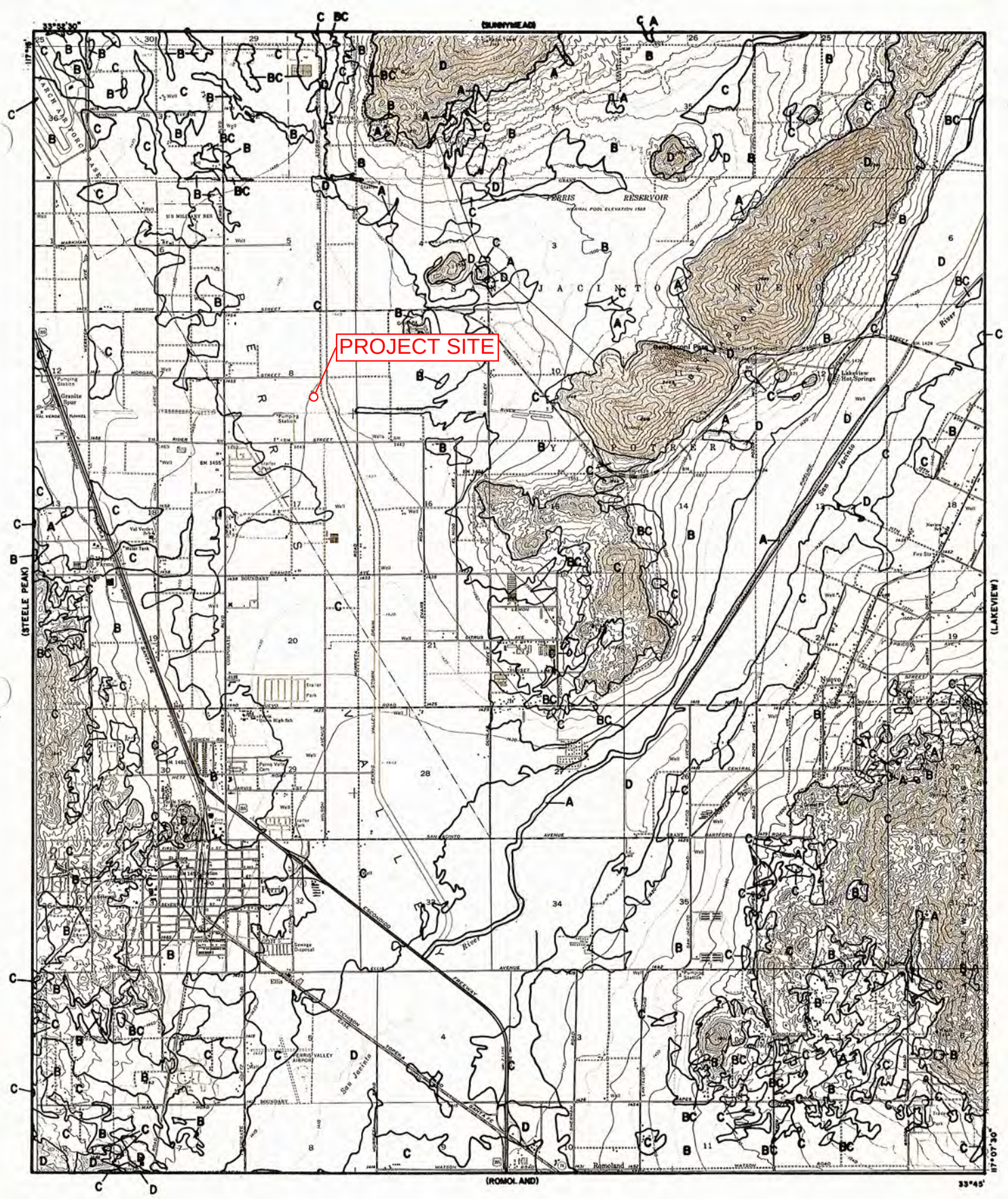
SECTION 4 - CONCLUSION

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

- The proposed on-site subsurface storm drain systems will adequately convey flows to the modular wetland and provide flood protection for the 100-year storm event.
- The proposed modular wetland will adequately treat on-site flows.
- The proposed project will not impact flooding conditions to upstream or downstream properties.

APPENDIX A – HYDROLOGY

HYDROLOGIC SOILS GROUP MAP (PLATE C-1.30)



LEGEND

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

RCFC&WCD

HYDROLOGY MANUAL

0 FEET 5000

HYDROLOGIC SOILS GROUP MAP FOR PERRIS

PLATE C-1.30

STANDARD INTENSITY-DURATION CURVES (PLATE D-4.1)

RAINFALL INTENSITY—INCHES PER HOUR

MIRA LOMA			MURRIETA - TEMECULA & RANCHO CALIFORNIA			NORCO			PALM SPRINGS			PERRIS VALLEY		
DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY	
	10 YEAR	100 YEAR		10 YEAR	100 YEAR		10 YEAR	100 YEAR		10 YEAR	100 YEAR		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		

STANDARD INTENSITY-DURATION CURVES DATA

RATIONAL METHOD HYDROLOGY

10-YEAR PROPOSED HYDROLOGY

EAST SIDE – TRIBUTARY TO LINE A

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
Rational Hydrology Study Date: 03/05/19 File:PROP10EAST.out

17-0357 RIDER DISTRIBUTION CENTER IV
RATIONAL METHOD HYDROLOGY - ONSITE FLOWS
10 YEAR STORM EVENT, EAST SIDE (LINE A)
FN: PROP10EAST.OUT TSW

********* 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 [Perris Valley] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.780(In/Hr)
100 year storm 10 minute intensity = 2.690(In/Hr)
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.780(In/Hr)
Slope of intensity duration curve = 0.4900

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

Initial area flow distance = 548.000(Ft.)
Top (of initial area) elevation = 1449.700(Ft.)
Bottom (of initial area) elevation = 1446.700(Ft.)
Difference in elevation = 3.000(Ft.)
Slope = 0.00547 s(percent)= 0.55
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 10.592 min.
Rainfall intensity = 1.825(In/Hr) for a 10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.878
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 69.00
Pervious area fraction = 0.100; Impervious fraction = 0.900
Initial subarea runoff = 3.043(CFS)
Total initial stream area = 1.900(Ac.)
Pervious area fraction = 0.100

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

Upstream point/station elevation = 1442.500(Ft.)
Downstream point/station elevation = 1441.700(Ft.)
Pipe length = 274.00(Ft.) Manning's N = 0.012
No. of pipes = 1 Required pipe flow = 3.043(CFS)
Nearest computed pipe diameter = 15.00(In.)
Calculated individual pipe flow = 3.043(CFS)
Normal flow depth in pipe = 10.20(In.)

```
Flow top width inside pipe =   14.00(In.)
Critical Depth =    8.43(In.)
Pipe flow velocity =      3.43(Ft/s)
Travel time through pipe =    1.33 min.
Time of concentration (TC) =    11.92 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      102.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
COMMERCIAL subarea type
Runoff Coefficient = 0.877
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    11.92 min.
Rainfall intensity =      1.722(In/Hr) for a    10.0 year storm
Subarea runoff =      3.170(CFS) for      2.100(Ac.)
Total runoff =      6.213(CFS)  Total area =       4.000(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1441.700(Ft.)
Downstream point/station elevation =  1441.000(Ft.)
Pipe length  =   221.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     6.213(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     6.213(CFS)
Normal flow depth in pipe =   14.30(In.)
Flow top width inside pipe =   14.55(In.)
Critical Depth =   11.56(In.)
Pipe flow velocity =      4.13(Ft/s)
Travel time through pipe =    0.89 min.
Time of concentration (TC) =    12.82 min.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Process from Point/Station      103.000 to Point/Station      103.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
COMMERCIAL subarea type
Runoff Coefficient = 0.876
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    12.82 min.
Rainfall intensity =      1.662(In/Hr) for a    10.0 year storm
Subarea runoff =      3.203(CFS) for      2.200(Ac.)
Total runoff =      9.416(CFS)  Total area =       6.200(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1441.000(Ft.)
Downstream point/station elevation =  1440.300(Ft.)
Pipe length  =   222.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     9.416(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     9.416(CFS)
Normal flow depth in pipe =   16.78(In.)
Flow top width inside pipe =   16.83(In.)
Critical Depth =   13.70(In.)
Pipe flow velocity =      4.57(Ft/s)
Travel time through pipe =    0.81 min.
Time of concentration (TC) =    13.63 min.
```

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

COMMERCIAL subarea type
Runoff Coefficient = 0.876
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 69.00
Pervious area fraction = 0.100; Impervious fraction = 0.900
Time of concentration = 13.63 min.
Rainfall intensity = 1.613(In/Hr) for a 10.0 year storm
Subarea runoff = 3.530(CFS) for 2.500(Ac.)
Total runoff = 12.946(CFS) Total area = 8.700(Ac.)

++
Process from Point/Station 104.000 to Point/Station 105.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1440.300(Ft.)
Downstream point/station elevation = 1439.600(Ft.)
Pipe length = 244.00(Ft.) Manning's N = 0.012
No. of pipes = 1 Required pipe flow = 12.946(CFS)
Nearest computed pipe diameter = 24.00(In.)
Calculated individual pipe flow = 12.946(CFS)
Normal flow depth in pipe = 19.36(In.)
Flow top width inside pipe = 18.96(In.)
Critical Depth = 15.54(In.)
Pipe flow velocity = 4.76(Ft/s)
Travel time through pipe = 0.85 min.
Time of concentration (TC) = 14.48 min.

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

COMMERCIAL subarea type
Runoff Coefficient = 0.875
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 69.00
Pervious area fraction = 0.100; Impervious fraction = 0.900
Time of concentration = 14.48 min.
Rainfall intensity = 1.565(In/Hr) for a 10.0 year storm
Subarea runoff = 8.630(CFS) for 6.300(Ac.)
Total runoff = 21.576(CFS) Total area = 15.000(Ac.)

++
Process from Point/Station 105.000 to Point/Station 105.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 15.000(Ac.)
Runoff from this stream = 21.576(CFS)
Time of concentration = 14.48 min.
Rainfall intensity = 1.565(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	21.576	14.48	1.565

Largest stream flow has longer time of concentration
Qp = 21.576 + sum of
Qp = 21.576

Total of 1 streams to confluence:
Flow rates before confluence point:
21.576
Area of streams before confluence:
15.000

Results of confluence:
Total flow rate = 21.576(CFS)
Time of concentration = 14.480 min.
Effective stream area after confluence = 15.000(Ac.)
End of computations, total study area = 15.00 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged RI index number = 69.0

WEST SIDE – TRIBUTARY TO LINE B

WEST SIDE – TRIBUTARY TO LINE B

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
Rational Hydrology Study Date: 03/05/19 File:PROP10WEST.out

17-0357 RIDER DISTRIBUTION CENTER IV
RATIONAL METHOD HYDROLOGY - ONSITE FLOWS
10 YEAR STORM EVENT, WEST SITE (LINE B)
FN: PROP10WEST.OUT TSW

********* 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 [Perris Valley] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.780(In/Hr)
100 year storm 10 minute intensity = 2.690(In/Hr)
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.780(In/Hr)
Slope of intensity duration curve = 0.4900

++
Process from Point/Station 100.000 to Point/Station 201.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 599.000(Ft.)
Top (of initial area) elevation = 1449.700(Ft.)
Bottom (of initial area) elevation = 1446.400(Ft.)
Difference in elevation = 3.300(Ft.)
Slope = 0.00551 s(percent)= 0.55
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 10.962 min.
Rainfall intensity = 1.794(In/Hr) for a 10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.877
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 69.00
Pervious area fraction = 0.100; Impervious fraction = 0.900
Initial subarea runoff = 4.565(CFS)
Total initial stream area = 2.900(Ac.)
Pervious area fraction = 0.100

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

Upstream point/station elevation = 1442.100(Ft.)
Downstream point/station elevation = 1441.500(Ft.)
Pipe length = 235.00(Ft.) Manning's N = 0.012
No. of pipes = 1 Required pipe flow = 4.565(CFS)
Nearest computed pipe diameter = 18.00(In.)
Calculated individual pipe flow = 4.565(CFS)
Normal flow depth in pipe = 12.12(In.)

```
Flow top width inside pipe =   16.89(In.)
Critical Depth =    9.84(In.)
Pipe flow velocity =      3.61(Ft/s)
Travel time through pipe =    1.08 min.
Time of concentration (TC) =    12.05 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      202.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
COMMERCIAL subarea type
Runoff Coefficient = 0.877
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    12.05 min.
Rainfall intensity =      1.713(In/Hr) for a    10.0 year storm
Subarea runoff =      3.154(CFS) for      2.100(Ac.)
Total runoff =      7.719(CFS)  Total area =       5.000(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      203.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1441.500(Ft.)
Downstream point/station elevation =  1441.000(Ft.)
Pipe length  =   224.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     7.719(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     7.719(CFS)
Normal flow depth in pipe =   16.36(In.)
Flow top width inside pipe =   17.43(In.)
Critical Depth =   12.35(In.)
Pipe flow velocity =      3.84(Ft/s)
Travel time through pipe =    0.97 min.
Time of concentration (TC) =    13.02 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      203.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
COMMERCIAL subarea type
Runoff Coefficient = 0.876
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    13.02 min.
Rainfall intensity =      1.649(In/Hr) for a    10.0 year storm
Subarea runoff =      3.178(CFS) for      2.200(Ac.)
Total runoff =     10.897(CFS)  Total area =       7.200(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      204.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1441.000(Ft.)
Downstream point/station elevation =  1440.400(Ft.)
Pipe length  =   240.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =    10.897(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    10.897(CFS)
Normal flow depth in pipe =   17.63(In.)
Flow top width inside pipe =   21.20(In.)
Critical Depth =   14.19(In.)
Pipe flow velocity =      4.41(Ft/s)
Travel time through pipe =    0.91 min.
Time of concentration (TC) =    13.93 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      204.000 to Point/Station      204.000
**** SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------------
COMMERCIAL subarea type
Runoff Coefficient = 0.875
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    13.93 min.
Rainfall intensity =      1.596(In/Hr) for a    10.0 year storm
Subarea runoff =      6.146(CFS) for      4.400(Ac.)
Total runoff =     17.043(CFS)  Total area =      11.600(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      204.000 to Point/Station      204.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     11.600(Ac.)
Runoff from this stream =     17.043(CFS)
Time of concentration =   13.93 min.
Rainfall intensity =     1.596(In/Hr)
Summary of stream data:

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


1       17.043     13.93                 1.596
Largest stream flow has longer time of concentration
Qp =     17.043 + sum of
Qp =     17.043

Total of 1 streams to confluence:
Flow rates before confluence point:
      17.043
Area of streams before confluence:
       11.600
Results of confluence:
Total flow rate =     17.043(CFS)
Time of concentration =    13.927 min.
Effective stream area after confluence =     11.600(Ac.)
End of computations, total study area =           11.60 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged RI index number =  69.0
```

OFF-SITE SOUTH SIDE

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
Rational Hydrology Study Date: 03/05/19 File:OFFSITE10.out

17-0358 RIDER DISTRIBUTION CENTER IV
RATIONAL METHOD HYDROLOGY - OFFSITE FLOWS
10 YEAR STORM EVENT
FN: OFFSITE10.OUT TSW

********* 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 [Perris Valley] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.780(In/Hr)
100 year storm 10 minute intensity = 2.690(In/Hr)
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 0.780(In/Hr)
Slope of intensity duration curve = 0.4900

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

Initial area flow distance = 948.000(Ft.)
Top (of initial area) elevation = 1446.500(Ft.)
Bottom (of initial area) elevation = 1445.500(Ft.)
Difference in elevation = 1.000(Ft.)
Slope = 0.00105 s(percent)= 0.11
TC = k(0.940)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 57.440 min.
Rainfall intensity = 0.797(In/Hr) for a 10.0 year storm
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.567
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 74.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 1.129(CFS)
Total initial stream area = 2.500(Ac.)
Pervious area fraction = 1.000

++
Process from Point/Station 1.000 to Point/Station 2.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 2.500(Ac.)
Runoff from this stream = 1.129(CFS)
Time of concentration = 57.44 min.
Rainfall intensity = 0.797(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	1.129	57.44	0.797

Largest stream flow has longer time of concentration
Qp = 1.129 + sum of
Qp = 1.129

Total of 1 streams to confluence:
Flow rates before confluence point:
1.129
Area of streams before confluence:
2.500
Results of confluence:
Total flow rate = 1.129(CFS)
Time of concentration = 57.440 min.
Effective stream area after confluence = 2.500(Ac.)
End of computations, total study area = 2.50 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number = 74.0

100-YEAR PROPOSED HYDROLOGY

ON-SITE EAST SIDE – TRIBUTARY TO LINE A

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
Rational Hydrology Study Date: 03/05/19 File:PROP100EAST.out

17-0357 RIDER DISTRIBUTION CENTER IV
RATIONAL METHOD HYDROLOGY - ONSITE FLOWS
100 YEAR STORM EVENT, EAST SIDE (LINE A)
FN: PROP100EAST.OUT TSW

********* 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 [Perris Valley] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.780(In/Hr)
100 year storm 10 minute intensity = 2.690(In/Hr)
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.120(In/Hr)
Slope of intensity duration curve = 0.4900

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

Initial area flow distance = 548.000(Ft.)
Top (of initial area) elevation = 1449.700(Ft.)
Bottom (of initial area) elevation = 1446.700(Ft.)
Difference in elevation = 3.000(Ft.)
Slope = 0.00547 s(percent)= 0.55
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 10.592 min.
Rainfall intensity = 2.620(In/Hr) for a 100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.883
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 69.00
Pervious area fraction = 0.100; Impervious fraction = 0.900
Initial subarea runoff = 4.397(CFS)
Total initial stream area = 1.900(Ac.)
Pervious area fraction = 0.100

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

Upstream point/station elevation = 1442.500(Ft.)
Downstream point/station elevation = 1441.700(Ft.)
Pipe length = 274.00(Ft.) Manning's N = 0.012
No. of pipes = 1 Required pipe flow = 4.397(CFS)
Nearest computed pipe diameter = 18.00(In.)
Calculated individual pipe flow = 4.397(CFS)
Normal flow depth in pipe = 11.25(In.)

