FIR Wilson 3
P22-00017
City of Perris, Riverside County, California

Preliminary Drainage Study

Prepared for:
First Industrial Realty Trust
Attn: Paul Loubet
898 N Pacific Coast Highway, Suite 175
El Segundo, CA 90245
(909) 230-3892

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

Original Date Prepared: June 2022
Revision Date(s): September 2022

[Stamp]

Engineer
Title

TABLE OF CONTENTS

SECTION 1 - SUMMARY

PURPOSE

The purpose of this report is to document the hydrologic and hydraulic analyses performed in support of the First Industrial Realty Trust (FIR) Wilson 3 project located in City of Perris, County of Riverside, California. The project site is located south of Rider Street, north of Placentia Avenue and situated between Wilson Avenue and Redlands Avenue. The project proposes to build a commercial/industrial building on approximately 9.9 gross acres. This report will summarize the hydrologic and hydraulic analyses that were conducted in order to determine the necessary drainage improvements required to provide flood protection for the proposed building and safely convey the runoff through the site.

The scope of this report will include the following:

- Determine the peak 100-year and 10-year flow rates for the developed condition using the Riverside County Flood Control and Water Conservation District (RCFC&WCD) Rational Method.
- Determine the required storm drain facilities, alignment, and sizes required to flood protect the project site.
- Determine the necessary basin area and volume required for water quality treatment and to mitigate for increases in runoff.
- Preparation of a preliminary report summarizing the hydrology and hydraulic results.

DESCRIPTION OF WATERSHED

As previously described, the project is proposing a commercial/industrial building (approximately 180,000 square feet) on approximately 9.9 gross acres of vacant land. Existing elevations across the site vary from 1446 at the northwest corner to 1439 at the southeast corner (NAVD88 datum). The site currently slopes down at approximately 1-2% grade to the southeast. The existing drainage pattern for the site and the general area is characterized by sheet flows that follow the slope to the southeast towards Wilson Avenue.

The project is located within the Perris Valley Commerce Center (PVCC) specific plan and is also within the Perris Valley master Drainage Plan (PVMDP) adopted July 1987 and revised June 1991. This project is tabled to discharge into existing MDP Line A-C. Line A-C will be built with FIR Wilson 1 (P19-00007) and designed per guidelines listed in the Line A-B, Line A-C Flow Reallocation Memo (see Appendix C).

PROPOSED CONDITIONS

The proposed project will only generate on-site flows. This runoff will surface flow through the site utilizing curb and gutter into several inlets on the site. The flow will then be piped on-site to discharge into an underground detention chamber, which will then be pumped into a treatment box to treat the water quality volume and bypass higher intensity runoff. Mitigation for HCOC is not required; the project will connect to MDP facility Line A-C before discharging to the Perris Valley Storm Drain.

Since the project is HCOC exempt, a comparison analysis between existing and proposed drainage conditions will not be required. Only analyses demonstrating how proposed designs will flood protect the proposed site are necessary.

The project proposes two main on-site drainage paths. The eastern portion of the site will surface flow to the easternmost parking stalls where it will be intercepted by an inlet and piped to the underground storage chamber. The northern, southern, and western portions of the site will surface flow into an inlet near the truck court on the western side of the site via curb and gutter, and then piped to the underground storage chamber. See the Rational Method Map in Appendix A.

This project will not be subject to off-site run-on. Adjacent properties to the north and northwest will be developed and will contain their respective flows on-site. Adjacent vacant property to the west naturally drains southeast into a natural berm that directs flows south past the Wilson 3 project site. In addition, Wilson Avenue already safely conveys road runoff via existing curb and gutter. Therefore, no analyses need to be done for off-site flows.

METHODOLOGY

HYDROLOGY

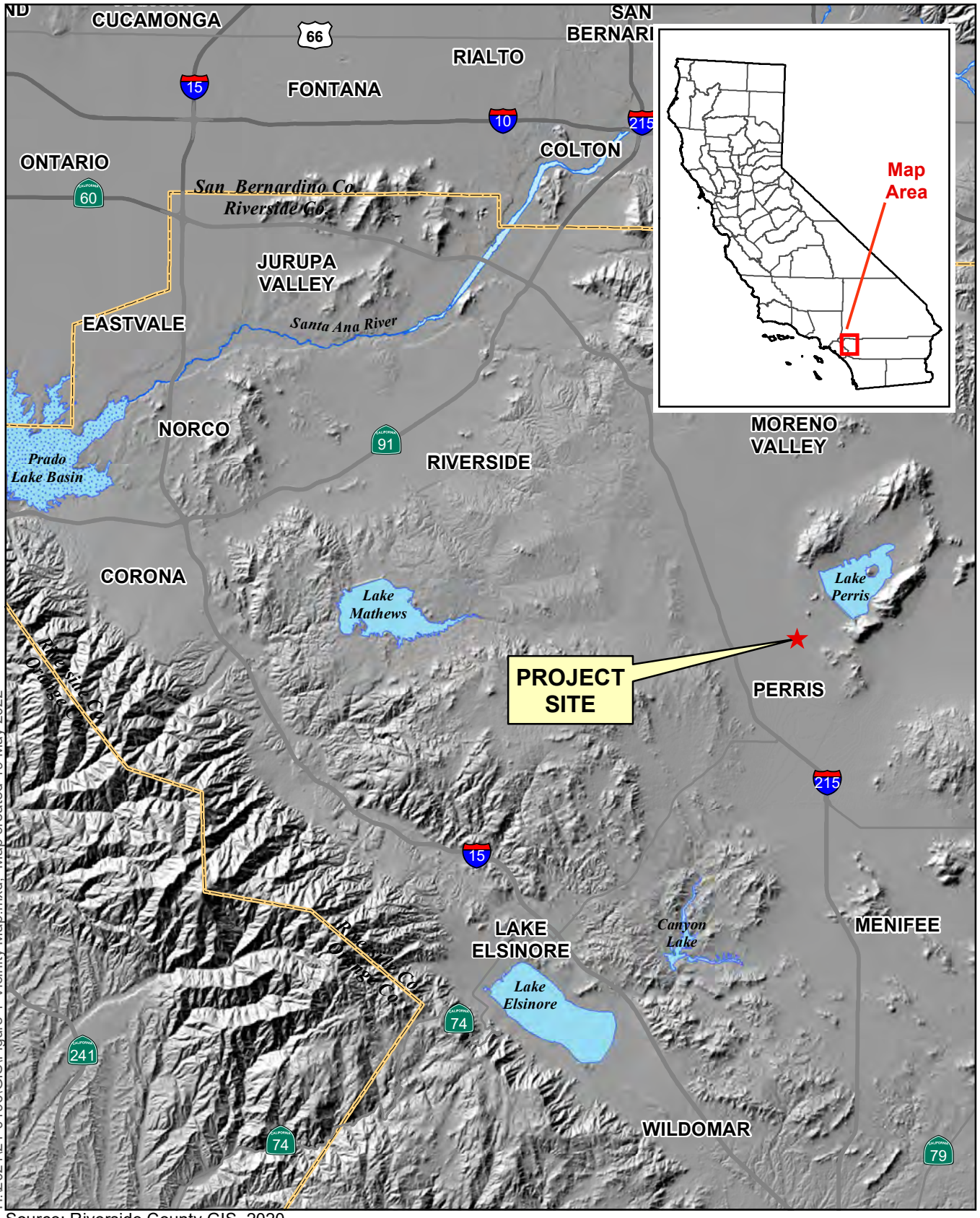
Hydrologic calculations were performed in accordance with the RCFC&WCD Hydrology Manual, dated April 1978. The Rational Method was utilized in determining peak flow rates.

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

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

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

The Unit Hydrograph Method will not be utilized since there is no need to compare existing and proposed conditions due to the HCOC exemption for this project.