Flow top width inside pipe = 17.43(In.)
Critical Depth = 9.66(In.)
Pipe flow velocity = 3.78(Ft/s)
Travel time through pipe = 1.21 min.
Time of concentration (TC) = 11.80 min.

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

COMMERCIAL subarea type
Runoff Coefficient = 0.883
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 69.00
Pervious area fraction = 0.100; Impervious fraction = 0.900
Time of concentration = 11.80 min.
Rainfall intensity = 2.485(In/Hr) for a 100.0 year storm
Subarea runoff = 4.605(CFS) for 2.100(Ac.)
Total runoff = 9.002(CFS) Total area = 4.000(Ac.)

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

Upstream point/station elevation = 1441.700(Ft.)
Downstream point/station elevation = 1441.000(Ft.)
Pipe length = 221.00(Ft.) Manning's N = 0.012
No. of pipes = 1 Required pipe flow = 9.002(CFS)
Nearest computed pipe diameter = 21.00(In.)
Calculated individual pipe flow = 9.002(CFS)
Normal flow depth in pipe = 16.05(In.)
Flow top width inside pipe = 17.82(In.)
Critical Depth = 13.37(In.)
Pipe flow velocity = 4.56(Ft/s)
Travel time through pipe = 0.81 min.
Time of concentration (TC) = 12.61 min.

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

COMMERCIAL subarea type
Runoff Coefficient = 0.882
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 69.00
Pervious area fraction = 0.100; Impervious fraction = 0.900
Time of concentration = 12.61 min.
Rainfall intensity = 2.406(In/Hr) for a 100.0 year storm
Subarea runoff = 4.668(CFS) for 2.200(Ac.)
Total runoff = 13.670(CFS) Total area = 6.200(Ac.)

++
Process from Point/Station 103.000 to Point/Station 104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1441.000(Ft.)
Downstream point/station elevation = 1440.300(Ft.)
Pipe length = 222.00(Ft.) Manning's N = 0.012
No. of pipes = 1 Required pipe flow = 13.670(CFS)
Nearest computed pipe diameter = 24.00(In.)
Calculated individual pipe flow = 13.670(CFS)
Normal flow depth in pipe = 19.55(In.)
Flow top width inside pipe = 18.66(In.)
Critical Depth = 15.98(In.)
Pipe flow velocity = 4.99(Ft/s)
Travel time through pipe = 0.74 min.
Time of concentration (TC) = 13.35 min.

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

COMMERCIAL subarea type
Runoff Coefficient = 0.882
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 69.00
Pervious area fraction = 0.100; Impervious fraction = 0.900
Time of concentration = 13.35 min.
Rainfall intensity = 2.339(In/Hr) for a 100.0 year storm
Subarea runoff = 5.156(CFS) for 2.500(Ac.)
Total runoff = 18.826(CFS) Total area = 8.700(Ac.)

++
Process from Point/Station 104.000 to Point/Station 105.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1440.300(Ft.)
Downstream point/station elevation = 1439.600(Ft.)
Pipe length = 244.00(Ft.) Manning's N = 0.012
No. of pipes = 1 Required pipe flow = 18.826(CFS)
Nearest computed pipe diameter = 27.00(In.)
Calculated individual pipe flow = 18.826(CFS)
Normal flow depth in pipe = 23.53(In.)
Flow top width inside pipe = 18.07(In.)
Critical Depth = 18.20(In.)
Pipe flow velocity = 5.12(Ft/s)
Travel time through pipe = 0.79 min.
Time of concentration (TC) = 14.14 min.

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

COMMERCIAL subarea type
Runoff Coefficient = 0.881
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 69.00
Pervious area fraction = 0.100; Impervious fraction = 0.900
Time of concentration = 14.14 min.
Rainfall intensity = 2.274(In/Hr) for a 100.0 year storm
Subarea runoff = 12.624(CFS) for 6.300(Ac.)
Total runoff = 31.450(CFS) Total area = 15.000(Ac.)

++
Process from Point/Station 105.000 to Point/Station 105.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 15.000(Ac.)
Runoff from this stream = 31.450(CFS)
Time of concentration = 14.14 min.
Rainfall intensity = 2.274(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	31.450	14.14	2.274

Largest stream flow has longer time of concentration
Qp = 31.450 + sum of
Qp = 31.450

Total of 1 streams to confluence:
Flow rates before confluence point:
31.450
Area of streams before confluence:
15.000

Results of confluence:
Total flow rate = 31.450(CFS)
Time of concentration = 14.142 min.
Effective stream area after confluence = 15.000(Ac.)
End of computations, total study area = 15.00 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged RI index number = 69.0

ON-SITE WEST SIDE – TRIBUTARY TO LINE B

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
Rational Hydrology Study Date: 03/05/19 File:PROP100WEST.out

17-0357 RIDER DISTRIBUTION CENTER IV
RATIONAL METHOD HYDROLOGY - ONSITE FLOWS
100 YEAR STORM EVENT, WEST SITE (LINE B)
FN: PROP100WEST.OUT TSW

********* 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 [Perris Valley] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.780(In/Hr)
100 year storm 10 minute intensity = 2.690(In/Hr)
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.120(In/Hr)
Slope of intensity duration curve = 0.4900

++
Process from Point/Station 100.000 to Point/Station 201.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 599.000(Ft.)
Top (of initial area) elevation = 1449.700(Ft.)
Bottom (of initial area) elevation = 1446.400(Ft.)
Difference in elevation = 3.300(Ft.)
Slope = 0.00551 s(percent)= 0.55
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 10.962 min.
Rainfall intensity = 2.576(In/Hr) for a 100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.883
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 69.00
Pervious area fraction = 0.100; Impervious fraction = 0.900
Initial subarea runoff = 6.597(CFS)
Total initial stream area = 2.900(Ac.)
Pervious area fraction = 0.100

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

Upstream point/station elevation = 1442.100(Ft.)
Downstream point/station elevation = 1441.500(Ft.)
Pipe length = 235.00(Ft.) Manning's N = 0.012
No. of pipes = 1 Required pipe flow = 6.597(CFS)
Nearest computed pipe diameter = 21.00(In.)
Calculated individual pipe flow = 6.597(CFS)
Normal flow depth in pipe = 13.71(In.)

```
Flow top width inside pipe =   19.99(In.)
Critical Depth =   11.37(In.)
Pipe flow velocity =      3.97(Ft/s)
Travel time through pipe =    0.99 min.
Time of concentration (TC) =    11.95 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      202.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
COMMERCIAL subarea type
Runoff Coefficient = 0.882
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    11.95 min.
Rainfall intensity =      2.470(In/Hr) for a   100.0 year storm
Subarea runoff =      4.576(CFS) for      2.100(Ac.)
Total runoff =     11.173(CFS)  Total area =       5.000(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      203.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1441.500(Ft.)
Downstream point/station elevation =  1441.000(Ft.)
Pipe length  =   224.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =    11.173(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    11.173(CFS)
Normal flow depth in pipe =   18.94(In.)
Flow top width inside pipe =   19.58(In.)
Critical Depth =   14.38(In.)
Pipe flow velocity =      4.20(Ft/s)
Travel time through pipe =    0.89 min.
Time of concentration (TC) =    12.84 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      203.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
COMMERCIAL subarea type
Runoff Coefficient = 0.882
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    12.84 min.
Rainfall intensity =      2.384(In/Hr) for a   100.0 year storm
Subarea runoff =      4.626(CFS) for      2.200(Ac.)
Total runoff =     15.799(CFS)  Total area =       7.200(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      204.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1441.000(Ft.)
Downstream point/station elevation =  1440.400(Ft.)
Pipe length  =   240.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =    15.799(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    15.799(CFS)
Normal flow depth in pipe =   20.84(In.)
Flow top width inside pipe =   22.67(In.)
Critical Depth =   16.64(In.)
Pipe flow velocity =      4.80(Ft/s)
Travel time through pipe =    0.83 min.
Time of concentration (TC) =    13.67 min.
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      204.000 to Point/Station      204.000
**** SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------------
COMMERCIAL subarea type
Runoff Coefficient = 0.881
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =    13.67 min.
Rainfall intensity =      2.312(In/Hr) for a   100.0 year storm
Subarea runoff =      8.967(CFS) for      4.400(Ac.)
Total runoff =     24.766(CFS)  Total area =      11.600(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      204.000 to Point/Station      204.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     11.600(Ac.)
Runoff from this stream =     24.766(CFS)
Time of concentration =   13.67 min.
Rainfall intensity =     2.312(In/Hr)
Summary of stream data:

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


1       24.766     13.67                2.312
Largest stream flow has longer time of concentration
Qp =     24.766 + sum of
Qp =     24.766

Total of 1 streams to confluence:
Flow rates before confluence point:
      24.766
Area of streams before confluence:
       11.600
Results of confluence:
Total flow rate =     24.766(CFS)
Time of concentration =    13.671 min.
Effective stream area after confluence =     11.600(Ac.)
End of computations, total study area =           11.60 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged RI index number =  69.0
```

OFF-SITE SOUTH SIDE

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
Rational Hydrology Study Date: 03/05/19 File:OFFSITE100.out

17-0358 RIDER DISTRIBUTION CENTER IV
RATIONAL METHOD HYDROLOGY - OFFSITE FLOWS
100 YEAR STORM EVENT
FN: OFFSITE100.OUT TSW

********* 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 [Perris Valley] area used.
10 year storm 10 minute intensity = 1.880(In/Hr)
10 year storm 60 minute intensity = 0.780(In/Hr)
100 year storm 10 minute intensity = 2.690(In/Hr)
100 year storm 60 minute intensity = 1.120(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.120(In/Hr)
Slope of intensity duration curve = 0.4900

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

Initial area flow distance = 948.000(Ft.)
Top (of initial area) elevation = 1446.500(Ft.)
Bottom (of initial area) elevation = 1445.500(Ft.)
Difference in elevation = 1.000(Ft.)
Slope = 0.00105 s(percent)= 0.11
TC = k(0.940)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 57.440 min.
Rainfall intensity = 1.144(In/Hr) for a 100.0 year storm
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.639
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 74.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 1.827(CFS)
Total initial stream area = 2.500(Ac.)
Pervious area fraction = 1.000

++
Process from Point/Station 1.000 to Point/Station 2.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 2.500(Ac.)
Runoff from this stream = 1.827(CFS)
Time of concentration = 57.44 min.
Rainfall intensity = 1.144(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	1.827	57.44	1.144

Largest stream flow has longer time of concentration
Qp = 1.827 + sum of
Qp = 1.827

Total of 1 streams to confluence:
Flow rates before confluence point:
1.827
Area of streams before confluence:
2.500
Results of confluence:
Total flow rate = 1.827(CFS)
Time of concentration = 57.440 min.
Effective stream area after confluence = 2.500(Ac.)
End of computations, total study area = 2.50 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number = 74.0

HYDROLOGY MAPS

MORGAN STREET

REDLANDS AVE

PERRIS VALLEY STORM DRAIN

100
1449.7

101
1446.7
*1442.5
Q_{100}=4.4 CFS
Q_{10}=3.0 CFS

102
*1441.7
SUB TOTAL
Q_{100}=4.6 CFS
Q_{10}=3.2 CFS
TOTAL
Q_{100}=9.0 CFS
Q_{10}=6.2 CFS

103
*1441.0
SUB TOTAL
Q_{100}=4.7 CFS
Q_{10}=3.2 CFS
TOTAL
Q_{100}=13.7 CFS
Q_{10}=9.4 CFS

104
*1440.3
SUB TOTAL
Q_{100}=5.1 CFS
Q_{10}=3.5 CFS
TOTAL
Q_{100}=18.8 CFS
Q_{10}=12.9 CFS

105
*1439.6
SUB TOTAL
Q_{100}=12.6 CFS
Q_{10}=8.6 CFS
TOTAL
Q_{100}=31.4 CFS
Q_{10}=21.5 CFS

201
1446.4
*1442.1
Q_{100}=6.6 CFS
Q_{10}=4.6 CFS

202
*1441.5
SUB TOTAL
Q_{100}=4.6 CFS
Q_{10}=3.1 CFS
TOTAL
Q_{100}=11.2 CFS
Q_{10}=7.7 CFS

203
*1441.0
SUB TOTAL
Q_{100}=4.6 CFS
Q_{10}=3.2 CFS
TOTAL
Q_{100}=15.8 CFS
Q_{10}=10.9 CFS

204
*1440.4
SUB TOTAL
Q_{100}=9.0 CFS
Q_{10}=6.1 CFS
TOTAL
Q_{100}=24.8 CFS
Q_{10}=17.0 CFS

AREA-A1 — 1.9 / 548'
AREA-A2 — 2.1 / —
AREA-A3 — 2.2 / —
AREA-A4 — 2.5 / —
AREA-A5 — 6.3 / —
AREA-B1 — 2.9 / 599'
AREA-B2 — 2.1 / —
AREA-B3 — 2.2 / —
AREA-B4 — 4.4 / —

OS-1 — 2.5 / 948

1
1446.5

2
1445.5

PROP. STORM DRAIN (LINE B)

PROP. STORM DRAIN (LINE A)

WATER QUALITY DISCHARGE POINT

EXIST. LATERAL G-2

EXIST. LATERAL G-2

FUTURE. LATERAL G-2

PROP. LATERAL G-2

LINE B DISCHARGE POINT = 24.8 CFS

LINE A DISCHARGE POINT = 31.4 CFS

OFFSITE DISCHARGE POINT = 1.8 CFS

LEGEND

- DRAINAGE MANAGEMENT BOUNDARY
- FLOW DIRECTION
- LANDSCAPING
- 101 / 14xx — NODE DESIGNATION / NODE ELEVATION
- *14XX — *INVERT ELEVATION
- 5.0 / 1000' — WATERSHED AREA (ACRES) / LONGEST WATER PATH (FT)

N W E S

1" = 80'

40 0 80 160 240

CITY OF PERRIS

RATIONAL METHOD HYDROLOGY MAP
RIDER DISTRIBUTION CENTER IV
ON-SITE/OFF-SITE HYDROLOGY

SCALE:	1"=80'	W.O.	17-0358
DATE:	8/26/19	SHEET	1
DESIGNED:	TSW	OF	1 SHEETS
CHECKED:	DJA		
PLN CK REF:		DWG. NO.	
F.B.			

ALBERT A. WEBB ASSOCIATES
ENGINEERING CONSULTANTS
3788 McCRAY STREET
RIVERSIDE CA. 92506
PH. (951) 686-1070
FAX (951) 788-1256

C:\2017\17-0358\DRAINAGE\HYDROLOGY\DWG FOLDER\17-0358-PHYD-RATIONAL.DWG 4/25/2019 4:24:24 PM

TM KRW

APPENDIX B – HYDRAULICS

LINE-A

```
T1 17-0358 RIDER DISTRIBUTION CENTER IV                                    0
T2 ONSITE STORM DRAIN LINE A CONNECTS TO EXIST. LINE G-2, 100 YEAR
T3 FN:LINEA100.WSW
SO   1000.0001440.160  1                        1444.160
REM ASSUMED SOFFIT CONTROL FOR SO
R    1014.3701440.200  1      .013                                 .000    .000 0
TS   1019.8701440.220  1      .012                                 .000    .000
R    1039.7401439.390  1      .012                                 .000    .000 0
TS   1045.2401439.410  2      .012                                 .000    .000
R    1084.1301439.520  2      .012                                 .000  30.000 0
R    1105.0001439.590  2      .012                                 .000    .000 0
JX   1110.0001439.600  2  4   .012    4.400         1439.590       -45.0        0.000
R    1345.0001440.310  2      .012                                 .000    .000 0
JX   1350.0001440.320  2  4   .012    4.600         1440.310       -45.0        0.000
R    1570.0001440.990  2      .012                                 .000    .000 0
JX   1575.0001441.000  3  4   .012    4.700         1440.990       -45.0        0.000
R    1790.0001441.650  3      .012                                 .000    .000 0
JX   1795.0001441.660  3  4   .012    5.100         1441.650       -45.0        0.000
R    1937.6001442.080  3      .012                                 .000 -22.500 0
R    2065.2501442.470  3      .012                                 .000    .000 0
WE   2065.2501442.470  5      .500
R    2068.2501442.480  5      .013                                 .000
SH   2068.2501442.480  5                        1442.120
CD   1  4   1    .000   4.000     .000  .000  .000   .00
CD   2  4   1    .000   3.000     .000  .000  .000   .00
CD   3  4   1    .000   2.500     .000  .000  .000   .00
CD   4  4   1    .000   1.500     .000  .000  .000   .00
CD   5  2   0    .000   5.000    5.000  .000  .000   .00
Q           12.600   .0
```

FILE: LINEA100.WSW W S P G W - EDIT LISTING - Version 14.06
Date: 3- 6-2019 Time: 8:46: 0

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	4	1		4.000														
CD	2	4	1		3.000														
CD	3	4	1		2.500														
CD	4	4	1		1.500														
CD	5	2	0	.000	5.000	5.000			.00										

W S P G W

PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -
17-0358 RIDER DISTRIBUTION CENTER IV

HEADING LINE NO 2 IS -
ONSITE STORM DRAIN LINE A CONNECTS TO EXIST. LINE G-2, 100 YEAR

HEADING LINE NO 3 IS -
FN:LINEA100.WSW

W S P G W

PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1000.000	1440.160	1	1444.160

REMARKS: ASSUMED SOFFIT CONTROL FOR SO

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1014.370	1440.200	1	.013	.000	.000	.000	0

ELEMENT NO 3 IS A TRANSITION * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE
	1019.870	1440.220	1	.012	.000	.000

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1039.740	1439.390	1	.012	.000	.000	.000	0

THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING

ELEMENT NO 5 IS A TRANSITION * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE
	1045.240	1439.410	2	.012	.000	.000

ELEMENT NO 6 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1084.130	1439.520	2	.012	.000	.000	30.000	0

ELEMENT NO 7 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1105.000	1439.590	2	.012	.000	.000	.000	0

ELEMENT NO 8 IS A JUNCTION * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	1110.000	1439.600	2	4	0	.012	4.400	.000	1439.590	.000	-45.000	.000

RADIUS	ANGLE
.000	.000

ELEMENT NO 9 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1345.000	1440.310	2	.012	.000	.000	.000	0

ELEMENT NO 10 IS A JUNCTION * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3

```
INVERT-4  PHI 3  PHI 4
                                1350.000 1440.320    2     4     0   .012     4.600      .000  1440.310
    .000 -45.000     .000
                                                                                                RADIUS
   ANGLE
                                                                                                  .000
   .000
                                                    W S P G W
           PAGE NO   3
                          WATER SURFACE PROFILE - ELEMENT CARD LISTING
  ELEMENT NO  11 IS A REACH              *         *     *
                    U/S DATA   STATION    INVERT  SECT               N                          RADIUS
   ANGLE     ANG PT  MAN H
                                1570.000 1440.990    2               .012                         .000
   .000      .000     0
  ELEMENT NO  12 IS A JUNCTION           *         *     *     *               *                  *
          *
                    U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3        Q4     INVERT-3
INVERT-4  PHI 3  PHI 4
                                1575.000 1441.000    3     4     0   .012     4.700      .000  1440.990
    .000 -45.000     .000
                                                                                                RADIUS
   ANGLE
                                                                                                  .000
   .000
  ELEMENT NO  13 IS A REACH              *         *     *
                    U/S DATA   STATION    INVERT  SECT               N                          RADIUS
   ANGLE     ANG PT  MAN H
                                1790.000 1441.650    3               .012                         .000
   .000      .000     0
  ELEMENT NO  14 IS A JUNCTION           *         *     *     *               *                  *
          *
                    U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3        Q4     INVERT-3
INVERT-4  PHI 3  PHI 4
                                1795.000 1441.660    3     4     0   .012     5.100      .000  1441.650
    .000 -45.000     .000
                                                                                                RADIUS
   ANGLE
                                                                                                  .000
   .000
  ELEMENT NO  15 IS A REACH              *         *     *
                    U/S DATA   STATION    INVERT  SECT               N                          RADIUS
   ANGLE     ANG PT  MAN H
                                1937.600 1442.080    3               .012                         .000
   .000    -22.500     0
  ELEMENT NO  16 IS A REACH              *         *     *
                    U/S DATA   STATION    INVERT  SECT               N                          RADIUS
   ANGLE     ANG PT  MAN H
                                2065.250 1442.470    3               .012                         .000
   .000      .000     0
  ELEMENT NO  17 IS A  WALL  ENTRANCE                  *
                    U/S DATA   STATION    INVERT  SECT               FP
                                2065.250 1442.470    5               .500
  ELEMENT NO  18 IS A REACH              *         *     *
                    U/S DATA   STATION    INVERT  SECT               N                          RADIUS
   ANGLE     ANG PT  MAN H
                                2068.250 1442.480    5               .013                         .000
   .000      .000     0
  ELEMENT NO  19 IS A SYSTEM HEADWORKS                 *                         *
                    U/S DATA   STATION    INVERT  SECT                                    W S ELEV
                                2068.250 1442.480    5                                  1442.120
```

Program Package Serial Number: 1585

WATER SURFACE PROFILE LISTING Date: 3- 6-2019 Time: 8:46: 3

17-0358 RIDER DISTRIBUTION CENTER IV

ONSITE STORM DRAIN LINE A CONNECTS TO EXIST. LINE G-2, 100 YEAR

FN:LINEA100.WSW

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1000.000	1440.160	4.000	1444.160	31.40	2.50	.10	1444.26	.00	1.66	.00	4.000	.000	.00	1 .0
.000	.0028					.0005	.00	4.00	.00	1.80	.013	.00	.00	PIPE
1000.000	1440.160	4.000	1444.160	31.40	2.50	.10	1444.26	.00	1.66	.00	4.000	.000	.00	1 .0
14.370	.0028					.0005	.01	4.00	.00	1.80	.013	.00	.00	PIPE
1014.370	1440.200	3.966	1444.165	31.40	2.50	.10	1444.26	.00	1.66	.74	4.000	.000	.00	1 .0
TRANS STR	.0036					.0004	.00	3.97	.11		.012	.00	.00	PIPE
1019.870	1440.220	3.947	1444.167	31.40	2.51	.10	1444.26	.00	1.66	.91	4.000	.000	.00	1 .0
1.234	-.0418					.0004	.00	3.95	.12	.00	.012	.00	.00	PIPE
1021.104	1440.168	4.000	1444.168	31.40	2.50	.10	1444.27	.00	1.66	.00	4.000	.000	.00	1 .0
18.636	-.0418					.0004	.01	4.00	.00	.00	.012	.00	.00	PIPE
1039.740	1439.390	4.786	1444.176	31.40	2.50	.10	1444.27	.00	1.66	.00	4.000	.000	.00	1 .0
TRANS STR	.0036					.0011	.01	4.79	.00		.012	.00	.00	PIPE
1045.240	1439.410	4.605	1444.015	31.40	4.44	.31	1444.32	.00	1.82	.00	3.000	.000	.00	1 .0
38.890	.0028					.0019	.07	4.60	.00	2.06	.012	.00	.00	PIPE
1084.130	1439.520	4.599	1444.119	31.40	4.44	.31	1444.42	.00	1.82	.00	3.000	.000	.00	1 .0
20.870	.0034					.0019	.04	4.60	.00	1.94	.012	.00	.00	PIPE
1105.000	1439.590	4.568	1444.158	31.40	4.44	.31	1444.46	.00	1.82	.00	3.000	.000	.00	1 .0
JUNCT STR	.0020					.0016	.01	4.57	.00		.012	.00	.00	PIPE

Program Package Serial Number: 1585

WATER SURFACE PROFILE LISTING Date: 3- 6-2019 Time: 8:46: 3

17-0358 RIDER DISTRIBUTION CENTER IV

ONSITE STORM DRAIN LINE A CONNECTS TO EXIST. LINE G-2, 100 YEAR

FN:LINEA100.WSW

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS) / Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
1110.000	1439.600	4.692	1444.292	27.00	3.82	.23	1444.52	.00	1.68	.00	3.000	.000	.00	1 .0
235.000	.0030					.0014	.33	4.69	.00	1.81	.012	.00	.00	PIPE
1345.000	1440.310	4.310	1444.620	27.00	3.82	.23	1444.85	.00	1.68	.00	3.000	.000	.00	1 .0
JUNCT STR	.0020					.0012	.01	4.31	.00		.012	.00	.00	PIPE
1350.000	1440.320	4.410	1444.730	22.40	3.17	.16	1444.89	.00	1.52	.00	3.000	.000	.00	1 .0
220.000	.0030					.0010	.21	4.41	.00	1.61	.012	.00	.00	PIPE
1570.000	1440.990	3.951	1444.941	22.40	3.17	.16	1445.10	.00	1.52	.00	3.000	.000	.00	1 .0
JUNCT STR	.0020					.0013	.01	3.95	.00		.012	.00	.00	PIPE
1575.000	1441.000	3.939	1444.939	17.70	3.61	.20	1445.14	.00	1.42	.00	2.500	.000	.00	1 .0
215.000	.0030					.0016	.34	3.94	.00	1.58	.012	.00	.00	PIPE
1790.000	1441.650	3.630	1445.280	17.70	3.61	.20	1445.48	.00	1.42	.00	2.500	.000	.00	1 .0
JUNCT STR	.0020					.0012	.01	3.63	.00		.012	.00	.00	PIPE
1795.000	1441.660	3.759	1445.420	12.60	2.57	.10	1445.52	.00	1.19	.00	2.500	.000	.00	1 .0
142.600	.0029					.0008	.11	3.76	.00	1.28	.012	.00	.00	PIPE
1937.600	1442.080	3.462	1445.542	12.60	2.57	.10	1445.64	.00	1.19	.00	2.500	.000	.00	1 .0
127.650	.0031					.0008	.10	3.46	.00	1.27	.012	.00	.00	PIPE
2065.250	1442.470	3.175	1445.645	12.60	2.57	.10	1445.75	.00	1.19	.00	2.500	.000	.00	1 .0
WALL	ENTRANCE													

Program Package Serial Number: 1585

WATER SURFACE PROFILE LISTING Date: 3- 6-2019 Time: 8:46: 3

17-0358 RIDER DISTRIBUTION CENTER IV

ONSITE STORM DRAIN LINE A CONNECTS TO EXIST. LINE G-2, 100 YEAR

FN:LINEA100.WSW

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
2065.250	1442.470	3.314	1445.784	12.60	.76	.01	1445.79	.00	.58	5.00	5.000	5.000	.00	0 .0
3.000	.0033					.0000	.00	3.31	.07	.61	.013	.00	.00	RECTANG
2068.250	1442.480	3.304	1445.784	12.60	.76	.01	1445.79	.00	.58	5.00	5.000	5.000	.00	0 .0

LINE-B

```
T1 17-0358 RIDER DISTRIBUTION CENTER IV                                        0
T2 ONSITE STORM DRAIN LINE B CONNECTS TO EXIST. LINE G-2, 100 YEAR
T3 FN:LINEB100.WSW
SO   1000.0001441.210  1                        1445.210
REM ASSUMED SOFFIT CONTROL FOR SO
R    1026.0001441.290  1      .013                                  .000    .000 0
TS   1031.5001441.300  1      .012                                  .000    .000
R    1053.0001439.970  1      .012                                  .000    .000 0
TS   1058.5001439.990  2      .012                                  .000    .000
R    1073.7501440.020  2      .012                                  .000  30.000 0
R    1245.0001440.320  2      .012                                  .000    .000 0
JX   1250.0001440.330  2  4   .012    6.600         1440.330         45.0        0.000
R    1432.1301440.880  2      .012                                  .000    .000 0
TS   1437.6301440.900  3      .012                                  .000    .000
R    1495.0001441.040  3      .012                                  .000    .000 0
JX   1500.0001441.050  3  4   .012    4.600         1441.050         45.0        0.000
R    1715.0001441.570  3      .012                                  .000    .000 0
JX   1720.0001441.580  3  4   .012    4.600         1440.330         45.0        0.000
R    1907.0601442.020  3      .012                                  .000  22.500 0
R    1943.2501442.110  3      .012                                  .000    .000 0
WE   1943.2501442.110  5      .500
R    1946.2501442.120  5      .013                                  .000
SH   1946.2501442.120  5                        1442.120
CD   1  4   1    .000   4.000     .000  .000  .000   .00
CD   2  4   1    .000   3.000     .000  .000  .000   .00
CD   3  4   1    .000   2.500     .000  .000  .000   .00
CD   4  4   1    .000   1.500     .000  .000  .000   .00
CD   5  2   0    .000   5.000    5.000  .000  .000   .00
Q            9.000   .0
```

FILE: LINEB100.WSW W S P G W - EDIT LISTING - Version 14.06
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WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	4	1		4.000														
CD	2	4	1		3.000														
CD	3	4	1		2.500														
CD	4	4	1		1.500														
CD	5	2	0	.000	5.000	5.000			.00										

PAGE NO 1

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -
17-0358 RIDER DISTRIBUTION CENTER IV

HEADING LINE NO 2 IS -
ONSITE STORM DRAIN LINE B CONNECTS TO EXIST. LINE G-2, 100 YEAR

HEADING LINE NO 3 IS -
FN:LINEB100.WSW

PAGE NO 2

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1000.000	1441.210	1	1445.210

REMARKS: ASSUMED SOFFIT CONTROL FOR SO

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1026.000	1441.290	1	.013	.000	.000	.000	0

ELEMENT NO 3 IS A TRANSITION * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE
	1031.500	1441.300	1	.012	.000	.000

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1053.000	1439.970	1	.012	.000	.000	.000	0

THE ABOVE ELEMENT CONTAINED AN INVERT ELEV WHICH WAS NOT GREATER THAN THE PREVIOUS INVERT ELEV -WARNING

ELEMENT NO 5 IS A TRANSITION * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE
	1058.500	1439.990	2	.012	.000	.000

ELEMENT NO 6 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1073.750	1440.020	2	.012	.000	.000	30.000	0

ELEMENT NO 7 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1245.000	1440.320	2	.012	.000	.000	.000	0

ELEMENT NO 8 IS A JUNCTION * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	1250.000	1440.330	2	4	0	.012	6.600	.000	1440.330	.000	45.000	.000

RADIUS	ANGLE
.000	.000

ELEMENT NO 9 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1432.130	1440.880	2	.012	.000	.000	.000	0

ELEMENT NO 10 IS A TRANSITION * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE

```
                                1437.630 1440.900    3               .012                          .000
   .000
                                                                W S P G W
           PAGE NO   3
                              WATER SURFACE PROFILE - ELEMENT CARD LISTING
  ELEMENT NO  11 IS A REACH             *         *     *
                    U/S DATA   STATION    INVERT  SECT               N                          RADIUS
   ANGLE     ANG PT  MAN H
                                1495.000 1441.040    3               .012                          .000
   .000      .000     0
  ELEMENT NO  12 IS A JUNCTION          *         *     *     *                *                   *
          *
                    U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3         Q4      INVERT-3
INVERT-4  PHI 3  PHI 4
                                1500.000 1441.050    3     4     0   .012     4.600       .000  1441.050
    .000  45.000     .000
                                                                                               RADIUS
   ANGLE
                                                                                                .000
   .000
  ELEMENT NO  13 IS A REACH             *         *     *
                    U/S DATA   STATION    INVERT  SECT               N                          RADIUS
   ANGLE     ANG PT  MAN H
                                1715.000 1441.570    3               .012                          .000
   .000      .000     0
  ELEMENT NO  14 IS A JUNCTION          *         *     *     *                *                   *
          *
                    U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3         Q4      INVERT-3
INVERT-4  PHI 3  PHI 4
                                1720.000 1441.580    3     4     0   .012     4.600       .000  1440.330
    .000  45.000     .000
                                                                                               RADIUS
   ANGLE
                                                                                                .000
   .000
  ELEMENT NO  15 IS A REACH             *         *     *
                    U/S DATA   STATION    INVERT  SECT               N                          RADIUS
   ANGLE     ANG PT  MAN H
                                1907.060 1442.020    3               .012                          .000
   .000    22.500     0
  ELEMENT NO  16 IS A REACH             *         *     *
                    U/S DATA   STATION    INVERT  SECT               N                          RADIUS
   ANGLE     ANG PT  MAN H
                                1943.250 1442.110    3               .012                          .000
   .000      .000     0
  ELEMENT NO  17 IS A  WALL  ENTRANCE                   *
                    U/S DATA   STATION    INVERT  SECT              FP
                                1943.250 1442.110    5               .500
  ELEMENT NO  18 IS A REACH             *         *     *
                    U/S DATA   STATION    INVERT  SECT               N                          RADIUS
   ANGLE     ANG PT  MAN H
                                1946.250 1442.120    5               .013                          .000
   .000      .000     0
  ELEMENT NO  19 IS A SYSTEM HEADWORKS                  *                        *
                    U/S DATA   STATION    INVERT  SECT                                    W S ELEV
                                1946.250 1442.120    5                                  1442.120
```