H:\2021\21-0196\GIS\Figure 1-Vicinity Map.mxd: Map created 19 May 2022

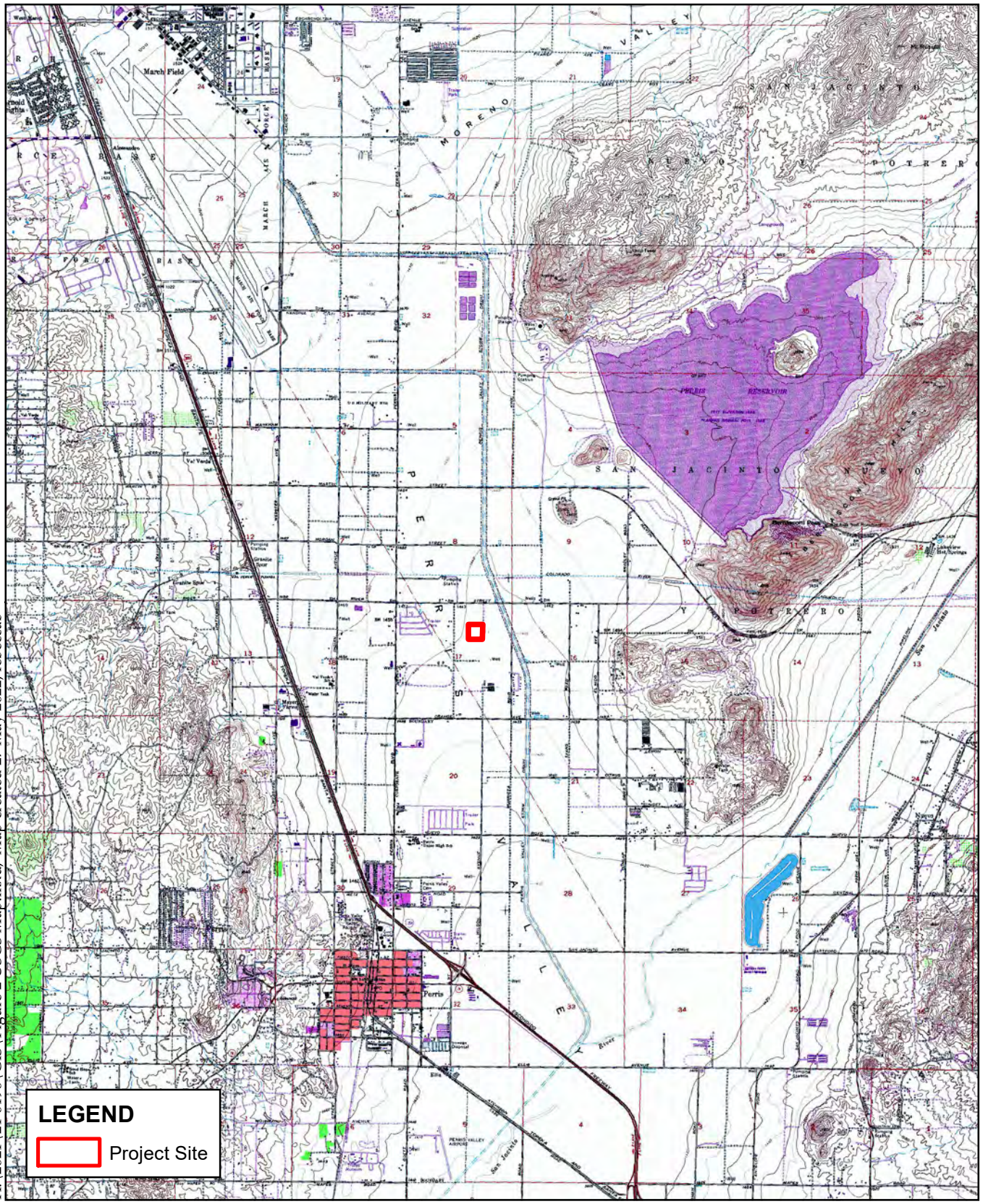
Source: Riverside County GIS, 2020

0 2 4 6 Miles

Figure 1 – Vicinity Map

FIR Wilson 3

ALBERT A. WEBB ASSOCIATES



H:\2021\21-0196\GIS\Figure 2-USGS Map.mxd; Map created 27 May 2022; rebeccab

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

Figure 2 - USGS Map

FIR Wilson 3

ALBERT A. WEBB ASSOCIATES

H:\2021\21-0196\GIS\Figure 3-Aerial Map.mxd; Map created 31 May 2022

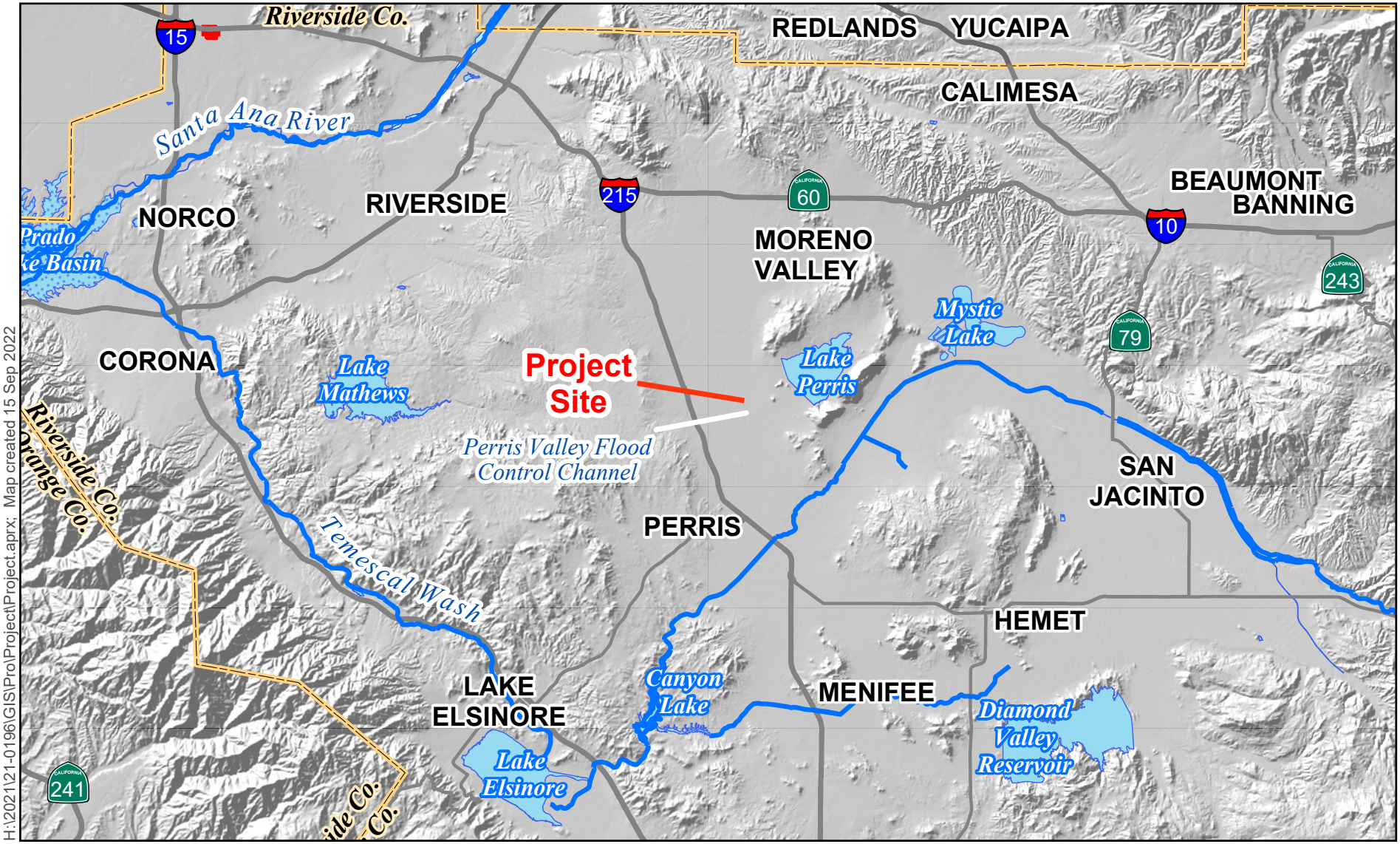
Sources: Riverside Co. GIS, 2021 (streets) and 2020 (imagery).

0 500 1,000 1,500 Feet

Figure 3 - Aerial Map

FIR Wilson 3

ALBERT A. WEBB ASSOCIATES



H:\2021\21-0196\GIS\Pro\Project\Project.aprx: Map created 15 Sep 2022

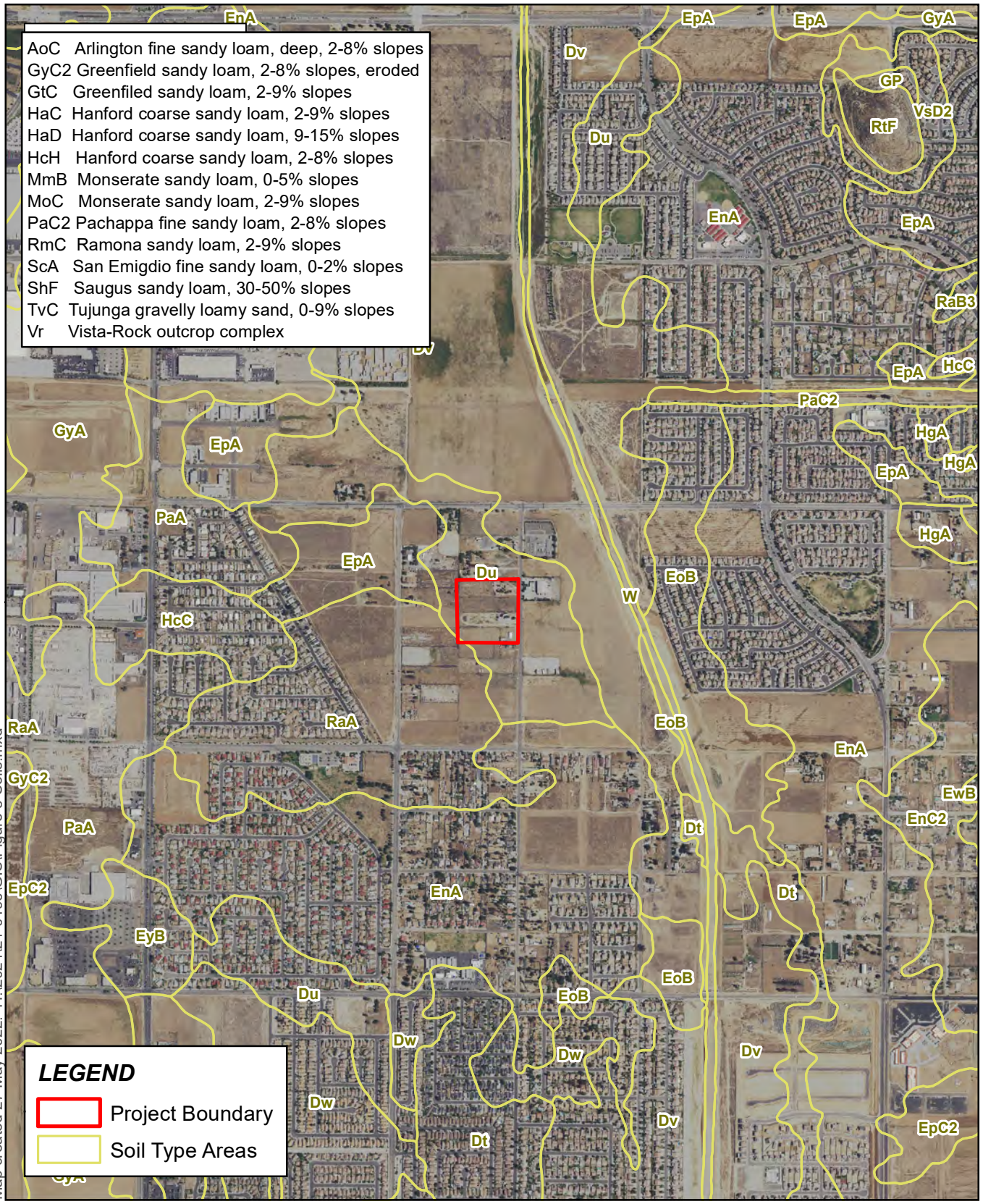
Sources: US NHD; USGS 30 Meter DEM

0 2 4 6 8 Miles

Figure 4 – Receiving Waterbodies

FIR Wilson 3

ALBERT A. WEBB ASSOCIATES



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

Figure 5 – Soils Map

FIR Wilson 3

ALBERT A. WEBB ASSOCIATES

SECTION 2 - HYDROLOGY ANALYSIS

HYDROLOGY PARAMETERS

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

Table 1 – Precipitation Values

	Duration
Storm Event	1-Hour (inches)
2-Year	0.45
100-Year	1.21

The value for slope of intensity was determined to be 0.49. The isohyetal maps have been included in Appendix A.

Based on the Plate C-1.30 (Perris) in the RCFC&WCD Hydrology Manual, the project site is classified as soil type C. However, per Web Soil Survey the site is classified as soil type D. For analysis, soil type D was used as it is the more conservative option. The soils map is included in Appendix A.

The cover type was determined based on the existing land cover and proposed land use of the site. Hydrological computations for the developed condition were done using 'Commercial/Industrial' cover type. The table below summarizes the runoff index values and the recommended values for percentage of impervious cover for each category:

Table 2 – Cover Type

Cover Type	Soil Group A	Soil Group B	Soil Group C	Soil Group D	Percentage of Impervious Cover
Commercial Landscaping	32	56	69	75	90%

ON-SITE RATIONAL METHOD HYDROLOGY

The rational method was used to determine peak flow rates in order to adequately size the proposed subsurface storm drains and associated inlets used to convey on-site flows to the proposed underground storage chamber. The project site was separated into two sub areas.

Area A accounts for the northern, southern, western portions of the site, including three quarters of the building. This produces a 100-year peak flowrate of 15.3 cfs. This runoff will surface flow via curb and gutter to a proposed inlet near the truck court on the western side of the site. It will then be piped to the underground storage chamber.

Area B accounts for the eastern portion of the site, including a quarter of the building and the eastern parking area. This produces a 100-year peak flowrate of 5.7 cfs. This runoff will surface flow to a proposed inlet in the eastern parking area, which will then be piped to the underground storage chamber.

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 101 – Flow from Area A	10.6	15.3
Node 104 – Flow from Area B	4.0	5.7
Total Flow	13.8	20.0

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

SECTION 3 - HYDRAULIC ANALYSIS

ON-SITE STORM DRAIN FACILITIES

The project proposes two subsurface storm drain systems that convey on-site flows to the proposed underground chamber located in the northernmost drive aisle. From the chamber, the runoff is pumped to the treatment box (BMP-A) to treat the water quality volume and higher intensity runoff is bypassed through a separate storm drain line AC-3. The flow is the conveyed via Line AC-3 into the connection with Line A-C, and then ultimately discharging into the Perris Valley Storm Drain Channel.

A brief summary of each system has been provided. The peak flow rates determined from the 100-year rational method on-site hydrology analysis were utilized to evaluate the proposed storm drain systems.

Line-1

The northern, southern, and western portions of the project site will surface flow and be collected by Line-1. Line-1 is a 24-inch HDPE storm drain that proposes to convey the 100-year peak flow rate to the proposed underground chamber. A normal depth calculation from the CivilD rational method output was used to determine the appropriate size for Line-1. A hydraulic model for Line-1 will be provided during final engineering to further assess the storm drain design.

Line-2

The eastern portion of the project site will surface flow and be collected by Line-2. Line-2 is an 18-inch HDPE storm drain that proposes to convey the 100-year peak flow rate to the proposed underground chamber. A normal depth calculation from the CivilD rational method output was used to determine the appropriate size for Line-2. A hydraulic model for Line-2 will be provided during final engineering to further assess the storm drain design.

High Flow Bypass Outlet Structure

The proposed underground chambers will fully store the water quality volume. All high intensity flows will push out of the chambers from a raised outlet pipe and gravity flow to a lift station in Line AC-3.

OFF-SITE STORM DRAIN FACILITIES

Line AC-3 (Line A-C Connection)

Line AC-3 will convey the entire runoff generated from the site into Line A-C. A normal depth calculation was used with the 100-year peak flow rate (20.0 cfs) produced from the entire site to determine the appropriate size for Line AC-3. It was determined that a 30-inch pipe will safely convey runoff to Line A-C. A hydraulic model for Line AC-3 will be provided during final engineering to further assess the storm drain design. Line A-C was designed to handle a proposed tributary flow rate of 22.2 cfs from the Wilson 3 project site per the Line A-B, Line A-C Flow Reallocation Memo in Appendix C. With a total 100-year peak flow rate of 20.0 cfs, the Wilson 3 project runoff can be safely conveyed through Line A-C to the Perris Valley Storm Drain.

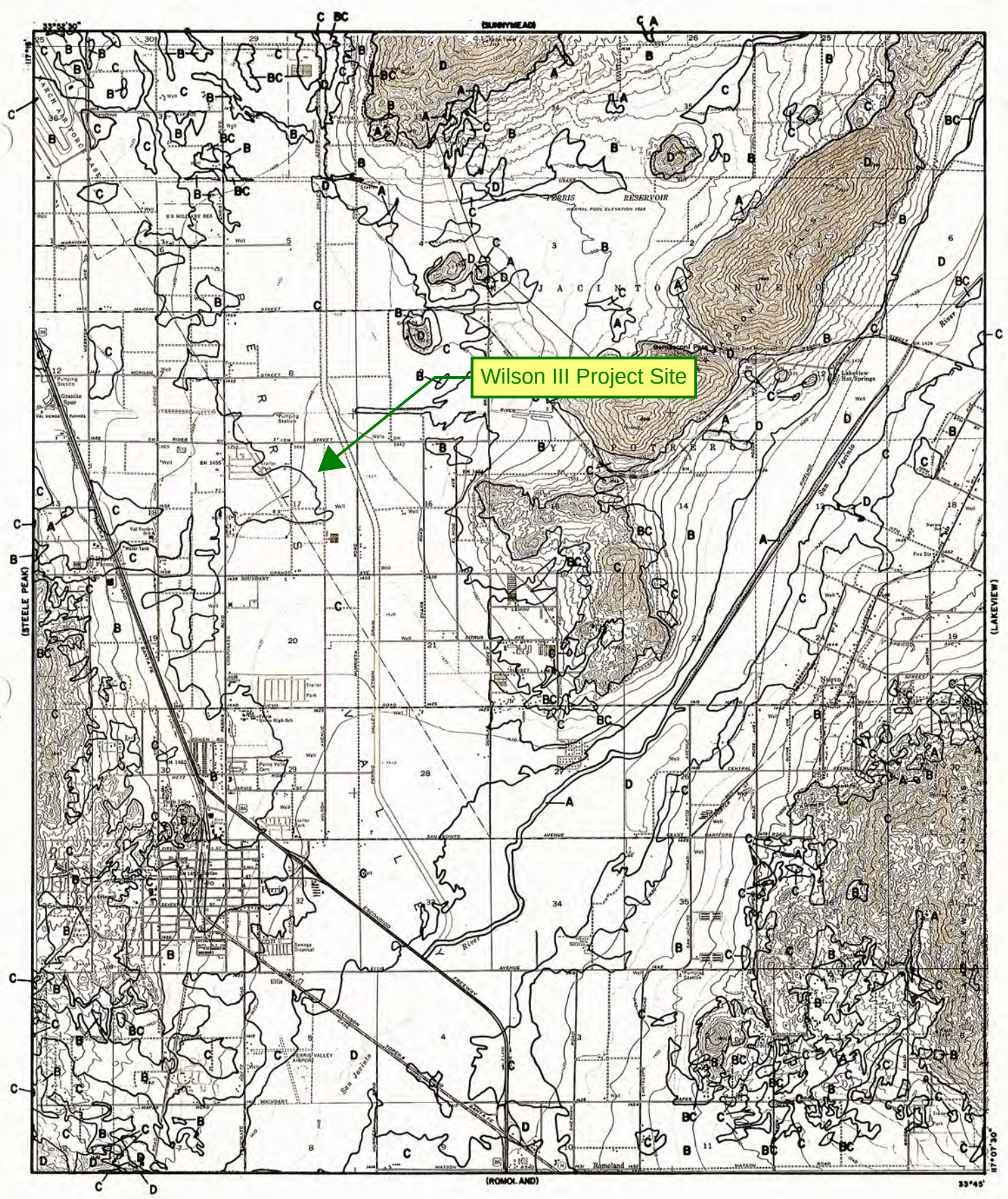
SECTION 4 - CONCLUSION

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

- The proposed drainage improvements will adequately convey flows to and from the underground chamber and provide flood protection for the 100-year storm event.
- The proposed project will not impact flooding condition to upstream or downstream properties.

APPENDIX A – HYDROLOGY ANALYSIS

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

Map Scale: 1:1,530 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 20 40 80 120

Feet: 0 50 100 200 300

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Western Riverside Area, California
Survey Area Data: Version 14, Sep 13, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 23, 2020—Feb 6, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Du	Domino silt loam	D	9.8	99.7%
RaA	Ramona sandy loam, 0 to 2 percent slopes, MLRA 19	B	0.0	0.3%
Totals for Area of Interest			**9.8**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