Program Package Serial Number: 1585

WATER SURFACE PROFILE LISTING Date: 3- 6-2019 Time: 8:47:59

17-0358 RIDER DISTRIBUTION CENTER IV

ONSITE STORM DRAIN LINE B CONNECTS TO EXIST. LINE G-2, 100 YEAR

FN:LINEB100.WSW

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1000.000	1441.210	4.000	1445.210	24.80	1.97	.06	1445.27	.00	1.47	.00	4.000	.000	.00	1 .0
.000	.0031					.0003	.00	4.00	.00	1.53	.013	.00	.00	PIPE
1000.000	1441.210	4.000	1445.210	24.80	1.97	.06	1445.27	.00	1.47	.00	4.000	.000	.00	1 .0
26.000	.0031					.0003	.01	4.00	.00	1.53	.013	.00	.00	PIPE
1026.000	1441.290	3.926	1445.216	24.80	1.98	.06	1445.28	.00	1.47	1.08	4.000	.000	.00	1 .0
TRANS STR	.0018					.0002	.00	3.93	.10		.012	.00	.00	PIPE
1031.500	1441.300	3.917	1445.217	24.80	1.98	.06	1445.28	.00	1.47	1.14	4.000	.000	.00	1 .0
1.326	-.0619					.0002	.00	3.92	.11	.00	.012	.00	.00	PIPE
1032.826	1441.218	4.000	1445.218	24.80	1.97	.06	1445.28	.00	1.47	.00	4.000	.000	.00	1 .0
20.174	-.0619					.0003	.01	4.00	.00	.00	.012	.00	.00	PIPE
1053.000	1439.970	5.253	1445.223	24.80	1.97	.06	1445.28	.00	1.47	.00	4.000	.000	.00	1 .0
TRANS STR	.0036					.0007	.00	5.25	.00		.012	.00	.00	PIPE
1058.500	1439.990	5.133	1445.123	24.80	3.51	.19	1445.31	.00	1.61	.00	3.000	.000	.00	1 .0
15.250	.0020					.0012	.02	5.13	.00	1.98	.012	.00	.00	PIPE
1073.750	1440.020	5.139	1445.159	24.80	3.51	.19	1445.35	.00	1.61	.00	3.000	.000	.00	1 .0
171.250	.0018					.0012	.20	5.14	.00	2.07	.012	.00	.00	PIPE
1245.000	1440.320	5.041	1445.361	24.80	3.51	.19	1445.55	.00	1.61	.00	3.000	.000	.00	1 .0
JUNCT STR	.0020					.0009	.00	5.04	.00		.012	.00	.00	PIPE

Program Package Serial Number: 1585

WATER SURFACE PROFILE LISTING Date: 3- 6-2019 Time: 8:47:59

17-0358 RIDER DISTRIBUTION CENTER IV

ONSITE STORM DRAIN LINE B CONNECTS TO EXIST. LINE G-2, 100 YEAR

FN:LINEB100.WSW

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1250.000	1440.330	5.136	1445.465	18.20	2.57	.10	1445.57	.00	1.37	.00	3.000	.000	.00	1 .0
182.130	.0030					.0006	.12	5.14	.00	1.43	.012	.00	.00	PIPE
1432.130	1440.880	4.701	1445.581	18.20	2.57	.10	1445.68	.00	1.37	.00	3.000	.000	.00	1 .0
TRANS STR	.0036					.0012	.01	4.70	.00		.012	.00	.00	PIPE
1437.630	1440.900	4.599	1445.499	18.20	3.71	.21	1445.71	.00	1.45	.00	2.500	.000	.00	1 .0
57.370	.0024					.0017	.10	4.60	.00	1.74	.012	.00	.00	PIPE
1495.000	1441.040	4.555	1445.595	18.20	3.71	.21	1445.81	.00	1.45	.00	2.500	.000	.00	1 .0
JUNCT STR	.0020					.0013	.01	4.56	.00		.012	.00	.00	PIPE
1500.000	1441.050	4.687	1445.737	13.60	2.77	.12	1445.86	.00	1.24	.00	2.500	.000	.00	1 .0
215.000	.0024					.0009	.20	4.69	.00	1.43	.012	.00	.00	PIPE
1715.000	1441.570	4.368	1445.938	13.60	2.77	.12	1446.06	.00	1.24	.00	2.500	.000	.00	1 .0
JUNCT STR	.0020					.0007	.00	4.37	.00		.012	.00	.00	PIPE
1720.000	1441.580	4.442	1446.022	9.00	1.83	.05	1446.07	.00	1.00	.00	2.500	.000	.00	1 .0
187.060	.0024					.0004	.08	4.44	.00	1.13	.012	.00	.00	PIPE
1907.060	1442.020	4.082	1446.102	9.00	1.83	.05	1446.15	.00	1.00	.00	2.500	.000	.00	1 .0
36.190	.0025					.0004	.01	4.08	.00	1.11	.012	.00	.00	PIPE
1943.250	1442.110	4.007	1446.117	9.00	1.83	.05	1446.17	.00	1.00	.00	2.500	.000	.00	1 .0
WALL	ENTRANCE													

Program Package Serial Number: 1585

WATER SURFACE PROFILE LISTING Date: 3- 6-2019 Time: 8:47:59

17-0358 RIDER DISTRIBUTION CENTER IV

ONSITE STORM DRAIN LINE B CONNECTS TO EXIST. LINE G-2, 100 YEAR

FN:LINEB100.WSW

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1943.250	1442.110	4.080	1446.190	9.00	.44	.00	1446.19	.00	.47	5.00	5.000	5.000	.00	0 .0
3.000	.0033					.0000	.00	4.08	.04	.49	.013	.00	.00	RECTANG
1946.250	1442.120	4.070	1446.190	9.00	.44	.00	1446.19	.00	.47	5.00	5.000	5.000	.00	0 .0

INLET CALCULATIONS

Hydraulic Analysis Report

Project Data

Project Title:

Designer:

Project Date: Tuesday, March 5, 2019

Project Units: U.S. Customary Units

Notes:

Median/Ditch Drop-Inlet Analysis: InletOnGrade

Notes:

Using the following channel: TruckCourt

Channel Analysis: TruckCourt

Notes:

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 143.0000 ft/ft

Side Slope 2 (Z2): 200.0000 ft/ft

Longitudinal Slope: 0.0030 ft/ft

Manning's n: 0.0140

Flow: 6.6000 cfs

Result Parameters

Depth: 0.1812 ft

Area of Flow: 5.6286 ft^2

Wetted Perimeter: 62.1401 ft

Hydraulic Radius: 0.0906 ft

Average Velocity: 1.1726 ft/s

Top Width: 62.1390 ft

Froude Number: 0.6866

Critical Depth: 0.1567 ft

Critical Velocity: 1.5665 ft/s

Critical Slope: 0.0065 ft/ft

Critical Top Width: 55.29 ft

Calculated Max Shear Stress: 0.0339 lb/ft^2

Calculated Avg Shear Stress: 0.0170 lb/ft^2

Inlet Data:

Grate Width: 3.0000 ft

Grate Length: 10.8100 ft

Computed Data:

Intercepted flow: 6.1394 cfs

Bypass flow: 0.4606 cfs

Hydraulic Analysis Report

Project Data

Project Title:

Designer:

Project Date: Tuesday, March 5, 2019

Project Units: U.S. Customary Units

Notes:

Median/Ditch Drop-Inlet Analysis: InletInSag

Notes:

Using the following channel: TruckCourt

Channel Analysis: TruckCourt

Notes:

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 143.0000 ft/ft

Side Slope 2 (Z2): 200.0000 ft/ft

Longitudinal Slope: 0.0030 ft/ft

Manning's n: 0.0140

Flow: 13.5000 cfs

Result Parameters

Depth: 0.2369 ft

Area of Flow: 9.6271 ft^2

Wetted Perimeter: 81.2677 ft

Hydraulic Radius: 0.1185 ft

Average Velocity: 1.4023 ft/s

Top Width: 81.2663 ft

Froude Number: 0.7180

Critical Depth: 0.2087 ft

Critical Velocity: 1.8075 ft/s

Critical Slope: 0.0059 ft/ft

Critical Top Width: 73.61 ft

Calculated Max Shear Stress: 0.0444 lb/ft^2

Calculated Avg Shear Stress: 0.0222 lb/ft^2

Inlet Data:

Grate Width: 3.0000 ft

Grate Length: 10.8100 ft

Computed Data:

Perimeter: 27.6200 ft

Effective Perimeter: 20.7150 ft

Area: 29.1870 ft^2

Effective Area: 21.8903 ft^2

Depth at Center of Grate: 0.3614 ft

Computed Top width at Sag: 123.9498 ft

WATER QUALITY CALCULATIONS AND ATTACHMENTS

*See Preliminary-WQMP for additional details

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

Legend: Required Entries | Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: Albert A. Webb Associates — Date: 4/25/2019

Designed by: TSW — Case No: PX-XXXX

Company Project Number/Name: Rider IV

BMP Identification

BMP NAME / ID: Modular Wetland System

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E — D_{85}= 0.63 inches

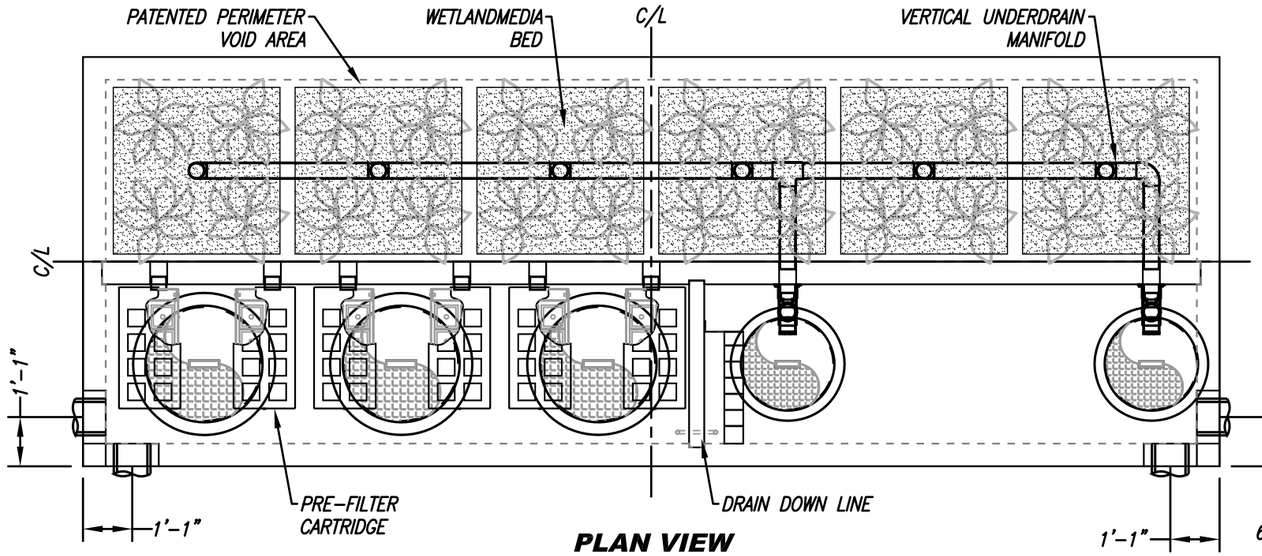
Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

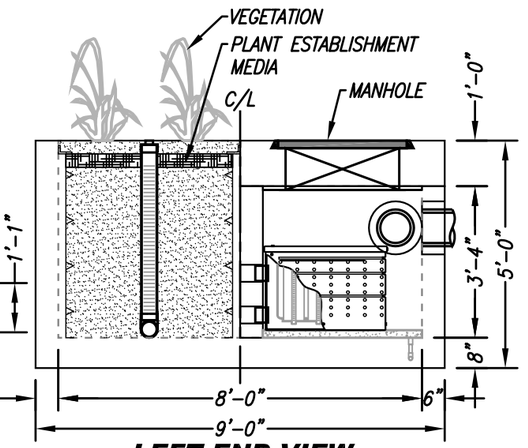
DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
L-A	7475	Ornamental Landscaping	0.1	0.11	825.7			
R-A	567098	Roofs	1	0.89	505851.4			
H-A	451119	Concrete or Asphalt	1	0.89	402398.1			
SR-A	110345							
	1136037	**Total**			909075.2	0.63	47726.4	47727

Notes:

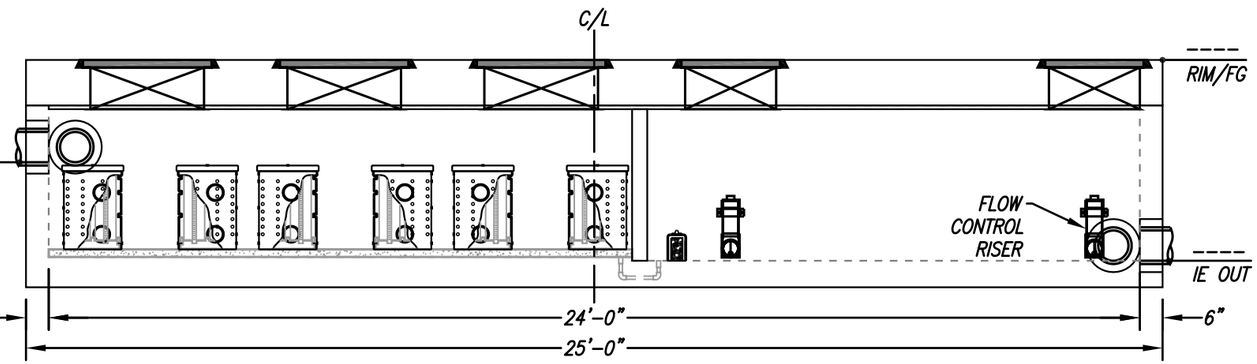
SITE SPECIFIC DATA			
PROJECT NUMBER		----	
PROJECT NAME		----	
PROJECT LOCATION		----	
STRUCTURE ID		----	
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
TREATMENT HGL AVAILABLE (FT)			
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	----	PVC	8"
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE	----	PVC	8"
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION	----	----	----
SURFACE LOAD	PARKWAY	OPEN PLANTER	PARKWAY
FRAME & COVER	3 EA ø30"	N/A	2 EA ø24"
WETLANDMEDIA VOLUME (CY)			TBD
WETLANDMEDIA DELIVERY METHOD			PER CONTRACT
ORIFICE SIZE (DIA. INCHES)			TBD
NOTES:			



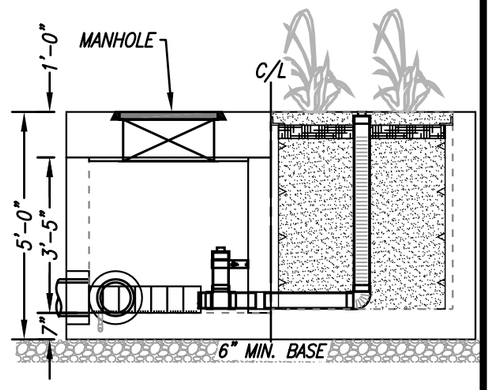
PLAN VIEW



LEFT END VIEW



ELEVATION VIEW



RIGHT END VIEW

INSTALLATION NOTES

1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
3. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL GAPS AROUND PIPES SHALL BE SEALED WATER TIGHT WITH A NON-SHRINK GROUT PER MANUFACTURERS STANDARD CONNECTION DETAIL AND SHALL MEET OR EXCEED REGIONAL PIPE CONNECTION STANDARDS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. DRIP OR SPRAY IRRIGATION REQUIRED ON ALL UNITS WITH VEGETATION.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING MODULAR WETLANDS FOR ACTIVATION OF UNIT. MANUFACTURES WARRANTY IS VOID WITH OUT PROPER ACTIVATION BY A MODULAR WETLANDS REPRESENTATIVE.

GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT MANUFACTURER.

TREATMENT FLOW (CFS)	0.693
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MODULAR WETLANDS

www.ModularWetlands.com | (855) 5MOD-WET

MWS-L-8-24-V

STORMWATER BIOFILTRATION SYSTEM STANDARD DETAIL

1/31/17/HAYDEN

APPENDIX C – REFERENCES

LATERAL G-2 EXCERPT FROM PVSD MDP

SECTION 10 - LATERAL G-2

COMMENTS

This MDP realigns Lateral G-2 to run along Sinclair Street. G-2 is a proposed open concrete trapezoidal channel that will pick up runoff from an existing industrial facility north of Sinclair Street between Perris Boulevard and Redlands Avenue. The downstream water surface in Lateral G-2 is set by the Perris Valley Storm Drain. "Alternative 5" of the San Jacinto River Stage III Master Plan is currently adopted by the City of Perris as the "preferred alternative". Alternative 5 call for a wide channel crossing over the existing MWD Colorado River Aqueduct that is located just downstream of the Lateral G-2/PVSD confluence. The drainage area tributary to Lateral G-2 will require fill or some other acceptable drainage design (i.e. onsite retention basin and pumps) in order to properly connect to Lateral G-2.

HYDROLOGY

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 05/12/09 File:LatG2.out

Perris Valley Commerce Center - Perris Valley MDP
Lateral G-2 (Updated from original MDP) Watershed revised to account
for exisitng development
jcc 12 May 2009

********* 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

2 year, 1 hour precipitation = 0.820(In.)
100 year, 1 hour precipitation = 1.200(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.200(In/Hr)
Slope of intensity duration curve = 0.4900

++

Process from Point/Station 10.000 to Point/Station 15.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 900.000(Ft.)
Top (of initial area) elevation = 1462.000(Ft.)
Bottom (of initial area) elevation = 1459.000(Ft.)
Difference in elevation = 3.000(Ft.)
Slope = 0.00333 s(percent)= 0.33
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 14.264 min.
Rainfall intensity = 2.426(In/Hr) for a 100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.873
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 56.00
Pervious area fraction = 0.100; Impervious fraction = 0.900
Initial subarea runoff = 19.905(CFS)
Total initial stream area = 9.400(Ac.)
Pervious area fraction = 0.100

++

Process from Point/Station 15.000 to Point/Station 20.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****

Top of street segment elevation = 1459.000(Ft.)
End of street segment elevation = 1456.000(Ft.)
Length of street segment = 325.000(Ft.)

```
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     42.359(CFS)
Depth of flow =   0.604(Ft.), Average velocity =   3.524(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    4.17(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  22.000(Ft.)
Flow velocity =   3.52(Ft/s)
Travel time =    1.54 min.     TC =   15.80  min.
 Adding area flow to street
COMMERCIAL subarea type
Runoff Coefficient = 0.874
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.800
Decimal fraction soil group C = 0.200
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  58.60
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      2.307(In/Hr) for a   100.0 year storm
Subarea runoff =     44.765(CFS) for     22.200(Ac.)
Total runoff =     64.670(CFS)        Total area =      31.600(Ac.)
Street flow at end of street =     64.670(CFS)
Half street flow at end of street =     32.335(CFS)
Depth of flow =   0.679(Ft.), Average velocity =   3.999(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    7.17(Ft.)
Flow width (from curb towards crown)=  22.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       20.000 to Point/Station       25.000
**** IMPROVED CHANNEL TRAVEL TIME ****
------------------------------------------------------------------------------
Upstream point elevation =  1456.000(Ft.)
Downstream point elevation =  1452.000(Ft.)
Channel length thru subarea  =   790.000(Ft.)
Channel base width     =    3.000(Ft.)
Slope or 'Z' of left channel bank =   1.500
Slope or 'Z' of right channel bank =   1.500
Estimated mean flow rate at midpoint of channel =     88.630(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    5.000(Ft.)
Flow(q) thru subarea =     88.630(CFS)
Depth of flow =   1.941(Ft.), Average velocity =   7.726(Ft/s)
Channel flow top width =    8.822(Ft.)
Flow Velocity =    7.73(Ft/s)
Travel time  =    1.70 min.
Time of concentration =   17.51 min.

Sub-Channel No. 1 Critical depth =      2.125(Ft.)
  '     '       '     Critical flow top width =      9.375(Ft.)
  '     '       '     Critical flow velocity=    6.741(Ft/s)
  '     '       '     Critical flow area =     13.148(Sq.Ft)

 Adding area flow to channel
COMMERCIAL subarea type
Runoff Coefficient = 0.879
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Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.200
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  66.40
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      2.194(In/Hr) for a   100.0 year storm
Subarea runoff =     47.828(CFS) for     24.800(Ac.)
Total runoff =    112.498(CFS)        Total area =      56.400(Ac.)
Depth of flow =   2.182(Ft.), Average velocity =   8.221(Ft/s)

Sub-Channel No. 1 Critical depth =      2.406(Ft.)
  '     '       '     Critical flow top width =     10.219(Ft.)
  '     '       '     Critical flow velocity=    7.074(Ft/s)
  '     '       '     Critical flow area =     15.904(Sq.Ft)



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       25.000 to Point/Station       30.000
**** IMPROVED CHANNEL TRAVEL TIME ****
------------------------------------------------------------------------
Upstream point elevation =  1452.000(Ft.)
Downstream point elevation =  1446.000(Ft.)
Channel length thru subarea  =   830.000(Ft.)
Channel base width     =    6.000(Ft.)
Slope or 'Z' of left channel bank =   1.500
Slope or 'Z' of right channel bank =   1.500
Estimated mean flow rate at midpoint of channel =    136.760(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    6.000(Ft.)
Flow(q) thru subarea =    136.760(CFS)
Depth of flow =   1.691(Ft.), Average velocity =   9.475(Ft/s)
Channel flow top width =   11.072(Ft.)
Flow Velocity =    9.48(Ft/s)
Travel time  =    1.46 min.
Time of concentration =   18.97 min.

Sub-Channel No. 1 Critical depth =      2.094(Ft.)
  '     '       '     Critical flow top width =     12.281(Ft.)
  '     '       '     Critical flow velocity=    7.146(Ft/s)
  '     '       '     Critical flow area =     19.138(Sq.Ft)

 Adding area flow to channel
COMMERCIAL subarea type
Runoff Coefficient = 0.880
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      2.110(In/Hr) for a   100.0 year storm
Subarea runoff =     48.467(CFS) for     26.100(Ac.)
Total runoff =    160.965(CFS)        Total area =      82.500(Ac.)
Depth of flow =   1.848(Ft.), Average velocity =   9.930(Ft/s)

Sub-Channel No. 1 Critical depth =      2.313(Ft.)
  '     '       '     Critical flow top width =     12.938(Ft.)
  '     '       '     Critical flow velocity=    7.351(Ft/s)
  '     '       '     Critical flow area =     21.896(Sq.Ft)



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Process from Point/Station       30.000 to Point/Station       35.000
**** IMPROVED CHANNEL TRAVEL TIME ****
------------------------------------------------------------------------
Upstream point elevation =  1446.000(Ft.)
Downstream point elevation =  1443.000(Ft.)
Channel length thru subarea  =   940.000(Ft.)
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Channel base width     =    6.000(Ft.)
Slope or 'Z' of left channel bank =   1.500
Slope or 'Z' of right channel bank =   1.500
Estimated mean flow rate at midpoint of channel =    180.316(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    6.000(Ft.)
Flow(q) thru subarea =    180.316(CFS)
Depth of flow =   2.443(Ft.), Average velocity =   7.638(Ft/s)
Channel flow top width =   13.328(Ft.)
Flow Velocity =    7.64(Ft/s)
Travel time  =    2.05 min.
Time of concentration =   21.02 min.

Sub-Channel No. 1 Critical depth =      2.469(Ft.)
  '     '       '     Critical flow top width =     13.406(Ft.)
  '     '       '     Critical flow velocity=    7.527(Ft/s)
  '     '       '     Critical flow area =     23.955(Sq.Ft)

 Adding area flow to channel
COMMERCIAL subarea type
Runoff Coefficient = 0.879
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      2.006(In/Hr) for a   100.0 year storm
Subarea runoff =     38.637(CFS) for     21.900(Ac.)
Total runoff =    199.602(CFS)        Total area =     104.400(Ac.)
Depth of flow =   2.576(Ft.), Average velocity =   7.854(Ft/s)

Sub-Channel No. 1 Critical depth =      2.594(Ft.)
  '     '       '     Critical flow top width =     13.781(Ft.)
  '     '       '     Critical flow velocity=    7.781(Ft/s)
  '     '       '     Critical flow area =     25.654(Sq.Ft)



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       35.000 to Point/Station       40.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________________
Upstream point elevation =  1443.000(Ft.)
Downstream point elevation =  1441.000(Ft.)
Channel length thru subarea  =   780.000(Ft.)
Channel base width     =    6.000(Ft.)
Slope or 'Z' of left channel bank =   1.500
Slope or 'Z' of right channel bank =   1.500
Estimated mean flow rate at midpoint of channel =    220.158(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    6.000(Ft.)
Flow(q) thru subarea =    220.158(CFS)
Depth of flow =   2.869(Ft.), Average velocity =   7.447(Ft/s)
Channel flow top width =   14.608(Ft.)
Flow Velocity =    7.45(Ft/s)
Travel time  =    1.75 min.
Time of concentration =   22.76 min.

Sub-Channel No. 1 Critical depth =      2.750(Ft.)
  '     '       '     Critical flow top width =     14.250(Ft.)
  '     '       '     Critical flow velocity=    7.907(Ft/s)
  '     '       '     Critical flow area =     27.844(Sq.Ft)

 Adding area flow to channel
COMMERCIAL subarea type
Runoff Coefficient = 0.879
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
```

```
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      1.929(In/Hr) for a   100.0 year storm
Subarea runoff =     41.029(CFS) for     24.200(Ac.)
Total runoff =    240.631(CFS)        Total area =     128.600(Ac.)
Depth of flow =   3.003(Ft.), Average velocity =   7.627(Ft/s)

Sub-Channel No. 1 Critical depth =      2.875(Ft.)
  '     '       '     Critical flow top width =     14.625(Ft.)
  '     '       '     Critical flow velocity=    8.116(Ft/s)
  '     '       '     Critical flow area =     29.648(Sq.Ft)



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Process from Point/Station       40.000 to Point/Station       45.000
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =  1441.000(Ft.)
Downstream point elevation =  1439.500(Ft.)
Channel length thru subarea  =  1300.000(Ft.)
Channel base width     =    8.000(Ft.)
Slope or 'Z' of left channel bank =   1.500
Slope or 'Z' of right channel bank =   1.500
Estimated mean flow rate at midpoint of channel =    271.321(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    7.000(Ft.)
Flow(q) thru subarea =    271.321(CFS)
Depth of flow =   3.523(Ft.), Average velocity =   5.797(Ft/s)
Channel flow top width =   18.570(Ft.)
Flow Velocity =    5.80(Ft/s)
Travel time  =    3.74 min.
Time of concentration =   26.50 min.

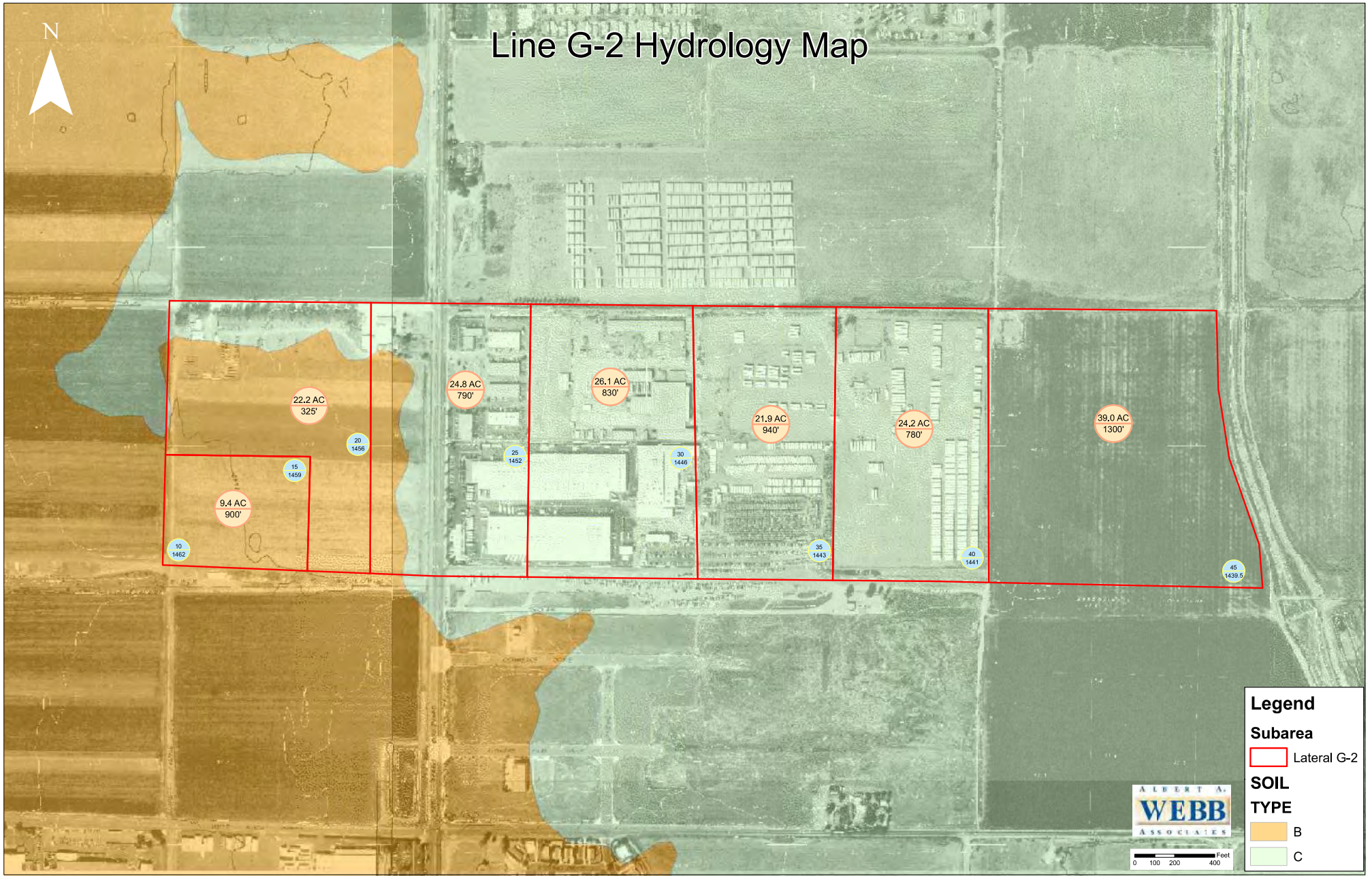
Sub-Channel No. 1 Critical depth =      2.750(Ft.)
  '     '       '     Critical flow top width =     16.250(Ft.)
  '     '       '     Critical flow velocity=    8.137(Ft/s)
  '     '       '     Critical flow area =     33.344(Sq.Ft)

 Adding area flow to channel
COMMERCIAL subarea type
Runoff Coefficient = 0.877
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      1.791(In/Hr) for a   100.0 year storm
Subarea runoff =     61.287(CFS) for     39.000(Ac.)
Total runoff =    301.918(CFS)        Total area =     167.600(Ac.)
Depth of flow =   3.724(Ft.), Average velocity =   5.967(Ft/s)

Sub-Channel No. 1 Critical depth =      2.938(Ft.)
  '     '       '     Critical flow top width =     16.813(Ft.)
  '     '       '     Critical flow velocity=    8.285(Ft/s)
  '     '       '     Critical flow area =     36.443(Sq.Ft)

End of computations, total study area =          167.60 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged RI index number =  66.5
```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15
1459
9.4 AC
900'
10
1462
24.8 AC
790'
25
1452
26.1 AC
830'
30
1446
21.9 AC
940'
35
1443
24.2 AC
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40
1441
39.0 AC
1300'
45
1439.5
Legend
Subarea
Lateral G-2
SOIL
TYPE
B
C
ALBERT A. WEBB ASSOCIATES
0 100 200 400
Feet