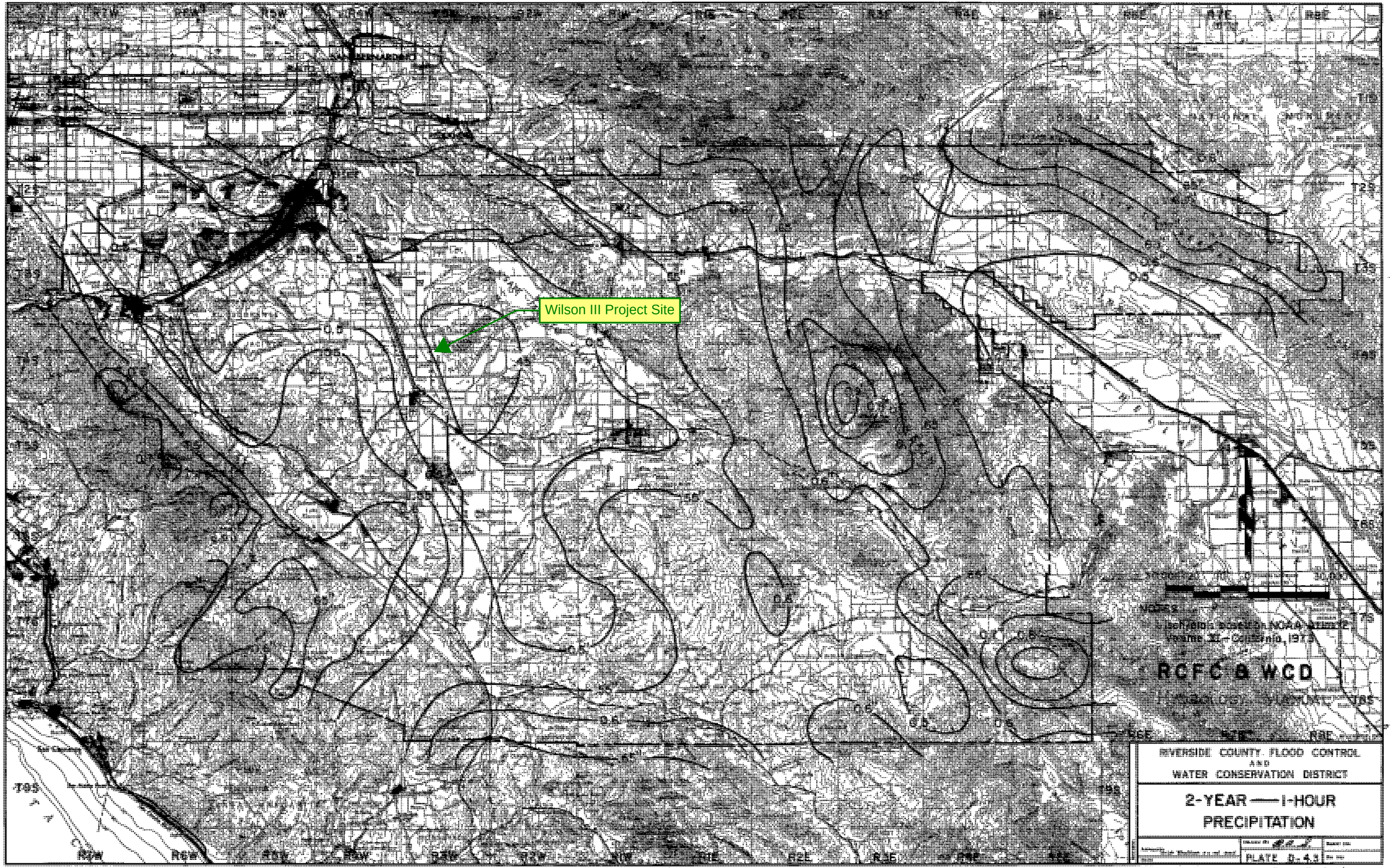
Rating Options

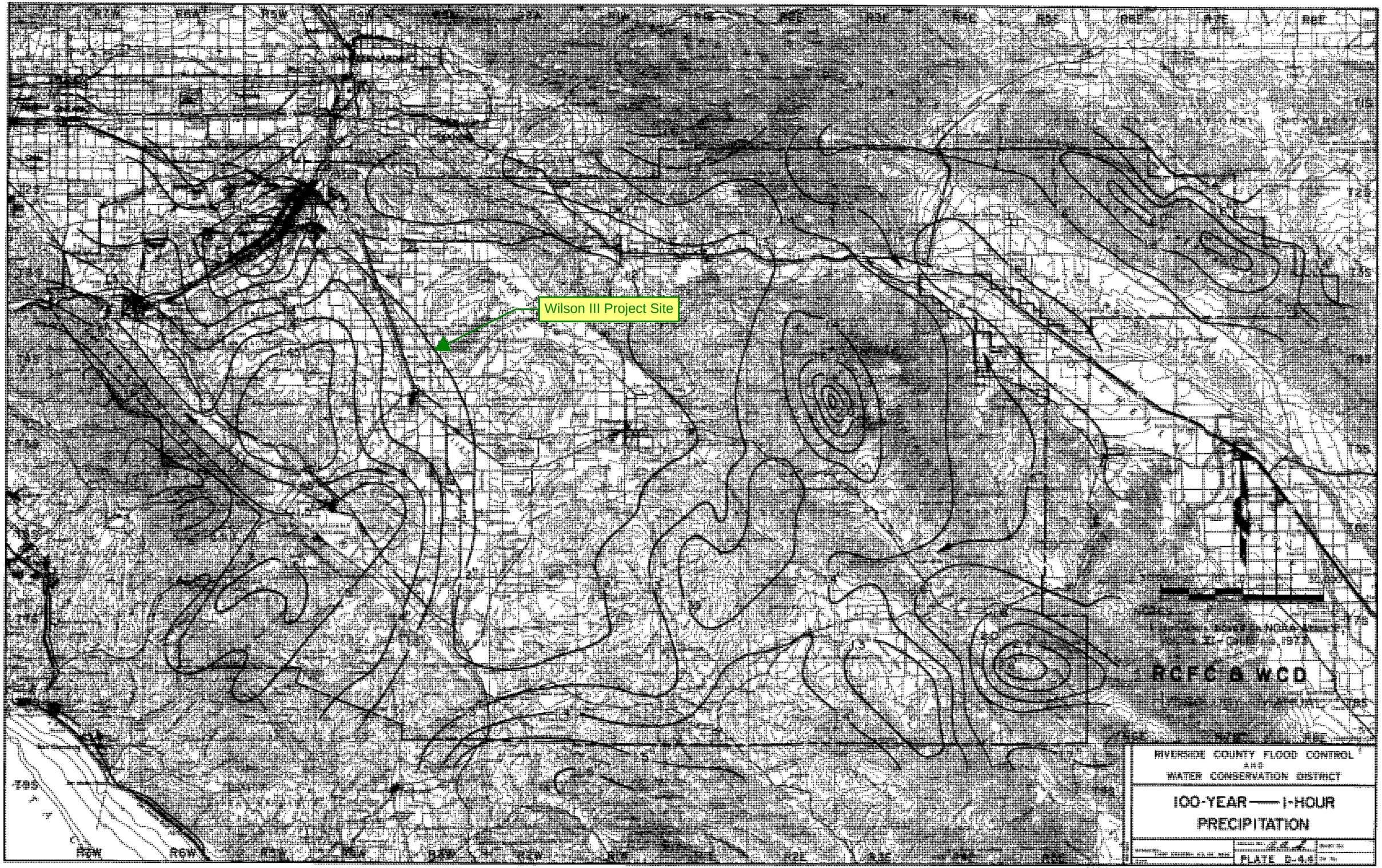
Aggregation Method: Dominant Condition

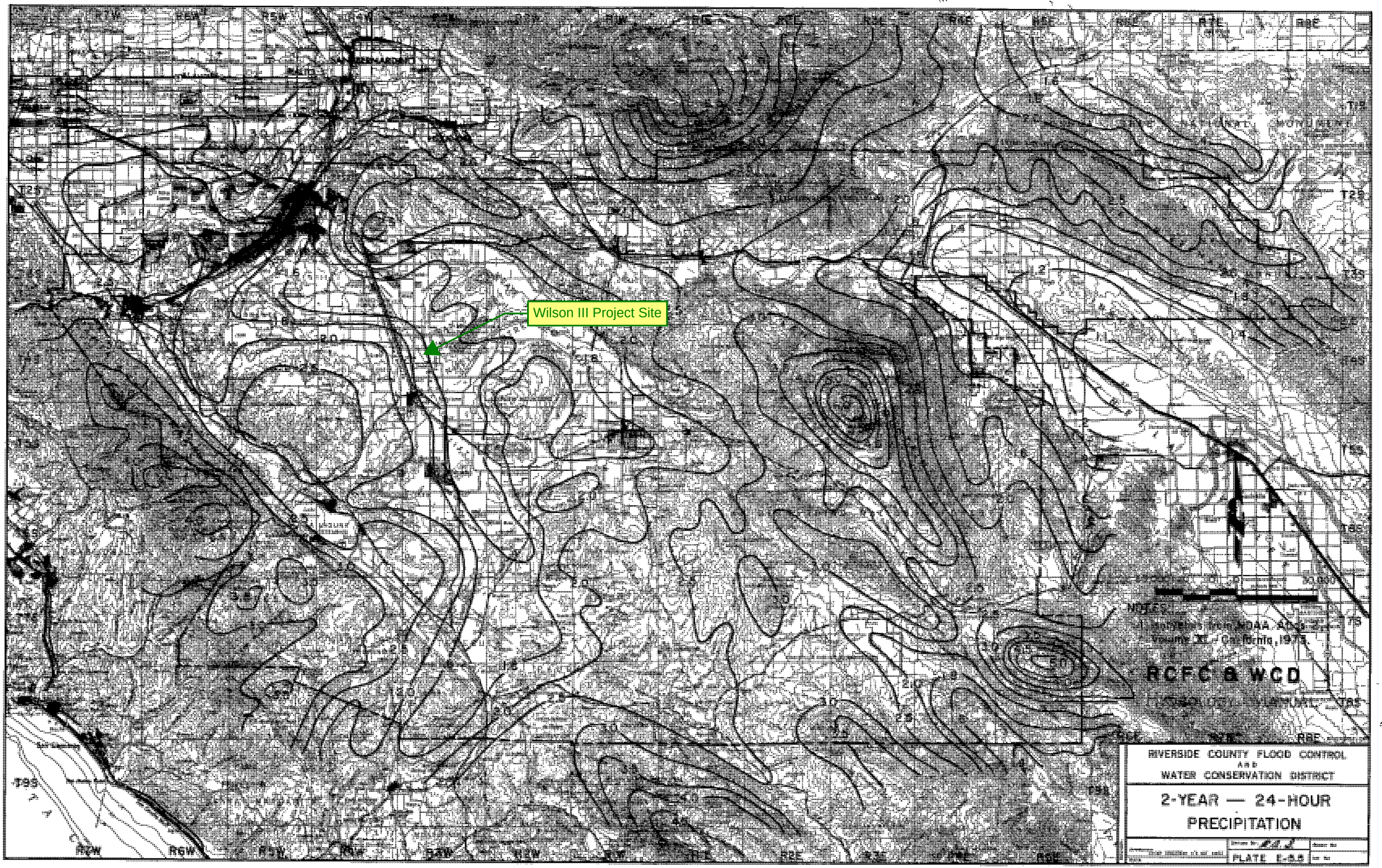
Component Percent Cutoff: None Specified

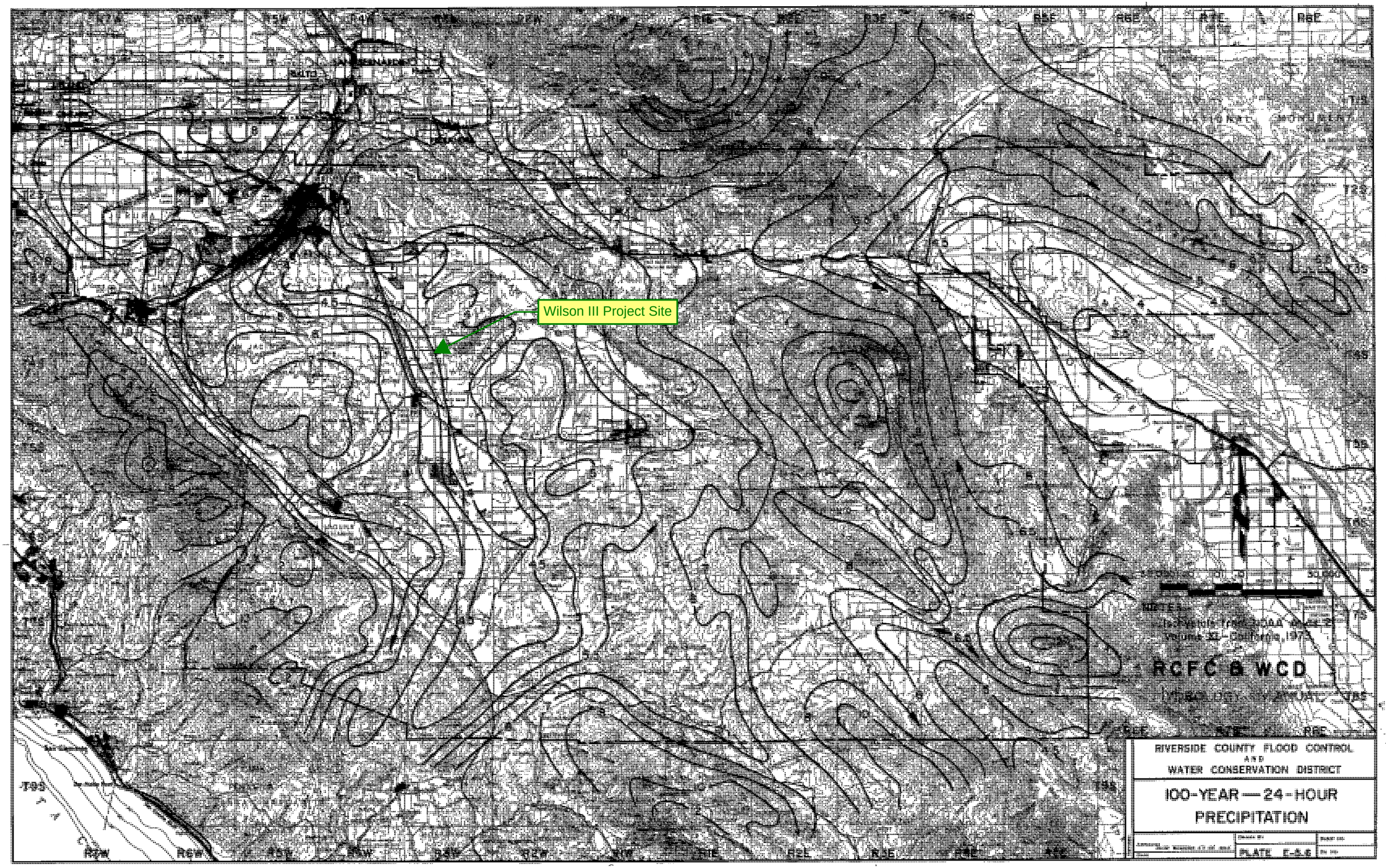
Tie-break Rule: Higher

ISOHYETAL MAPS


Wilson III Project Site
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
2-YEAR — 1-HOUR
PRECIPITATION
PLATE D-4.3
RCFC & WCD


Wilson III Project Site
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
100-YEAR — 1-HOUR
PRECIPITATION
PLATE D-4.4
RCFC & WCD


Wilson III Project Site
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
2-YEAR — 24-HOUR
PRECIPITATION
PLATE E-5.5


Wilson III Project Site
RCFC & WCD
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
100-YEAR — 24-HOUR
PRECIPITATION
PLATE E-6.6

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		

RCFC & WCD

HYDROLOGY MANUAL

STANDARD INTENSITY-DURATION CURVES DATA

PLATE D-4.1 (4 of 6)

10-YEAR ONSITE HYDROLOGY (RATIONAL METHOD)

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
Rational Hydrology Study Date: 09/14/22 File:prop10.out