HYDRAULICS

```
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T2 Lateral G-2 Hydraulics
T3 mla     06-10-09
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R    1480.0001438.333  4      .014                                .000
JX   1485.0001438.336  4  2   .014   41.000         1438.35         90.0         .000
R    1490.0001438.340  4      .014                                .000
TS   1505.0001438.360  3      .014                                .000
R    2261.1901439.110  3      .014                                .000
SH   2261.1901439.110  3                          1439.110
CD   1  1   0    .000   5.000    6.000 1.500 1.500   .00
CD   2  4   1    .000   5.000     .000  .000  .000   .00
CD   3  1   0    .000   5.000    6.000 1.500 1.500   .00
CD   4  3   0    .000   5.000   10.000  .000  .000   .00
Q           199.600   .0
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Program Package Serial Number: 1585

WATER SURFACE PROFILE LISTING Date: 5- 5-2010 Time: 9:32:23

06-0313 Perris Valley MDP
Lateral G-2 Hydraulics
mla 06-10-09

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
250.000	1437.100	3.920	1441.020	240.60	5.17	.41	1441.43	.00	2.88	17.76	5.000	6.000	1.50	0 .0
475.348	.0010					.0008	.39	3.92	.56	3.68	.014	.00	1.50	TRAP
725.348	1437.575	3.797	1441.372	240.60	5.42	.46	1441.83	.00	2.88	17.39	5.000	6.000	1.50	0 .0
734.652	.0010					.0009	.68	3.80	.60	3.68	.014	.00	1.50	TRAP
1460.000	1438.310	3.709	1442.019	240.60	5.61	.49	1442.51	.00	2.88	17.13	5.000	6.000	1.50	0 .0
TRANS STR	.0013					.0010	.01	3.71	.62		.014	.00	1.50	TRAP
1475.000	1438.330	3.551	1441.880	240.60	6.78	.71	1442.59	.00	2.62	10.00	5.000	10.000	.00	0 .0
5.000	.0006					.0015	.01	3.55	.63	5.00	.014	.00	.00	BOX
1480.000	1438.333	3.558	1441.891	240.60	6.76	.71	1442.60	.00	2.62	10.00	5.000	10.000	.00	0 .0
JUNCT STR	.0006					.0007	.00	3.56	.63		.014	.00	.00	BOX
1485.000	1438.336	4.091	1442.427	199.60	4.88	.37	1442.80	.00	2.31	10.00	5.000	10.000	.00	0 .0
5.000	.0008					.0007	.00	4.09	.43	3.96	.014	.00	.00	BOX
1490.000	1438.340	4.091	1442.431	199.60	4.88	.37	1442.80	.00	2.31	10.00	5.000	10.000	.00	0 .0
TRANS STR	.0013					.0006	.01	4.09	.43		.014	.00	.00	BOX
1505.000	1438.360	4.246	1442.606	199.60	3.80	.22	1442.83	.00	2.60	18.74	5.000	6.000	1.50	0 .0
188.529	.0010					.0004	.08	4.25	.40	3.36	.014	.00	1.50	TRAP
1693.529	1438.547	4.114	1442.661	199.60	3.99	.25	1442.91	.00	2.60	18.34	5.000	6.000	1.50	0 .0
198.063	.0010					.0005	.09	4.11	.43	3.36	.014	.00	1.50	TRAP

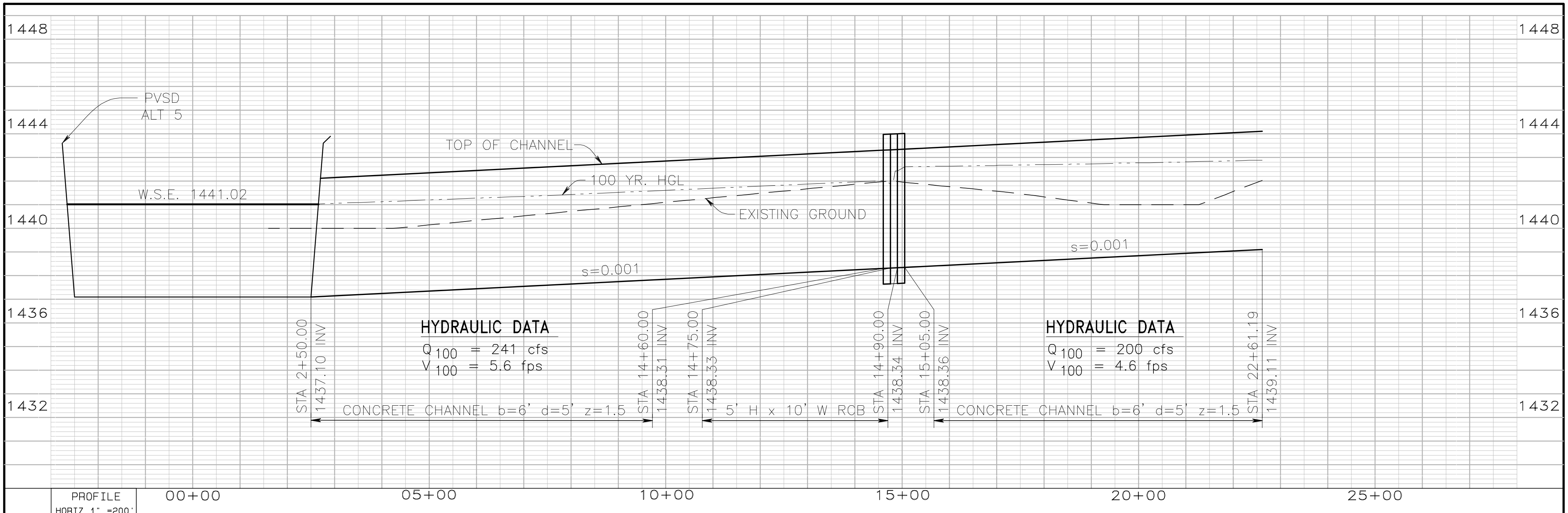
Program Package Serial Number: 1585

WATER SURFACE PROFILE LISTING Date: 5- 5-2010 Time: 9:32:23

06-0313 Perris Valley MDP
Lateral G-2 Hydraulics
mla 06-10-09

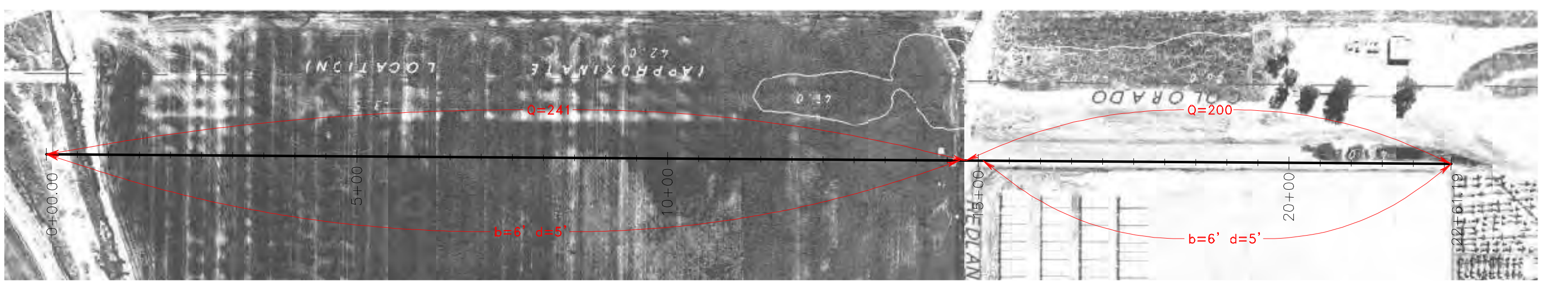
Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1891.592	1438.743	3.986	1442.729	199.60	4.18	.27	1443.00	.00	2.60	17.96	5.000	6.000	1.50	0 .0
213.169	.0010					.0005	.11	3.99	.45	3.36	.014	.00	1.50	TRAP
2104.761	1438.955	3.861	1442.816	199.60	4.38	.30	1443.11	.00	2.60	17.58	5.000	6.000	1.50	0 .0
156.429	.0010					.0006	.09	3.86	.48	3.36	.014	.00	1.50	TRAP
2261.190	1439.110	3.779	1442.889	199.60	4.53	.32	1443.21	.00	2.60	17.34	5.000	6.000	1.50	0 .0

PLAN AND PROFILE



PROFILE
HORIZ 1" =200'
VERT 1" = 4'

PLAN 1" = 200'



N

GRAPHIC SCALE 1"=200'
0 200 400

LATERAL G-2

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SAN JACTINO RIVER
MASTER DRAINAGE PLAN
ALTERNATIVE 5

SEAL
REGISTERED PROFESSIONAL ENGINEER
SCOTT R. HILDEBRANDT
NO. C44762
CIVIL
STATE OF CALIFORNIA

ALBERT A. WEBB ASSOCIATES
ENGINEERING CONSULTANTS
3788 McCRAY STREET, RIVERSIDE, CA 92506
PH. (951) 686-1070 FAX (951) 788-1256

APPROVED BY: ______ DATE: ______
R.C.E. NO. C44762 EXP. DATE: 3-31-08
DESIGNED BY: MLA
DRAWN BY: MLA
CHECKED BY: SRH

REVISIONS			
REF.	DESCRIPTION	APPR.	DATE

PRELIMINARY PROFILE
PERRIS VALLEY MDP
LATERAL G-2
STA 00+00.00 to STA 22+61.19

PROJECT NO.
DRAWING NO.
SHEET NO. 1 OF 18

COST ESTIMATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
2010 PROJECT PLANNING COSTS

PROJECT DESCRIPTION: Perris Valley Commercial Center Specific Plan - Lateral G-2

ITEM	UNIT	QUANTITY	CRITERIA	2009 COST	TOTAL
TRAP. CHANNEL EXCAVATION	CY	5908	b > 8 b ≤ 8	$9.00 $12.60	$74,441
RCB & RECT. CHAN. EXCAVATION	CY	187	b > 12 b ≤ 12	$11.70 $16.20	$3,029
COMPACTED FILL	CY		EXC > FILL EXC < FILL	$3.25 $7.30	
STRUCTURAL BACKFILL	CY	64		$10.40	$666
TRAP. CHANNEL CONCRETE	CY	955	b > 8* b ≤ 8	$380.00 $480.00	$458,400
R.C.B. CONCRETE (INCLUDING STEEL)	CY	36	L > 150 L < 150	$590.00 $820.00	$29,520
RECT. CHAN. CONC. (INCLUDING STEEL)	CY		L > 150 L < 150	$440.00 $615.00	
CUTOFF WALL (2' TYP.)	LF	3962		$13.50	$53,487
SUBDRAIN	LF		6 < b ≤ 16 b > 16	$12.50 $25.00	
FENCING (6' TYP.)	LF	3962		$16.00	$63,392
CATCH BASINS	LF			$560.00	
MANHOLES (PIPE)	EA		FOR MAINLINE FOR JUNCTION	$5,600.00 $6,500.00	
MANHOLES (RCB)	EA			$2,100.00	
A.C. PAVING & BASE	SF			$4.50	
CLASS 2 BASE (3" THICK)	SF	59430		$0.70	$41,601
ROCK SLOPE PROTECTION*** CONC.-ROCK SLOPE PROTECTION	CY**			$100.00 $150.00	
STORM DRAINS	SEE STORM DRAIN COST SHEET				
SLAB BRIDGES	LBS CY	SEE BRIDGE COST SHEET	REBAR CONCRETE	$1.10 $540.00	
ENV./ REGULATORY COSTS	LS		MITIGATION / E.A./ ALT STUDY, ETC.		
MISCELLANEOUS COSTS	SEE MISCELLANEOUS COST SHEET				

* No.4 bars at 18 inches
** 1.9 tons/cy
*** Use 75% for large installations (>1000cy)
**** Use 25% of rock slope protection quantity to determine concreted-rock quantity.

" i.e. Mobilization, Water Control, etc.
"" Connector pipe, etc.

SUBTOTAL	$724,536
SUBTOTAL (DAM & BASIN)	$0
LUMP SUM ITEMS (22%)"	$159,398
CONTINGENCIES (12%)""	$106,072
ENG & ADMIN. (25%) MITIGATION (3%) ? ☑ ON FOR YES	$277,202
SUBTOTAL (AS-BUILT)	
SUBTOTAL	$1,267,207
R/W (FROM R/W SHEET)	$240,000
R/W (FROM DAM & BASIN SHEET)	$0

2008 base index = 9894.94 (E.N.R./OCT 2008)
2009 base index = 9760.69 (E.N.R./OCT 2009)
Ratio increase = 0.986432

rev. 11/07/09

NAME & DATE	TOTAL	
mla 03/29/10		**$1,507,207**

RCB QUANTITY SUMMARY SHEET

Perris Valley MDP
MDP / ADP

3/29/10
DATE

Perris Valley Commercial Center Specific Plan - Lateral G-2
FACILITY

mla
ENGINEER

	Location	No. Cells	Cell Height (FT)	Cell Width (FT)	Concrete per Cell (CF/LF) *	Length (FT)	Depth from F.G. to Top of RCB (FT)	Avg. Overburden E.G. to F.G. (FT)	RCB Height (FT) **	RCB Width (FT) **	Concrete (CY)	Trench Depth Below F.G. (FT)	Sloped or Shored Trench	Height of Sloped Portion of Trench (FT)	Structural Excavation (CY) ***	Structural Backfill (CY) ***	R/W Width **** (FT)	R/W (AC)	With Overburden: Overburden Excavation (CY)	With Overburden: R/W Width ***** (FT)	With Overburden: R/W (AC)
1	Sta 14+60 to Sta 15+05	1	5.0	10.0	21.6	45.0	1.0	0.0	6.50	11.33	36.0	7.5	Sloped	4.0	186.7	63.9	19.3	0.02			
2									0.00	0.00		0.0			0.0	0.0	0.0				
3									0.00	0.00		0.0			0.0	0.0	0.0				
4									0.00	0.00		0.0			0.0	0.0	0.0				
5									0.00	0.00		0.0			0.0	0.0	0.0				
6									0.00	0.00		0.0			0.0	0.0	0.0				
7									0.00	0.00		0.0			0.0	0.0	0.0				
8									0.00	0.00		0.0			0.0	0.0	0.0				
9									0.00	0.00		0.0			0.0	0.0	0.0				
10									0.00	0.00		0.0			0.0	0.0	0.0				
11									0.00	0.00		0.0			0.0	0.0	0.0				
12									0.00	0.00		0.0			0.0	0.0	0.0				
13									0.00	0.00		0.0			0.0	0.0	0.0				
14									0.00	0.00		0.0			0.0	0.0	0.0				
15									0.00	0.00		0.0			0.0	0.0	0.0				
16									0.00	0.00		0.0			0.0	0.0	0.0				
17									0.00	0.00		0.0			0.0	0.0	0.0				
18									0.00	0.00		0.0			0.0	0.0	0.0				
19									0.00	0.00		0.0			0.0	0.0	0.0				
20									0.00	0.00		0.0			0.0	0.0	0.0				
rev. 11/07/09						45					36				187	64		0.0	0		0.0

* Caltrans Standard Plans, 1992, D80.

** Assumes wall thickness, t2 = 8", roof and invert slab thicknesses, t1, t3 = 9".

*** Below finish grade, per RCB pay lines (normal condition), Std. Dwg. No. M815. Refer to "Storm Drain Easement Widths," RCFC, Nov. 10, 1987 for sloped or shored trench sections.

**** "Storm Drain Easement Widths," RCFC, Nov. 10, 1987. Assumes a minimum width of 10' for construction access, the width of the sloped excavation, or the width of the shored excavation plus 8', whichever is greater.

***** Assumes cut slopes of 0.75H:1V between overburden and finish grade.

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
- PROJECT PLANNING R/W COSTS -

PROJECT: Perris Valley Commercial Center Specific Plan - Lateral G-2

DATE: 3/29/10

(1) Raw R/W Costs (*Land Value A*) = ***$100,000*** $/acre

Total Area required = ***2.40*** acres

Total R/W Raw Costs = **$240,000**

(2) Number of vacant parcels = ***0*** x *$5,000* = ***$0***

Number of occupied parcels = ***0*** x *$10,000* = ***$0***

Total Parcels Affected = ***0***

Total Parcels Costs = **$0**

(3) Total acreage of Improved parcels significantly impacted by the project = acres

$= \left[\left(\frac{1}{1-R}\right)-1\right]$

Improvement ratio ***R*** (*decimal*) = ***20%*** coefficient→ **0.3**

Land Value ***A*** (*per acre*) = ***$100,000***

Improvement value ***I*** (*per acre*) = ***$25,000*** $= A.\left[\left(\frac{1}{1-R}\right)-1\right]$

Value of Improved Land (*per acre*) = ***$125,000*** $= A + A.\left[\left(\frac{1}{1-R}\right)-1\right]$

Total Value of Damaged Property = ***$0***