21-0196 WILSON 3 PRELIM DEVELOPED
ONSITE RATIONAL METHOD HYDROLOGY
10 YEAR STORM EVENT
FN: PROP10.OUT RSB

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

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

Program License Serial Number 4010

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

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

Standard intensity-duration curves data (Plate D-4.1)
For the [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 = 932.000(Ft.)
Top (of initial area) elevation = 1441.600(Ft.)
Bottom (of initial area) elevation = 1435.700(Ft.)
Difference in elevation = 5.900(Ft.)
Slope = 0.00633 s(percent)= 0.63
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.723 min.
Rainfall intensity = 1.668(In/Hr) for a 10.0 year storm
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 = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 75.00
Pervious area fraction = 0.100; Impervious fraction = 0.900
Initial subarea runoff = 10.580(CFS)
Total initial stream area = 7.200(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 = 1433.700(Ft.)
Downstream point/station elevation = 1424.800(Ft.)
Pipe length = 600.00(Ft.) Manning's N = 0.013

```
No. of pipes = 1  Required pipe flow  =    10.580(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    10.580(CFS)
Normal flow depth in pipe =   12.48(In.)
Flow top width inside pipe =   16.60(In.)
Critical Depth =   14.99(In.)
Pipe flow velocity =      8.09(Ft/s)
Travel time through pipe =    1.24 min.
Time of concentration (TC) =    13.96 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      7.200(Ac.)
Runoff from this stream =     10.580(CFS)
Time of concentration =   13.96 min.
Rainfall intensity =     1.594(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   358.000(Ft.)
Top (of initial area) elevation =  1441.600(Ft.)
Bottom (of initial area) elevation =  1439.000(Ft.)
Difference in elevation =     2.600(Ft.)
Slope =    0.00726  s(percent)=       0.73
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.442 min.
Rainfall intensity =      2.039(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.884
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      3.965(CFS)
Total initial stream area =        2.200(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      102.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1433.000(Ft.)
Downstream point/station elevation =  1423.900(Ft.)
Pipe length  =   382.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.965(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     3.965(CFS)
Normal flow depth in pipe =    7.55(In.)
Flow top width inside pipe =   11.59(In.)
Critical Depth =   10.13(In.)
Pipe flow velocity =      7.62(Ft/s)
Travel time through pipe =    0.84 min.
Time of concentration (TC) =     9.28 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      102.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      2.200(Ac.)
Runoff from this stream =      3.965(CFS)
```

```
Time of concentration =    9.28 min.
Rainfall intensity =     1.947(In/Hr)
Summary of stream data:

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


1       10.580     13.96               1.594
2        3.965      9.28               1.947
Largest stream flow has longer time of concentration
Qp =     10.580 + sum of
          Qb          Ia/Ib
           3.965 *    0.819 =      3.246
Qp =     13.825

Total of 2 main streams to confluence:
Flow rates before confluence point:
      10.580       3.965
Area of streams before confluence:
        7.200        2.200


Results of confluence:
Total flow rate =     13.825(CFS)
Time of concentration =    13.959 min.
Effective stream area after confluence  =      9.400(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      105.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1423.900(Ft.)
Downstream point/station elevation =  1423.400(Ft.)
Pipe length  =   166.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    13.825(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    13.825(CFS)
Normal flow depth in pipe =   18.49(In.)
Flow top width inside pipe =   25.09(In.)
Critical Depth =   15.50(In.)
Pipe flow velocity =      4.76(Ft/s)
Travel time through pipe =    0.58 min.
Time of concentration (TC) =    14.54 min.
End of computations, total study area =            9.40 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged RI index number =  75.0
```

100-YEAR ONSITE HYDROLOGY (RATIONAL METHOD)

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2004 Version 7.0
Rational Hydrology Study Date: 09/14/22 File:prop100.out

21-0196 WILSON 3 PRELIM DEVELOPED
ONSITE RATIONAL METHOD HYDROLOGY
100 YEAR STORM EVENT
FN: PROP100.OUT RSB

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

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

Program License Serial Number 4010

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

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

Standard intensity-duration curves data (Plate D-4.1)
For the [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 = 932.000(Ft.)
Top (of initial area) elevation = 1441.600(Ft.)
Bottom (of initial area) elevation = 1435.700(Ft.)
Difference in elevation = 5.900(Ft.)
Slope = 0.00633 s(percent)= 0.63
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.723 min.
Rainfall intensity = 2.395(In/Hr) for a 100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.886
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2) = 75.00
Pervious area fraction = 0.100; Impervious fraction = 0.900
Initial subarea runoff = 15.275(CFS)
Total initial stream area = 7.200(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 = 1433.700(Ft.)
Downstream point/station elevation = 1424.800(Ft.)
Pipe length = 600.00(Ft.) Manning's N = 0.013

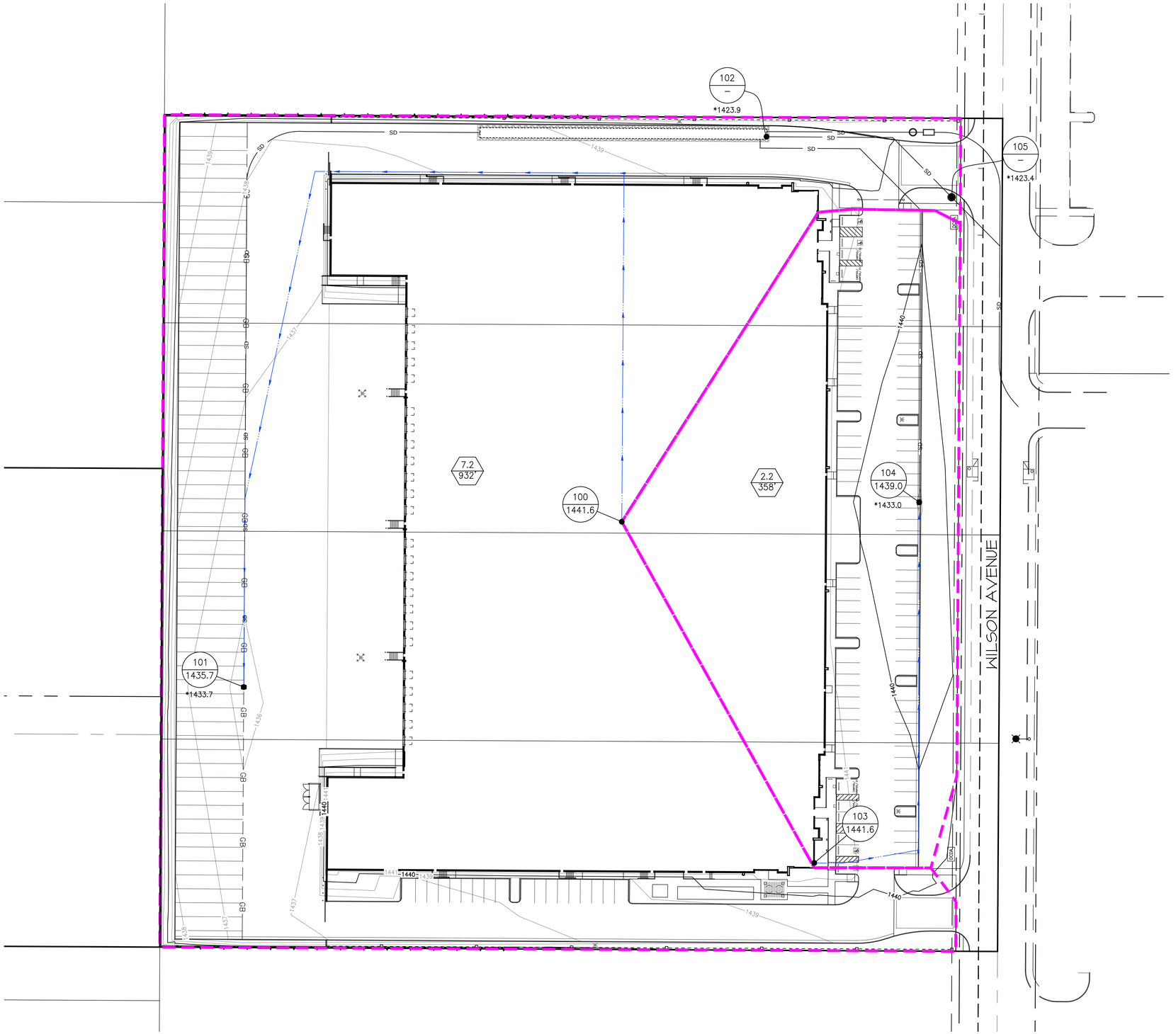
```
No. of pipes = 1  Required pipe flow  =    15.275(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    15.275(CFS)
Normal flow depth in pipe =   14.10(In.)
Flow top width inside pipe =   19.73(In.)
Critical Depth =   17.36(In.)
Pipe flow velocity =      8.90(Ft/s)
Travel time through pipe =    1.12 min.
Time of concentration (TC) =    13.85 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      7.200(Ac.)
Runoff from this stream =     15.275(CFS)
Time of concentration =   13.85 min.
Rainfall intensity =     2.297(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   358.000(Ft.)
Top (of initial area) elevation =  1441.600(Ft.)
Bottom (of initial area) elevation =  1439.000(Ft.)
Difference in elevation =     2.600(Ft.)
Slope =    0.00726  s(percent)=       0.73
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.442 min.
Rainfall intensity =      2.928(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.888
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  75.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      5.721(CFS)
Total initial stream area =        2.200(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      102.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1433.000(Ft.)
Downstream point/station elevation =  1423.900(Ft.)
Pipe length  =   382.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.721(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     5.721(CFS)
Normal flow depth in pipe =    8.14(In.)
Flow top width inside pipe =   14.94(In.)
Critical Depth =   11.61(In.)
Pipe flow velocity =      8.40(Ft/s)
Travel time through pipe =    0.76 min.
Time of concentration (TC) =     9.20 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      102.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      2.200(Ac.)
Runoff from this stream =      5.721(CFS)
```

```
Time of concentration =    9.20 min.
Rainfall intensity =     2.807(In/Hr)
Summary of stream data:

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


1       15.275     13.85               2.297
2        5.721      9.20               2.807
Largest stream flow has longer time of concentration
Qp =     15.275 + sum of
          Qb         Ia/Ib
           5.721 *    0.818 =      4.682
Qp =     19.957

Total of 2 main streams to confluence:
Flow rates before confluence point:
      15.275       5.721
Area of streams before confluence:
        7.200        2.200


Results of confluence:
Total flow rate =     19.957(CFS)
Time of concentration =    13.847 min.
Effective stream area after confluence  =      9.400(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      105.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1423.900(Ft.)
Downstream point/station elevation =  1423.400(Ft.)
Pipe length  =   166.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    19.957(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    19.957(CFS)
Normal flow depth in pipe =   21.98(In.)
Flow top width inside pipe =   26.55(In.)
Critical Depth =   18.21(In.)
Pipe flow velocity =      5.18(Ft/s)
Travel time through pipe =    0.53 min.
Time of concentration (TC) =    14.38 min.
End of computations, total study area =            9.40 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged RI index number =  75.0
```

RATIONAL METHOD HYDROLOGY MAPS

LEGEND

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



N
W WEBB E
S

1" = 40'
20 0 40 80 120

CITY OF PERRIS

RATIONAL METHOD HYDROLOGY MAP
DPR 22-00017 WILSON 3

SCALE:	1"=40'	ALBERT A. WEBB ASSOCIATES — ENGINEERING CONSULTANTS, 3788 McCRAY STREET, RIVERSIDE CA. 92506, PH. (951) 686-1070, FAX (951) 788-1256	W.O. 21-0196
DATE:	9/14/22		SHEET 1
DESIGNED:	RSB		OF 1 SHEETS
CHECKED:	SKK		DWG. NO.
PLN CK REF:			
F.B.			