Total Damages Costs (25%.Total Improvement value) = **$0**

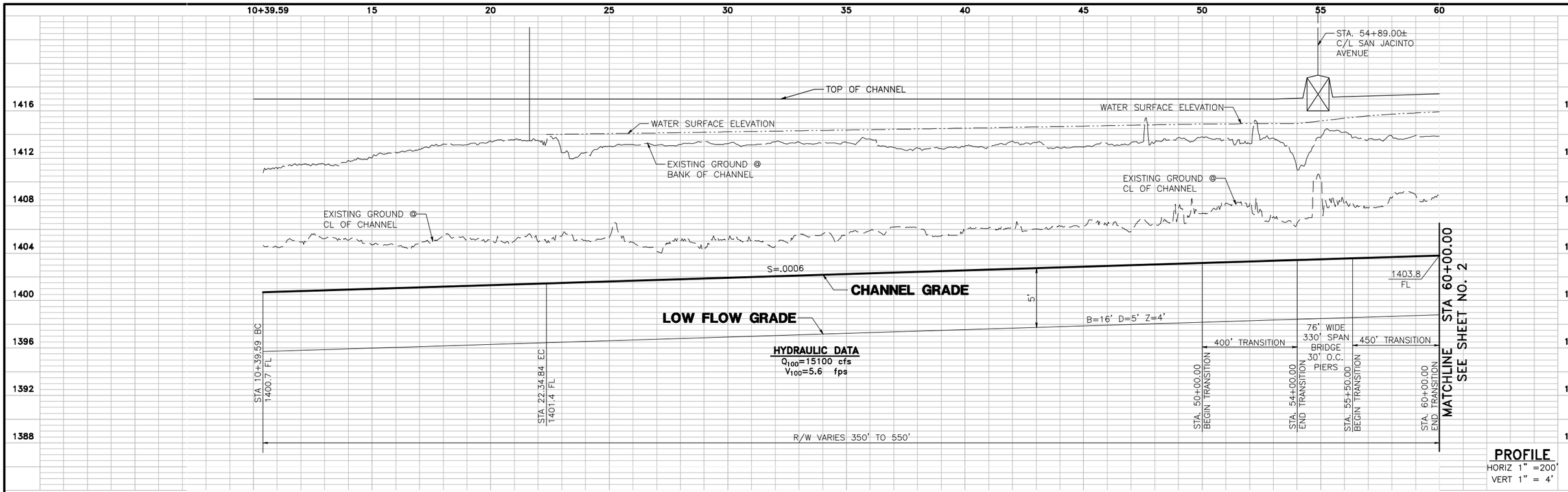
(4) Number of Houses for Buyout = houses

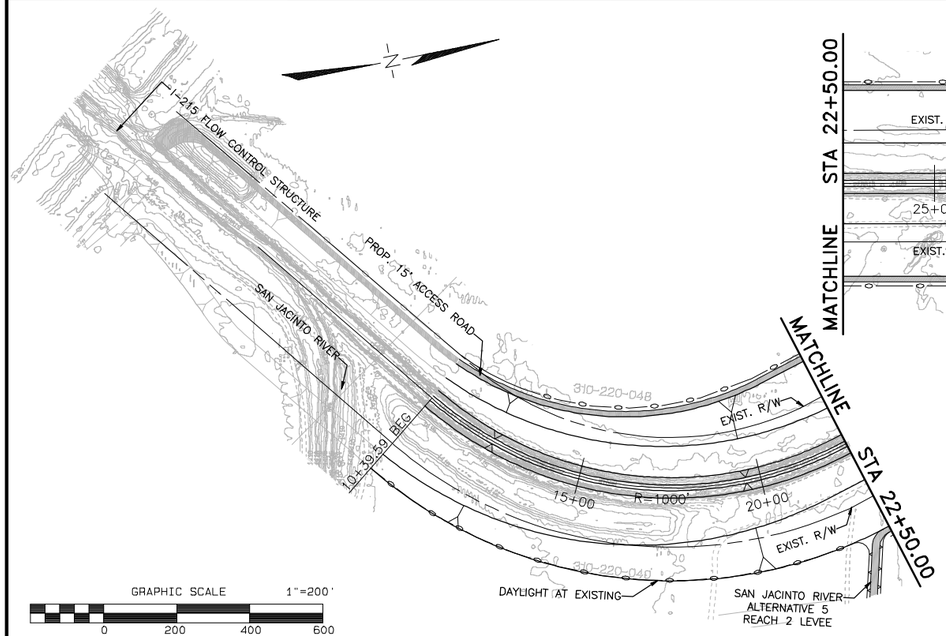
Cost per Home = ***$500,000***

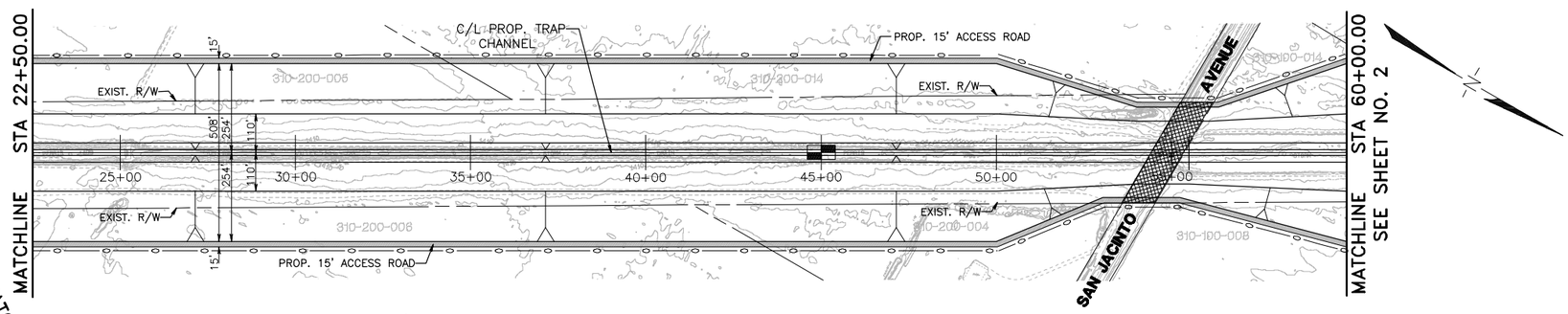
Total Relocation/Buyout Costs = **$0**

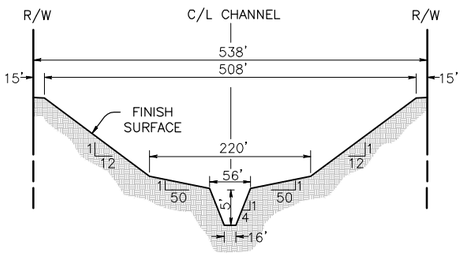
Grand Total R/W Costs = **$240,000**

PERRIS VALLEY STORM DRAIN PLANS









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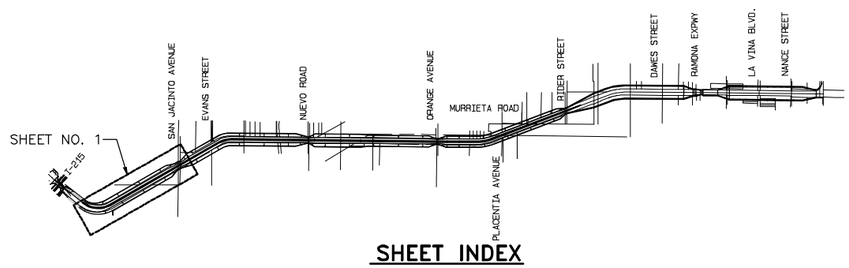

SHEET INDEX

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PERRIS VALLEY STORM DRAIN
ALTERNATIVE 5

SEAL

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SCOTT R. HILDEBRAND
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EXP. 3-31-08
CIVIL
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APPROVED BY: _____ DATE: _____

R.C.E. NO. C44762 EXP. DATE: 3-31-08

DESIGNED BY:
DRAWN BY: D.V.A.J.
CHECKED BY: SRH

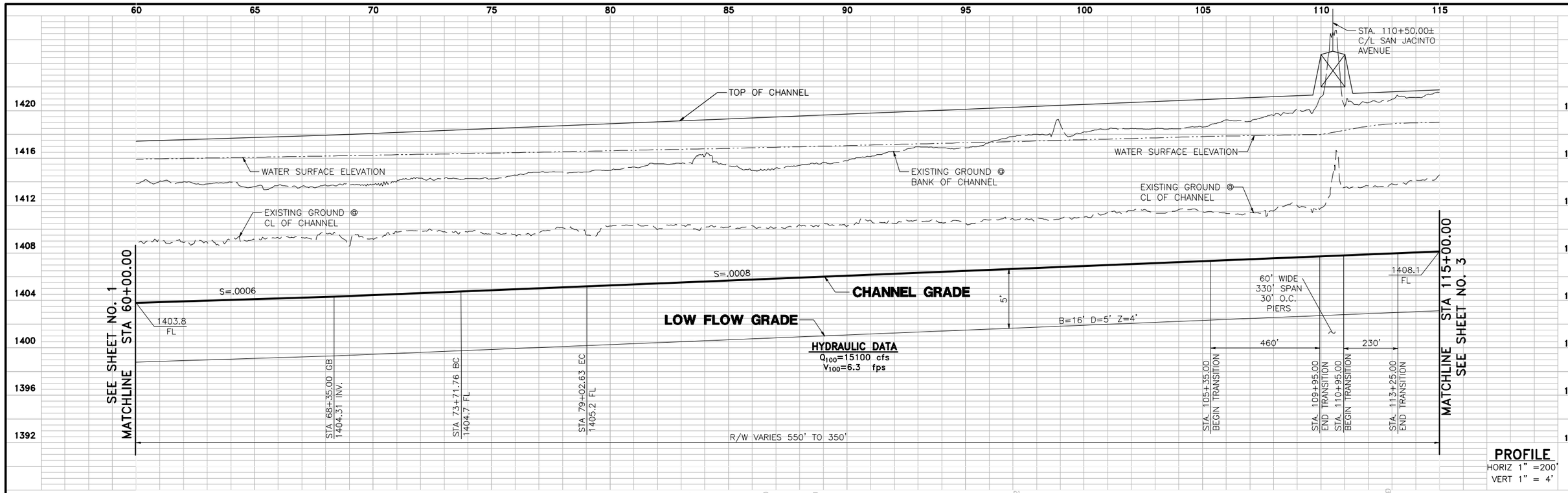
REF.	REVISIONS	APPR.	DATE

PRELIMINARY PROFILE
PERRIS VALLEY STORM DRAIN
ALTERNATIVE 5

PROJECT NO. 03-0451

DRAWING NO. ALTERNATIVE 5

SHEET NO. 1 OF 6



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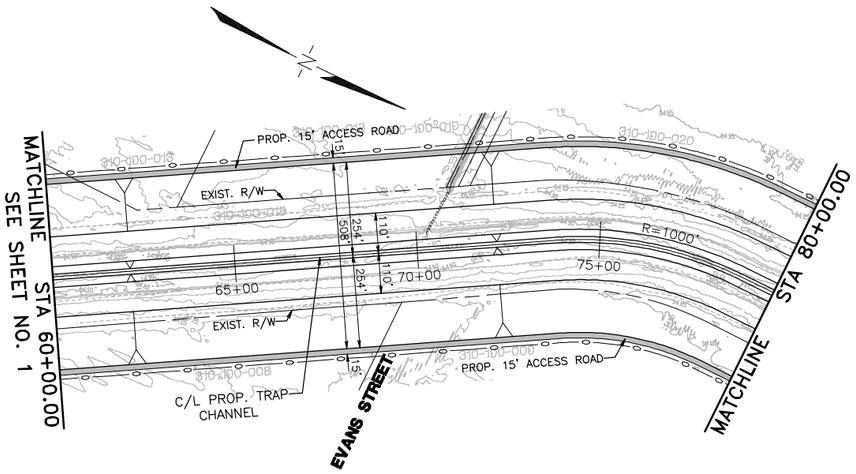

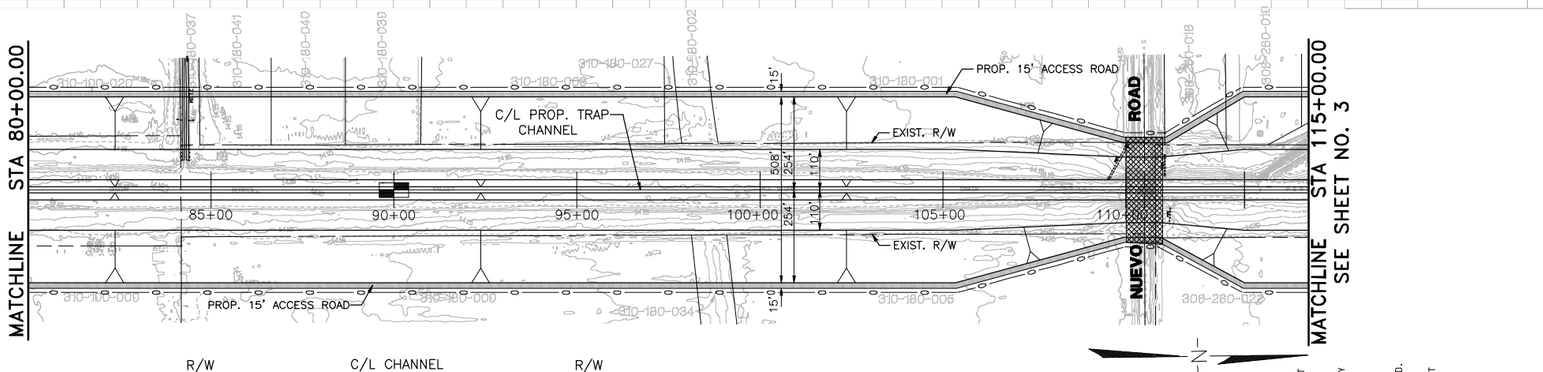

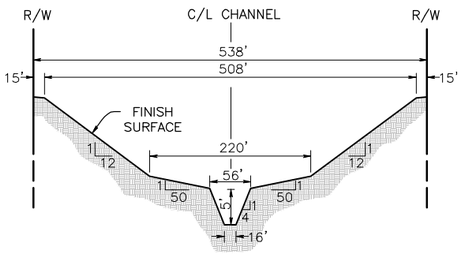

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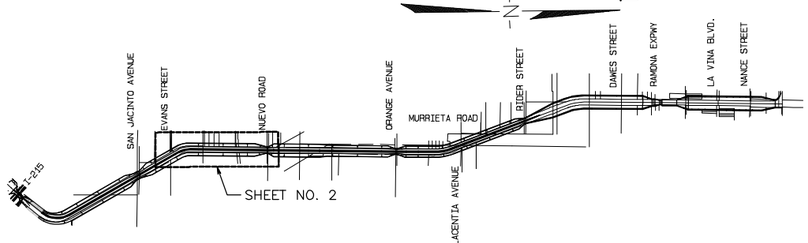

SHEET INDEX
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GRAPHIC SCALE 1"=200'
0 200 400 600

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ALTERNATIVE 5

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APPROVED BY: _____ DATE: _____
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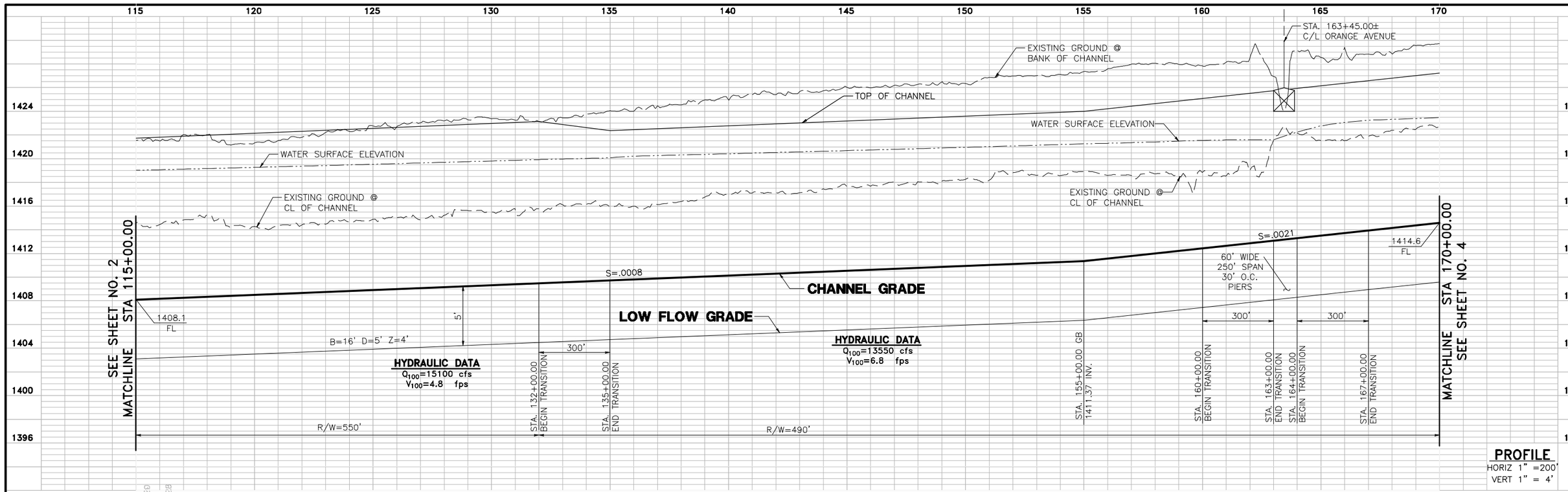
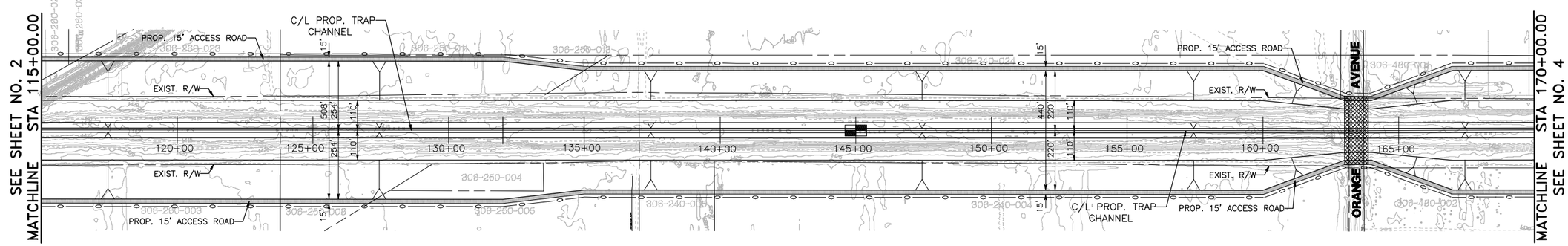
DESIGNED BY:
DRAWN BY: D.V.A.J.
CHECKED BY: SRH

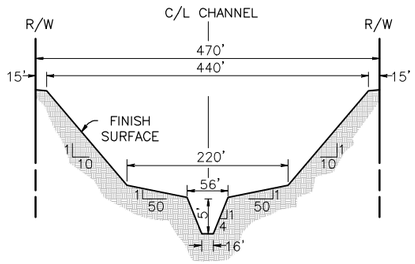
REF.	REVISIONS	APPR.	DATE

PRELIMINARY PROFILE
PERRIS VALLEY STORM DRAIN
ALTERNATIVE 5

PROJECT NO. 03-0451
DRAWING NO. ALTERNATIVE 5
SHEET NO. 2 OF 6







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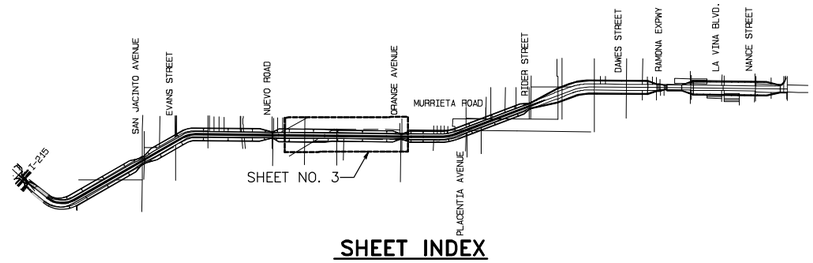

SHEET INDEX

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GRAPHIC SCALE 1"=200'

0 200 400 600

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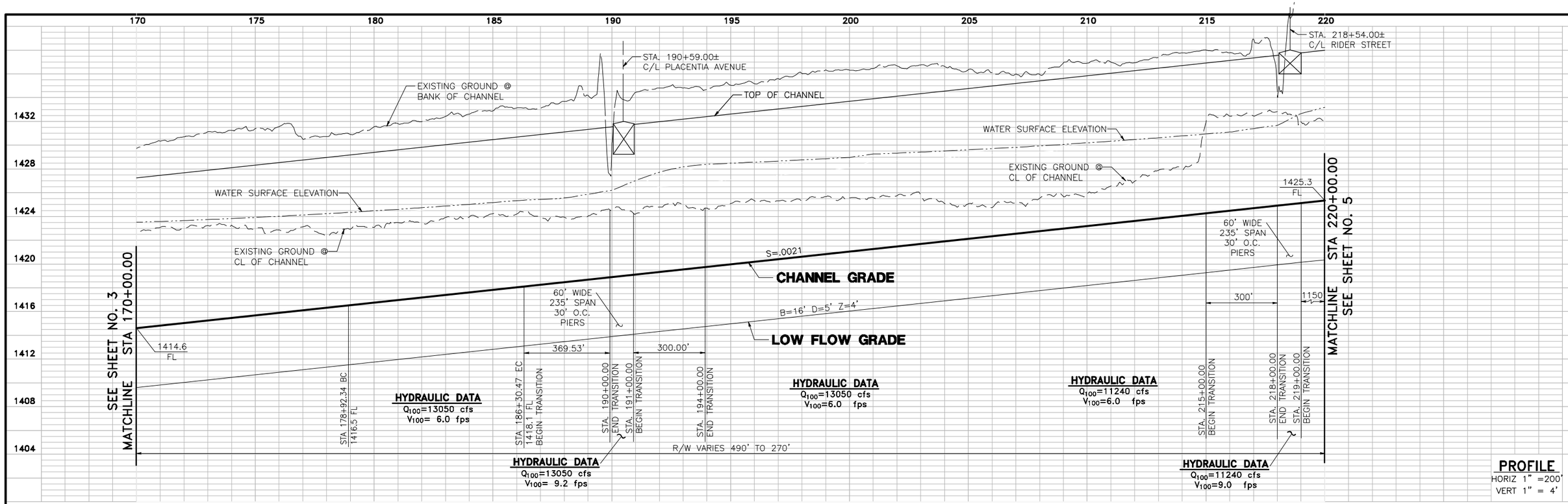
PRELIMINARY PROFILE
PERRIS VALLEY STORM DRAIN
ALTERNATIVE 5

PROJECT NO. 03-0461
DRAWING NO. ALTERNATIVE 5
SHEET NO. 3 OF 6



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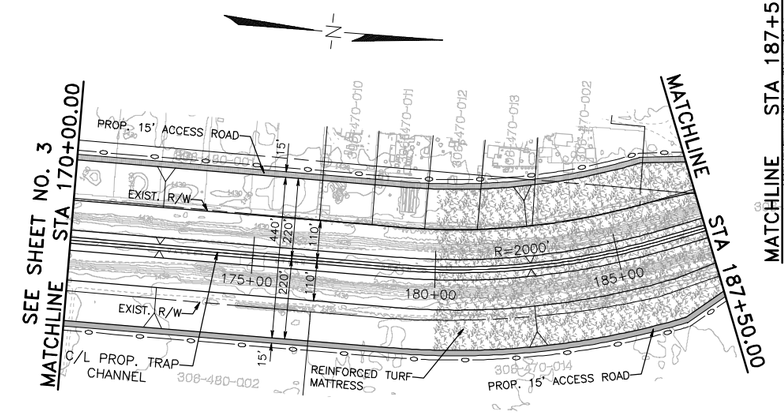

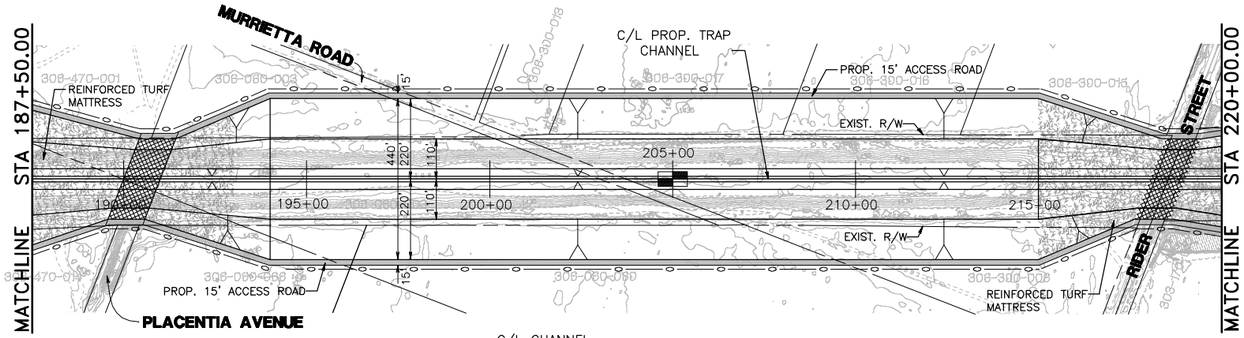

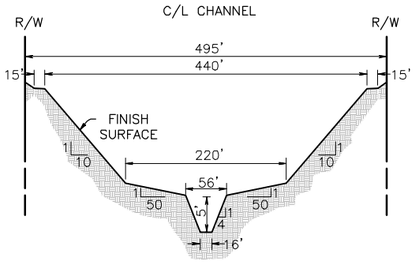

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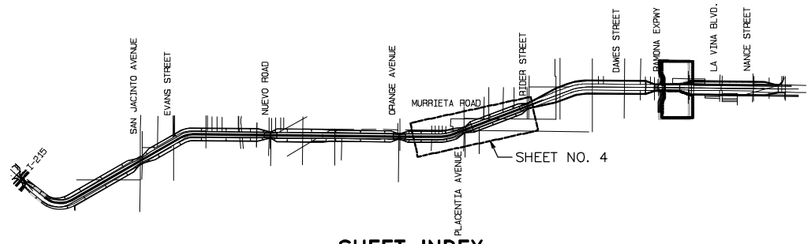

SHEET INDEX
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GRAPHIC SCALE 1"=200'
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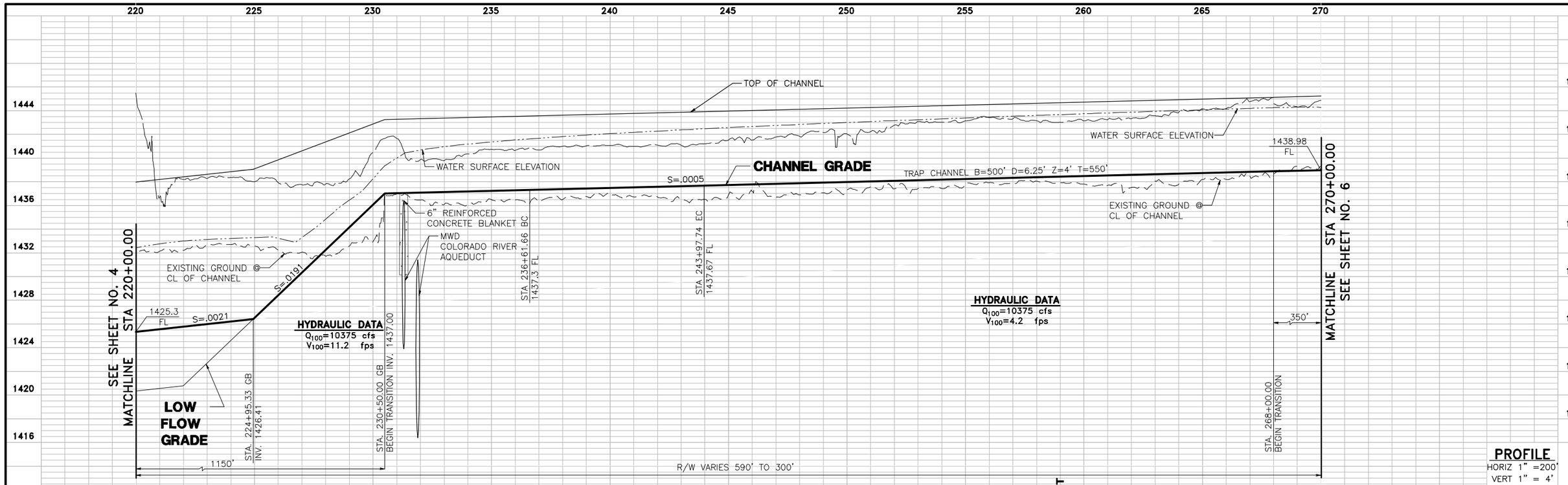
PRELIMINARY PROFILE
PERRIS VALLEY STORM DRAIN
ALTERNATIVE 5

PROJECT NO. 03-0461
DRAWING NO. ALTERNATIVE 5
SHEET NO. 4 OF 6



PROFILE

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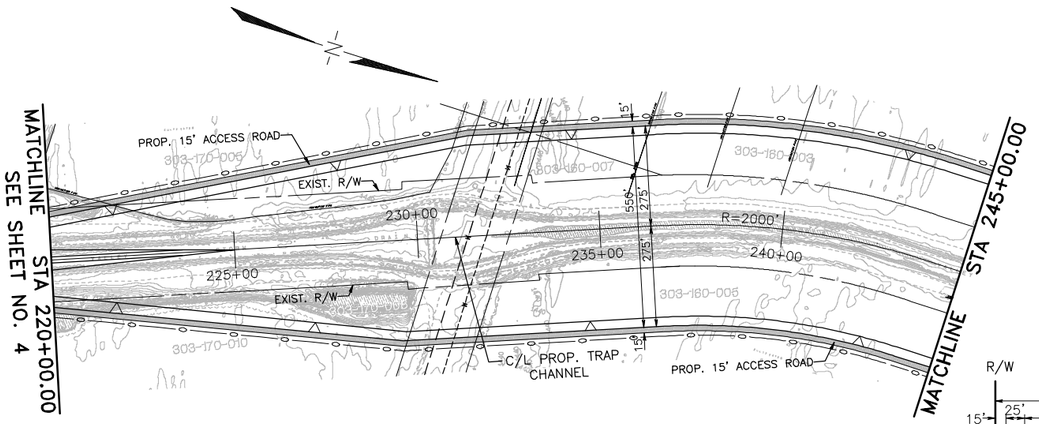
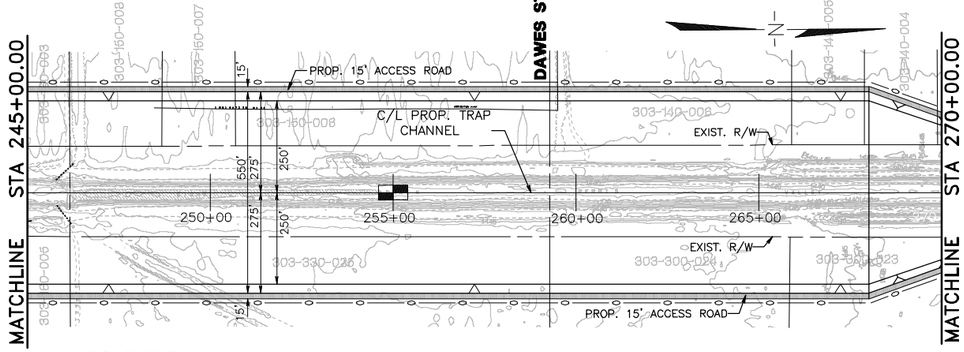
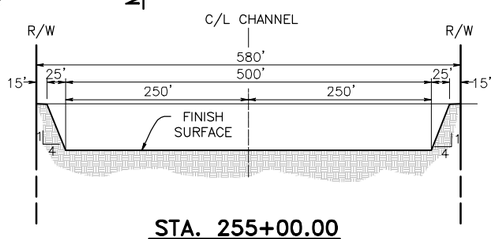
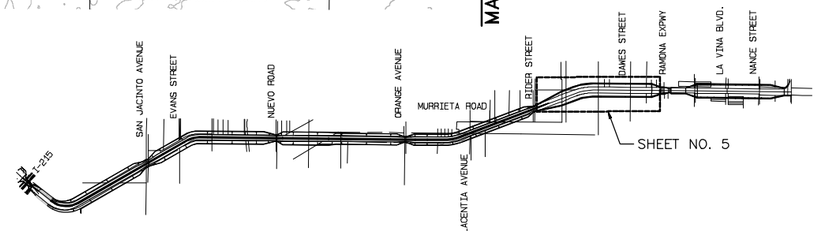






STA. 255+00.00

SCALE: 1" = 100'



SHEET INDEX

N.T.S.

GRAPHIC SCALE 1"=200'

0 200 400 600

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PERRIS VALLEY STORM DRAIN
ALTERNATIVE 5

SEAL

REGISTERED PROFESSIONAL ENGINEER
SCOTT R. HILDERBRAND
NO. C44762
EXP. 3-31-08
CIVIL
STATE OF CALIFORNIA

ALBERT A. WEBB ASSOCIATES
ENGINEERING CONSULTANTS
3788 McCRAY STREET, RIVERSIDE, CA 92506
PH. (951) 686-1070 FAX (951) 788-1256

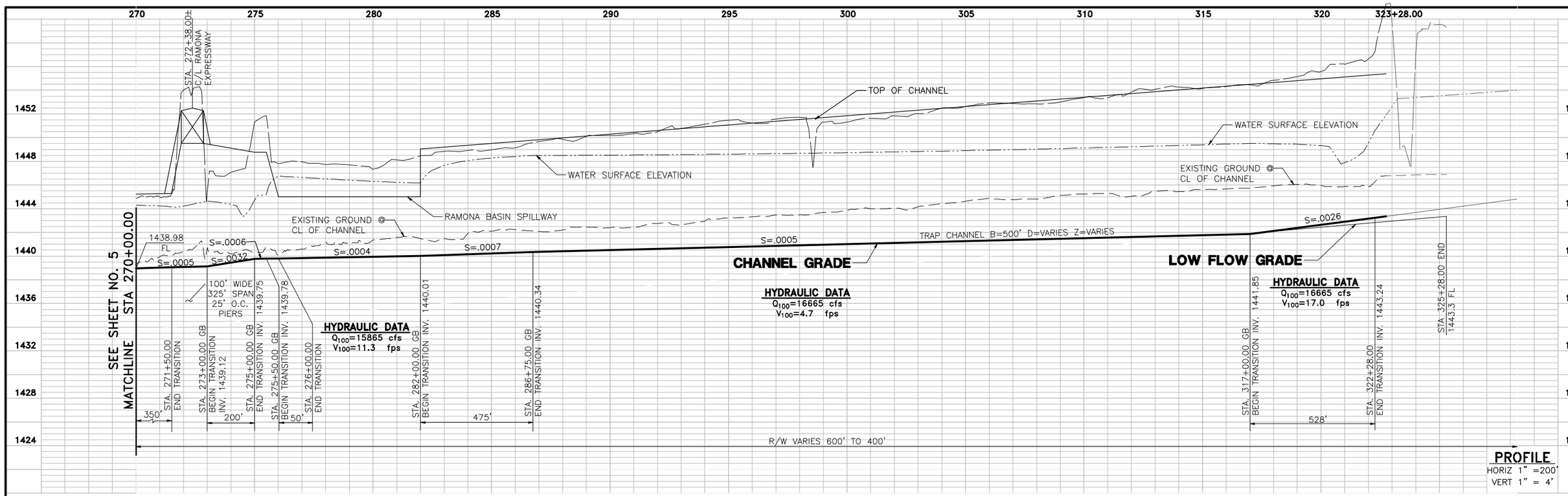
APPROVED BY: _____ DATE: _____
R.C.E. NO. C44762 EXP. DATE: 3-31-08

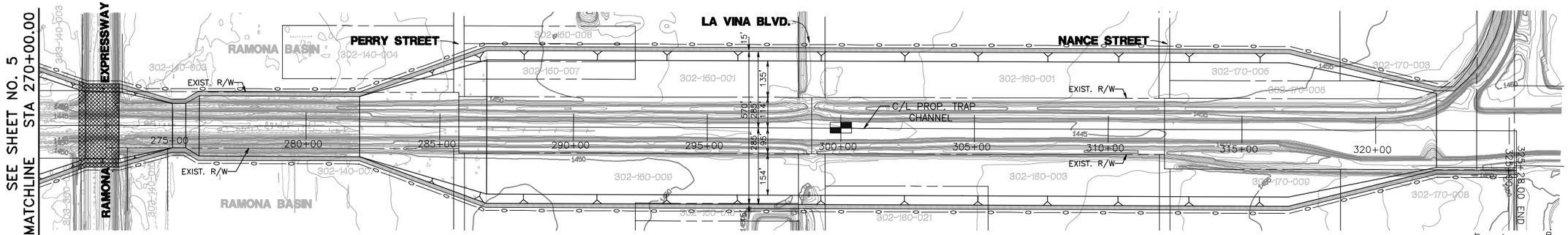
DESIGNED BY:
DRAWN BY: D.V.A.J.
CHECKED BY: SRH

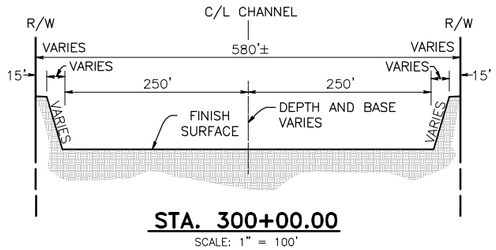
REF.	REVISIONS	APPR.	DATE

PRELIMINARY PROFILE
PERRIS VALLEY STORM DRAIN
ALTERNATIVE 5

PROJECT NO. 03-0451
DRAWING NO. ALTERNATIVE 5
SHEET NO. 5 OF 6







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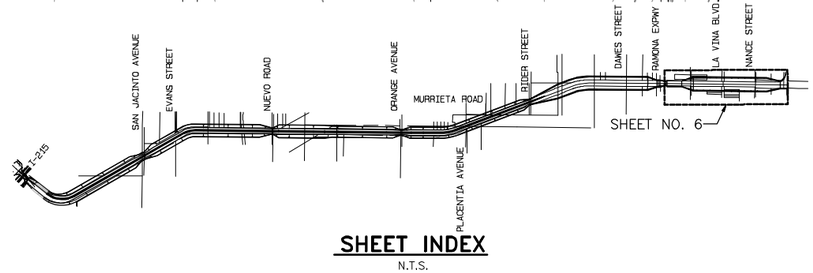
SCALE: 1" = 100'



SHEET INDEX
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GRAPHIC SCALE 1"=200'
0 200 400 600

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ALTERNATIVE 5

SEAL
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PRELIMINARY PROFILE
PERRIS VALLEY STORM DRAIN
ALTERNATIVE 5

PROJECT NO. 03-0451
DRAWING NO. ALTERNATIVE 5
SHEET NO. 6 OF 6