H:\2021\21-0196\DRAINAGE\HYD\DWG FOLDER\21-0196-PHYD-RATIONAL.DWG 9/14/2022 10:46:26 AM

BDBECC48

APPENDIX B – REFERENCES

LINE A-B, LINE A-C FLOW REALLOCATION MEMO

Technical Memorandum

To: Stuart E. McKibbin, P.E. (City of Perris)

From: Tyler Webb, E.I.T. (Webb)
DJ Arellano, P.E. (Webb)

Date: February 12, 2020

Re: Perris Valley MDP: Line A-B and Line A-C Tributary Watershed Modification

This technical memorandum has been prepared to document to the City of Perris and Riverside County Flood Control that the modification of tributary watersheds for Perris Valley MDP facilities Line A-B and Line A-C will not significantly impact the existing design of Line A-B or the design flow rate for the Perris Valley Storm Drain (PVSD). Master Drainage Plans are prepared based on the best data available at the time, and they provide guidance on how drainage in a particular area can be handled. It is often the case that development patterns required the modification of MDPs. Perris Valley Line A-B was designed by Thienes Engineering in conjunction with the development of an industrial building that is located on the southwesterly side of the intersection of Rider Street and Redlands Avenue. The design was sized based on assumed land uses and drainage strategies for the tributary watershed. Subsequent to the construction of Line A-B, several additional industrial buildings have either been constructed, or are planned to be constructed. The drainage design for these sites, coupled with site specific drainage strategies, has resulted in reduced flow rates for Line A-B compared to the original design assumptions. This memo documents the changes from the original design assumptions and proposes to introduce additional tributary area into Line A-B to take advantage of the unused capacity in the facility. This is done in such a manner that the peak design flows of PVSD are not changed and the tributary area for Line A-C can be reduced. This change in the MDP will accommodate the forthcoming construction of RCTC's Mid-County Parkway as well.

Section 1-A: Line A-B Capacity

Line A-B is located in Rider Street and has been constructed to accommodate the peak flowrates determined by Thienes Engineering when they designed the facility. As-built plans, to the intersection of Rider Street and Perris Boulevard, are included as part of this memorandum as reference. The facility is designed to accommodate runoff as depicted in the line A-B rational method map and analysis completed by Thienes Engineering (see Appendix A).

The proposed modification of tributary watershed areas, and the corresponding peak flow rates were determined using an area-yield analysis. The yield is based on the Line A-B rational method map and analysis stated above. The average yield was rounded up to the nearest whole number of 2.0 cfs/acre to conservatively calculate the peak flow rates (see Appendix A for modified drainage areas).

Hydraulic models were developed, based on the as-built plans for Line A-B. One model used the modified flow rates (revised model) determined using the methodology outlined above. The revised model was compared to a model using the original tributary flowrates (original model) to determine if Line A-B has adequate capacity. The hydraulic models were only completed to just before Lateral AB-11; this is because the tributary flowrates upstream of Lateral AB-10 remained unchanged. It should be noted that the revised model shows an increase in total flowrate for Line A-B; the area-yield method does not utilize confluences between the laterals and Line A-B which can lower the total flowrate by considering the time of concentration. The initial HGL for this model was taken from the ultimate Perris Valley Storm Drain Channel plans and double checked with the initial HGL in the Line A-B as-built plans, which both match and use the NGVD29 datum. The hydraulic analyses of Line A-B, even the one initially conducted by Thienes Engineering, assume ultimate improvements of the Channel have been completed. Capacity will be limited until the ultimate Channel improvements have been made.

The following are brief descriptions of the revised laterals for reference: **Lateral AB-1** is unchanged, **Lateral AB-2** is the single discharge point for the Rider II Distribution Center (DPR No. 19-00004) and removes flow from laterals AB-3 and AB-6, **Lateral AB-4** is the single discharge point for the Core 5 Rider Industrial project (DPR No. 19-05267) and removes flow from laterals AB-5 and AB-7, **Lateral AB-7.5** is the single discharge point for the FIR Rider Industrial project (DPR No. 19-05161) and removes flow from Lateral AB-8, **Lateral AB-9** is the single discharge point for the constructed Rider III Distribution Center which will discharge via pump at a constant 8 cfs instead of the original gravity flow of 61 cfs, **Lateral AB-10** will not remove flow from any laterals and be extended further south to add an additional 33 cfs.

Table 1 shows the HGL's (NGVD29) and total tributary flowrates at significant points for the original and revised Line A-B hydraulic models. For reference, Line A-B is an 8'x7' RCB from STA. 9+97.60 (outlet) to STA. 17+77.51 (Lateral AB-4), an 8'x6' RCB from STA. 17+77.51 (Lateral AB-4) to STA. 30+93.93 (Lateral AB-9), and a 7'x5' RCB from STA. 30+93.93 (Lateral AB-9) to the end of the model.

Table 1 – Line A-B hydraulics

Station and Lateral	Lateral Q's Original/Revised (cfs)	Line A-B Original Model HGL/Q* (ft/cfs)	Line A-B Revised Model HGL/Q* (ft/cfs)	Line A-B Revised minus Original ΔHGL/ΔQ (ft/cfs)
9+97.60 (Outlet)	--	1433.0/483.0	1433.0/506.1	0.0/23.1
12+63.33 (Lat AB-1)	21.1/21.1	1433.9/461.9	1434.0/485.0	0.1/23.1
12+75.33 (Lat AB-2)	15.9/87.0	1434.2/446.0	1434.7/398.0	0.5/-48.0
17+71.51 (Lat AB-4)	12.8/25.0	1435.0/413.0	1434.9/373.0	-0.1/-40.0
25+00.00 (Lat AB-7.5)	0.0/35.0	**1437.5/367.0	1437.4/338.0	-0.1/-29.0
30+83.49 (Lat AB-9)	61.0/8.0	1439.1/295.0	1438.1/330.0	***-1.0/35.0
31+16.47 (Lat AB-10)	13.0/48.0	1439.4/282.0	1439.2/282.0	-0.2/0.0

*Q is the flowrate in Line A-B directly upstream of the lateral junction
**Approximate HGL for proposed Lat AB-7.5 in the original model
***HGL is lower with higher Q because of downstream hydraulic jump, flow at Lat AB-9 is super critical

Per the results above, the flow reallocation will not significantly impact the hydraulics in Line A-B. The greatest HGL increase of 0.5-feet was located at Lateral AB-2 (Rider II Distribution Center outlet); all other HGL changes either decreased or were insignificant. This means the Line A-B HGL will not rise above the Rider Street pavement surface as previously designed. It should be mentioned that the revised lateral hydraulics will need to be analyzed separately with the construction of the proposed projects, and they might need to be upsized given the onsite designs.

See Appendix B for the Line A-B hydraulic calculations and plan and profile.

See Appendix D for the Line A-B as-built plans for reference.

See Appendix E for Ultimate Perris Valley Storm Drain Channel plans for reference.

Section 1-B: Line A-C Capacity

Line A-C is a proposed storm drain line whose MDP alignment is disrupted by the Mid County Parkway. As stated above, the tributary areas for Line A-C and Line A-B will be reduced because of this. The modified area for Line A-C was roughly cut in half from the original MDP area; it is our understanding through preliminary correspondence with Mark Lancaster at Riverside County Transportation Commission (RCTC), that the Mid County Parkway will address its own generated runoff by constructing and draining to MDP facility Line H. The proposed tributary flowrate to Line A-C was calculated using area-yield method of 2.0 cfs/acre which yields a total flowrate of 72.6 cfs (see Appendix A for reallocated drainage areas).

A preliminary hydraulic model, in NAVD88, was developed to analyze the proposed alignment and profile of Line A-C. The initial HGL for this model was taken from the ultimate Perris Valley Storm Drain Channel plans, which use the NGVD29 datum and were converted to NAVD88 (NAVD88 = NGVD29 + 2.6'). The hydraulic analysis of Line A-C assumes ultimate improvements of the PVSD have been completed. Capacity will be limited, just like other Channel connections, until the ultimate PVSD improvements have been completed. Based upon our analysis a 42-inch storm drain downstream and 36-inch storm drain upstream will adequately convey the modified flow; the HGL will be below the street and ground surface, and the facilities should provide backbone drainage for the tributary area.

See Appendix C for Line A-C hydraulic calculations and plan and profile.

See Appendix E for Ultimate Perris Valley Storm Drain Channel plans for reference.

Section 2: Impacts to the Perris Valley Storm Drain Channel

Per the area-yield flow analysis, an additional 23.1 cfs will be added upstream to the Perris Valley Storm Drain Channel via Line A-B. This change is insignificant – roughly 0.17% of the peak design flow of the Perris Valley Storm Drain Channel. This is especially inconsequential since variations in the peak flow timing were not considered.

Section 3: Conclusions

Per the hydrologic and hydraulic analyses listed above, we conclude that the revised MDP tributary areas and updated flowrates will not significantly impact the hydraulics of Line A-B. The greatest increase in HGL is only 6-inches, which remains well under the Rider Street pavement surface. The change in HGL at other

stations was either negligible or decreased. Also, the proposed alignment and profile of Line A-C will work hydraulically with the updated flow rates.

The Perris Valley Storm Drain Channel will not be impacted hydraulically since the increase in tributary flow reallocated upstream is one-one thousandth of a percent of the 100-year design flow per the MDP. Finally, this update is consistent with the forthcoming impacts of RCTC's Mid County Parkway to the original MDP drainage areas. It is our understanding through preliminary correspondence with Mark Lancaster at RCTC, that Mid County Parkway will accommodate their own generated runoff by constructing and draining to MDP facility Line H.

Should you have any questions regarding this analysis, please give me a call at (951) 320-6039 or email me at tyler.webb@webbassociates.com

Appendix A: Original and Revised Hydrology

SEE PERRIS VALLEY HYDROLOGY FOR LATERAL H-1

PERRIS BLVD.

EXISTING N'LY 1/2 OF SINCLAIR

FLOW IN STREET

SINCLAIR STREET

FLOW IN STREET

EXISTING RIBBON GUTTER

FLOW

EXISTING VEGETATED SWALE

FLOW

SPILLOVER FROM CHANNEL (TO NORTH)

FLOW

FLOW

100

5.00 AC.

6.20 AC.

5.80 AC.

6.00 AC.

6.60 AC.

7.10 AC.

103 Q100=38.2 CFS Tc=18.6 MIN.

101 Q100=12.7 CFS Tc=12.5 MIN.

102 Q100=25.5 CFS Tc=15.8 MIN.

190

191 Q100=13.0 CFS Tc=8.3 MIN.

192 Q100=27.5 CFS Tc=10.4 MIN.

193 Q100=40.3 CFS Tc=11.8 MIN.

3.90 AC.

COMMERCE DRIVE

BUSINESS PARK DRIVE

LAKEVIEW DRIVE

104 Q100=62.0 CFS Tc=19.7 MIN.

13.7 AC.

13.1 AC.

194 Q100=72.0 CFS Tc=15.4 MIN.

120

170

171 Q100=5.0 CFS Q(in basin)=6.8 CFS Tc=10.8 MIN.

2.70 AC.

2.30 AC.

4.20 AC.

2.20 AC.

LAT. "A-20"

4 Q100=133.3 CFS Tc=18.5 MIN.

121 Q100=6.0 CFS Tc=11.4 MIN.

122 Q100=10.5 CFS Q(in basin)=9.4 CFS Tc=14.8 MIN.

123 Q100(conf)=164.5 CFS Tc=20.8 MIN.

LAT. "A-18"

130 140 1.1 CFS FLOWBY

LAT. "A-16"

Q100=225.6 CFS Tc=21.3 MIN.

124

141 Q100=8.3 CFS Q(in basin)=7.6 CFS Tc=14.9 MIN.

LAT. "A-14"

132 Q100=227.2 CFS Tc=22.6 MIN.

Q100=234.1 CFS Tc=22.7 MIN.

142

Q100=277.4 CFS Tc=22.8 MIN.

1.8 CFS FLOWBY

154

LAT. "A-11"

Q100=282.1 CFS Tc=23.3 MIN.

172

LAT. "A-9"

RIDER STREET

0.70 AC.

LAT. "A-17"

11.5 CFS FLOWBY

LAT. "A-15"

LAT. "A-13"

6.5 CFS FLOWBY

0.70 AC.

LAT. "A-12"

LAT. "A-10"

111 Q100=6.3 CFS Tc=11.8 MIN.

113 Q100=155.4 CFS Tc=20.8 MIN.

112 Q100=25.2 CFS Q(in basin)=13.7 CFS Tc=15.5 MIN.

LAT. "A-19"

1.00 AC.

131 Q100=2.0 CFS Q(in basin)=7.0 CFS Tc=14.8 MIN.

160 162 Q100=278.5 CFS Tc=23.3 MIN.

Q100=1.7 CFS Q(in basin)=8.2 CFS Tc=10.2 MIN.

161

181 Q100=15.4 CFS Tc=15.4 MIN.

9.70 AC.

153 Q100=49.4 CFS Tc=28.4 MIN.

2.90 AC.

80 110

9.6 AC.

7.90 AC.

4.40 AC.

3.60 AC.

151 Q100=29.6 CFS Tc=24.9 MIN.

152 Q100=35.1 CFS Tc=26.0 MIN.

REDLANDS AVENUE

2.90 AC.

90

2.10 AC.

91 Q100=4.0 CFS Tc=14.2 MIN.

1.80 AC.

180

200

Q100=5.9 CFS Tc=12.3 MIN.

81

4.20 AC.

92 Q100=22.5 CFS Tc=23.5 MIN.

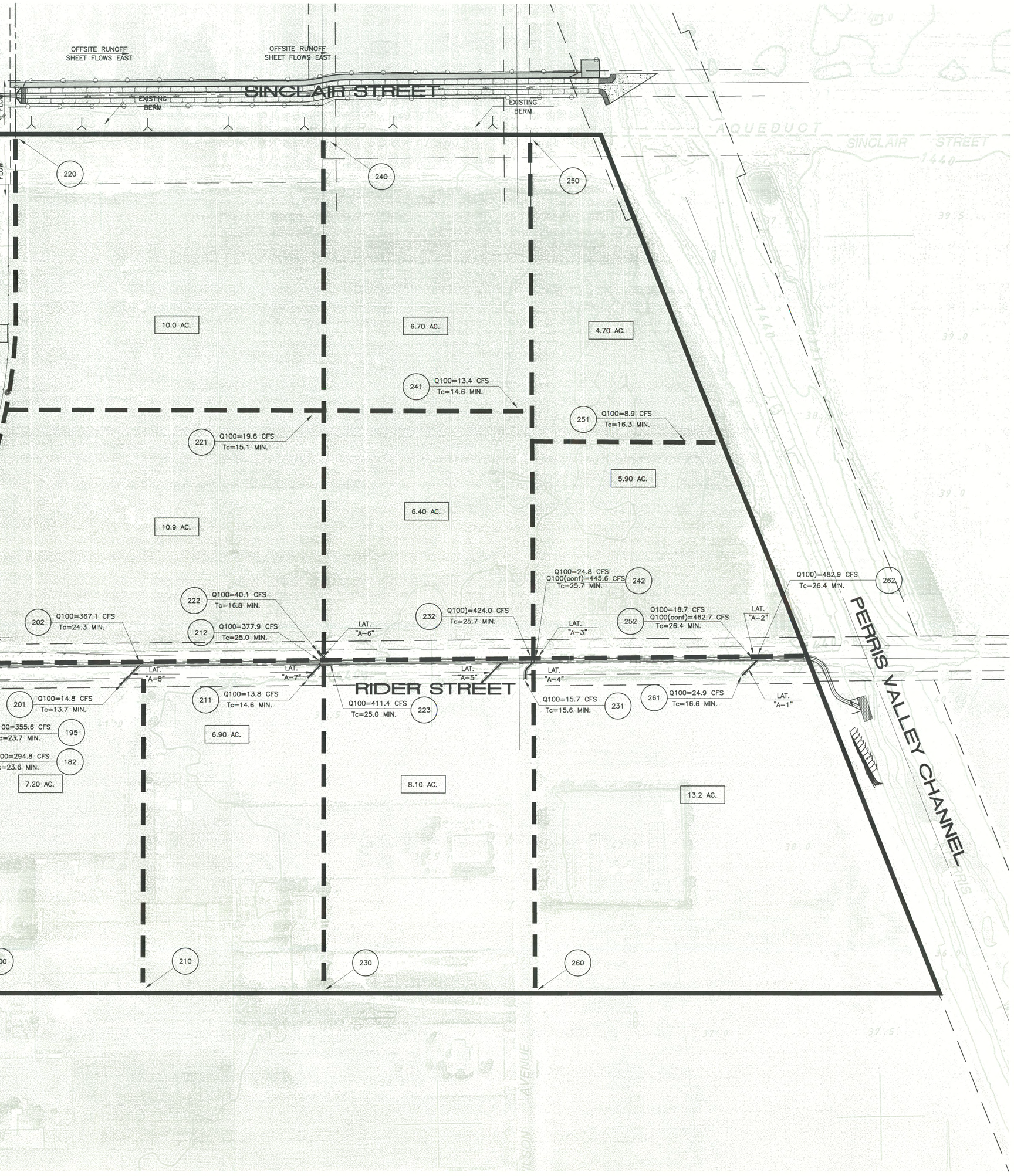
0.10 AC.

Q100=22.7 CFS Tc=24.4 MIN.

93

82 Q100=12.8 CFS Tc=19.5 MIN.

2.20 AC.



LEGEND

- PROJECT BOUNDARY
- SUBAREA BOUNDARY
- 1.00 AC. — SUBAREA AREA
- (100) — NODE NUMBER
- ANTICIPATED PONDING AREA

Last Update: 8/26/09
G:\2700-2799\2702\2702-hyd-mtd-box.dwg

CITY OF PERRIS
PUBLIC WORKS DEPARTMENT

HYDROLOGY MAP
PROPOSED CONDITIONS

PERRIS VALLEY MDP
LINE A-B (RIDER ST.)

Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

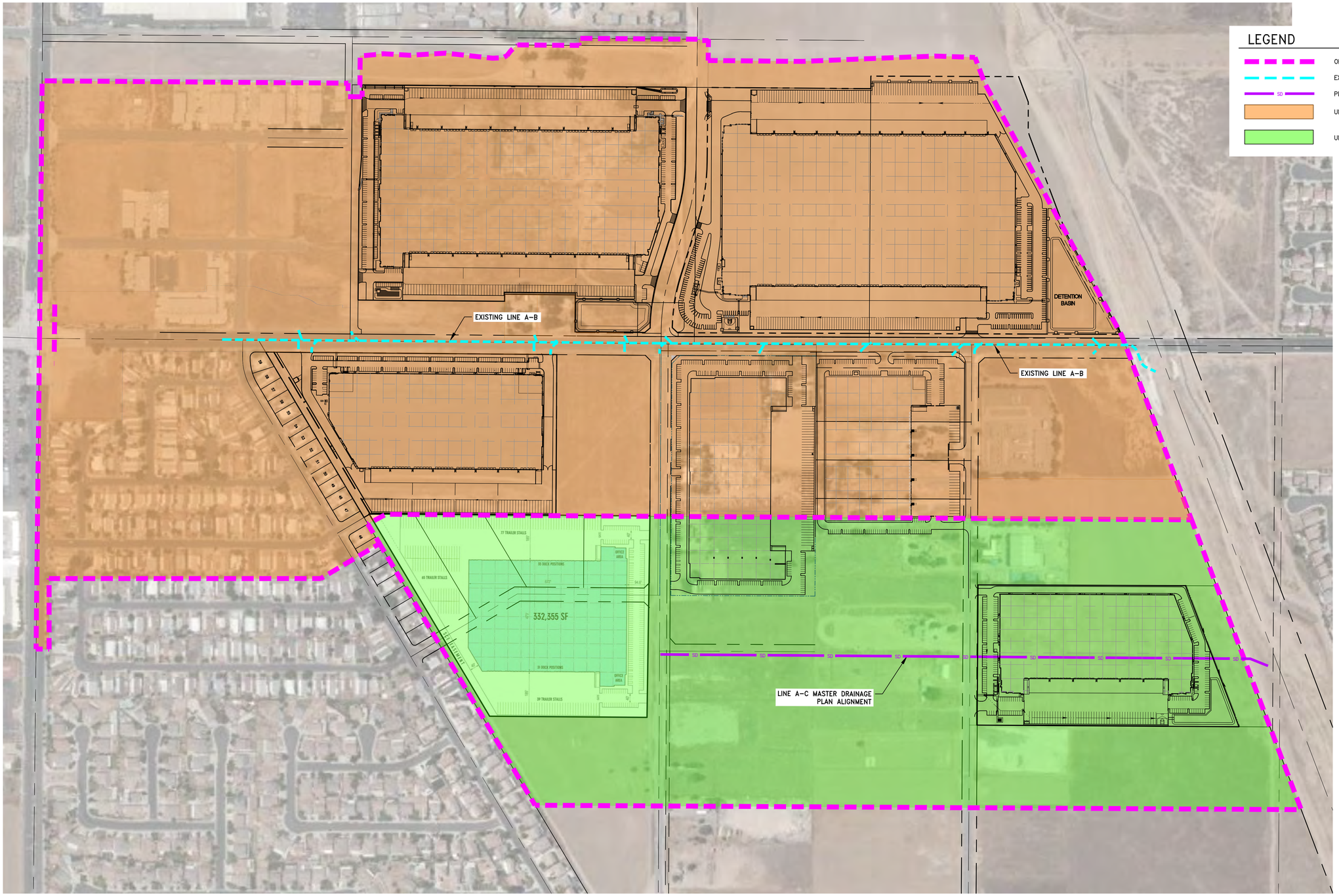
Designed by _____ Date _____
Checked by _____ Date _____
Designed by _____ Date _____
Checked by _____ Date _____

Aproved by _____ Date _____

Public Works Director _____ R.C.E. 28129

Sheet 2 of 2 Sheets

2702/ 2 OF 2 SHEET



N
W WEBB E
S

1" = 200'

100 0 200 400 600

CITY OF PERRIS

LINE A–B, LINE A–C
ORIGINAL TRIBUTARIES

SCALE: AS SHOWN	ALBERT A. WEBB ASSOCIATES	W.O. 18–0305
DATE: 1/30/20	ENGINEERING CONSULTANTS 3788 McCRAY STREET RIVERSIDE CA. 92506 PH. (951) 686–1070 FAX (951) 788–1256	SHEET 1
DESIGNED: TSW		OF 2 SHEETS
CHECKED: DJA		DWG. NO.
PLN CK REF:		
F.B.		

G:\2018\18-0305\DRAINAGE\PHYD\DWG FOLDER\LINEAB_LINEAC_TRIBUTARIES.DWG 1/29/2020 6:09:16 PM

XYZ DRW

LEGEND

- PROPOSED LINE A–B BOUNDARY
- PROPOSED LINE A–C BOUNDARY
- PROJECT BOUNDARIES
- EXISTING STORM DRAIN
- PLANNED STORM DRAIN (SD)
- UNDEVELOPED/DEVELOPED AREA CURRENTLY TRIBUTARY TO LINE A–B
- RIDER DISTRIBUTION CENTER III – MITIGATES FLOWS FROM 72 CFS TO 8 CFS
- AREA PROPOSED TRIBUTARY TO LINE A–C
- UNDEVELOPED AREA PROPOSED TRIBUTARY TO LATERAL AB–10
- UNDEVELOPED AREA PROPOSED TRIBUTARY TO LATERAL AB–7
- UNDEVELOPED AREA PROPOSED TRIBUTARY TO LATERAL AB–4
- RCTC MID COUNTY PARKWAY IMPACT AREA
- 10.0 — DRAINAGE AREA

RIDER DISTRIBUTION CENTER III PROJECT TRIBUTARY TO LATERAL AB–9
(CONSTRUCTED)
37.2
Q_{100}= 8.0 CFS

RIDER DISTRIBUTION CENTER II PROJECT TRIBUTARY TO LATERAL AB–2
DPR NO. 19–00004
42.2

EX. LAT AB–9
OLD=61.0 CFS
NEW=8.0 CFS

EX. LAT AB–6
OLD=32.7 CFS
NEW=0.0 CFS

EX. LAT AB–3
OLD=20.2 CFS
NEW=0.0 CFS

DETENTION BASIN

EX. LAT AB–2
OLD=15.9 CFS
NEW=87.0 CFS

EX. LINE A–B

EX. LAT AB–1
NO CHANGE

EX. LAT AB–4
OLD=12.8 CFS
NEW=25.0 CFS

EX. LINE A–B OUTLET
OLD=483.0 CFS
*NEW=506.1 CFS

RIDER DISTRIBUTION CENTER I PROJECT TRIBUTARY TO LATERAL AB–13
(CONSTRUCTED)
17.4

EX. LAT AB–10
OLD=13.0 CFS
NEW=48.0 CFS

7.8
PROP. LAT AB–10 EXTENSION

EX. LAT AB–8
OLD=11.0 CFS
NEW=0.0 CFS

PROP. LAT AB–7.5
OLD=0.0 CFS
NEW=34.6 CFS

FIRST RIDER INDUSTRIAL PROJECT TRIBUTARY TO LATERAL AB–7
DPR NO. 19–05161
17.3
Q_{100}=(17.3 ACRES * 2.0 CFS/ACRE) = 34.6 CFS

EX. LAT AB–7
OLD=11.3 CFS
NEW=0.0 CFS

EX. LAT AB–5
OLD=2.0 CFS
NEW=0.0 CFS

CORE 5 RIDER INDUSTRIAL PROJECT TRIBUTARY TO LATERAL AB–4
DPR NO. 19–05267
12.5
Q_{100}=(12.5 ACRES * 2.0 CFS/ACRE) = 25.0 CFS

9.6
Q_{100}=(9.6 ACRES * 2.0 CFS/ACRE) = 19.2 CFS

PROP. LINE A–C

LINE A–C TRIBUTARY TOTALS
72.6 CFS

IPT – REDLANDS PROJECT TRIBUTARY TO LAT AB–10
16.3
Q_{100}=(16.3 ACRES * 2.0 CFS/ACRE) = 32.6 CFS

PROPOSED AREA TRIBUTARY TO LINE A–C
11.1
Q_{100}=(11.1 ACRES * 2.0 CFS/ACRE) = 22.2 CFS

FIRST WILSON INDUSTRIAL PROJECT TRIBUTARY TO LINE A–C
DPR NO. 19–00007
15.6
Q_{100}=(15.6 ACRES * 2.0 CFS/ACRE) = 31.2 CFS

LOTS TRIBUTARY TO PVSD

MID COUNTY PARKWAY IMPACT AREA, PARKWAY WILL DRAIN TO AND CONSTRUCT LINE H

***NOTE**
NEW OUTLET FLOWRATE IS GREATER THAN OLD OUTLET FLOWRATE BECAUSE OF AREA–YIELD FLOW REALLOCATION METHOD. THIS WAS DONE TO BE MORE CONSERVATIVE IN THE REVISED HYDRAULIC MODEL EVALUATION. THE AREA–YIELD METHOD IS MORE CONSERVATIVE BECAUSE IT IGNORES STREAM CONFLUENCES WHICH CAN LOWER THE TRIBUTARY FLOWRATES.

N W E S WEBB

1" = 200'
100 0 200 400 600

CITY OF PERRIS

LINE A–B, LINE A–C PROPOSED TRIBUTARIES

SCALE: AS SHOWN	W.O. 18–0305
DATE: 1/30/20	SHEET 2
DESIGNED: TSW	OF 2 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

Appendix B: Line A-B Original and Revised Hydraulics, Plan and Profile

```
T1 LINE A-B HYDRAULIC MODEL - ORIGINAL TRIBUTARIES

T2 FN:LINEABORIGINAL.WSW
SO    997.6001426.790  1                          1433.000
R    1019.8401426.870  1      .013                                .000    .000 0
R    1055.1801426.990  1      .014                              45.000    .000 0
R    1099.8201427.160  1      .013                                .000    .000 0
R    1154.0801427.350  1      .014                             -69.080    .000 0
R    1263.3301427.730  1      .013                                .000    .000 1
JX   1263.3301427.740  1  3   .013   21.100         1428.810       -45.0        0.000
REM  EXISTING TRIBUTARY TO LATERAL AB-1
R    1275.3301427.760  1      .013                                .000    .000 0
JX   1275.3301427.770  1  2   .013   15.900         1428.840        45.0        0.000
REM  EXISTING TRIBUTARY TO LATERAL AB-2
R    1758.8201429.460  1      .013                                .000    .000 0
JX   1758.8201429.470  1  3   .013   20.200         1430.540        45.0        0.000
REM  EXISTING TRIBUTARY TO LATERAL AB-3
R    1771.5101429.500  1      .013                                .000    .000 1
JX   1777.5101430.000  7  2   .013   12.800         1430.000       -45.0        0.000
REM  EXISTING TRIBUTARY TO LATERAL AB-4
R    1841.8901430.190  7      .013                                .000    .000 0
JX   1841.8901430.200  7  8   .013    2.000         1431.690       -45.0        0.000
REM  EXISTING TRIBUTARY TO LATERAL AB-5
R    2236.2101431.380  7      .013                                .000    .000 1
JX   2236.2101431.390  7  6   .013   32.700         1431.970        45.0        0.000
REM  EXISTING TRIBUTARY TO LATERAL AB-6
R    2249.4101431.420  7      .013                                .000    .000 0
JX   2249.4101431.430  7  2   .013   11.300         1432.000       -45.0        0.000
REM  EXISTING TRIBUTARY TO LATERAL AB-7
R    2690.0001432.740  7      .013                                .000    .000 1
JX   2690.0001432.750  7  2   .013   11.000         1433.830       -60.0        0.000
REM  EXISTING TRIBUTARY TO LATERAL AB-8
R    3083.4901433.930  7      .013                                .000    .000 1
JX   3093.9301433.960  4  9   .013   61.000         1434.520        45.0        0.000
REM  EXISTING TRIBUTARY TO LATERAL AB-9
R    3116.4701434.030  4      .013                                .000    .000 0
JX   3116.4701434.040  4  2   .013   13.000         1434.620        45.0        0.000
REM  EXISTING TRIBUTARY TO LATERAL AB-10
R    3271.3701434.490  4      .013                                .000    .000 1
SH   3271.3701434.490  4                          1434.490
CD   2  4   1    .000   2.000     .000  .000  .000   .00
CD   3  4   1    .000   2.500     .000  .000  .000   .00
CD   6  4   1    .000   3.000     .000  .000  .000   .00
CD   8  4   1    .000   1.500     .000  .000  .000   .00
CD   9  4   1    .000   3.500     .000  .000  .000   .00
CD   1  6   0    .000             .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
CD   4  6   0    .000             .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
CD   5  6   0    .000             .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
CD   6  6   0    .000             .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
CD   7  6   0    .000             .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
PTS  1 8  1.000  7.330  1.000  1.670  1.670  1.000  8.330  1.000  9.000  1.670
PTS       9.000  7.330  8.330  8.000  1.670  8.000
PTS  4 8  1.000  5.330  1.000  1.670  1.670  1.000  7.330  1.000  8.000  1.670
PTS       8.000  5.330  7.330  6.000  1.670  6.000
PTS  5 8  1.000  4.830  1.000  1.670  1.670  1.000  7.330  1.000  8.000  1.670
PTS       8.000  4.830  7.330  5.500  1.670  5.500
PTS  6 8  1.000  4.420  1.000  1.580  1.580  1.000  6.420  1.000  7.000  1.580
PTS       7.000  4.420  6.420  5.000  1.580  5.000
PTS  7 8  1.000  6.330  1.000  1.670  1.670  1.000  8.330  1.000  9.000  1.670
PTS       9.000  6.330  8.330  7.000  1.670  7.000
Q           282.000   .0
```

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

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	2	4	1		2.000														
CD	3	4	1		2.500														
CD	6	4	1		3.000														
CD	8	4	1		1.500														
CD	9	4	1		3.500														
CD	1	6	0	.000															
CD	4	6	0	.000															
CD	5	6	0	.000															
CD	6	6	0	.000															
CD	7	6	0	.000															

WATER SURFACE PROFILE - CROSS SECTION POINT LISTING

CARD CODE	SECT NO	NO OF POINTS	X(1) , Y(1)	X(2) , Y(2)	X(3) , Y(3)	X(4) , Y(4)	X(5) , Y(5)	X(6) , Y(6)	X(7) , Y(7)	X(8) , Y(8)	X(9) , Y(9)	X(10) ,Y(10)	X(11) ,Y(11)	X(N) , Y(N)	X(N+1),Y(N+1)	X(35) ,Y(35)
PTS	1	8	1.000	7.330	1.000	1.670	1.670	1.000	8.330	1.000	9.000	1.670	9.000	7.330	8.000	
PTS			1.670	8.000												
PTS	4	8	1.000	5.330	1.000	1.670	1.670	1.000	7.330	1.000	8.000	1.670	8.000	5.330	7.330	6.000
PTS			1.670	6.000												
PTS	5	8	1.000	4.830	1.000	1.670	1.670	1.000	7.330	1.000	8.000	1.670	8.000	4.830	7.330	5.500
PTS			1.670	5.500												
PTS	6	8	1.000	4.420	1.000	1.580	1.580	1.000	6.420	1.000	7.000	1.580	7.000	4.420	6.420	5.000
PTS			1.580	5.000												
PTS	7	8	1.000	6.330	1.000	1.670	1.670	1.000	8.330	1.000	9.000	1.670	9.000	6.330	8.330	7.000
PTS			1.670	7.000												

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

LINE A-B HYDRAULIC MODEL - ORIGINAL TRIBUTARIES

HEADING LINE NO 2 IS -

FN:LINEABORIGINAL.WSW

HEADING LINE NO 3 IS -

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	997.600	1426.790	1	1433.000

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1019.840	1426.870	1	.013	.000	.000	.000	0

ELEMENT NO 3 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1055.180	1426.990	1	.014	44.996	45.000	.000	0

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1099.820	1427.160	1	.013	.000	.000	.000	0

ELEMENT NO 5 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1154.080	1427.350	1	.014	45.004	-69.080	.000	0

ELEMENT NO 6 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS

```
   ANGLE     ANG PT  MAN H
                              1263.330 1427.730    1               .013                          .000
   .000      .000     1
  ELEMENT NO   7 IS A JUNCTION          *         *     *     *                *                  *
           *
                      U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3         Q4     INVERT-3
INVERT-4  PHI 3  PHI 4
                              1263.330 1427.740    1     3     0   .013    21.100       .000  1428.810
    .000 -45.000     .000
                                                                                              RADIUS
   ANGLE
                                                                                               .000
   .000
  REMARKS:   EXISTING TRIBUTARY TO LATERAL AB-1

  ELEMENT NO   8 IS A REACH             *         *     *
                      U/S DATA   STATION    INVERT  SECT               N                      RADIUS
   ANGLE     ANG PT  MAN H
                              1275.330 1427.760    1               .013                          .000
   .000      .000     0
  ELEMENT NO   9 IS A JUNCTION          *         *     *     *                *                  *
           *
                      U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3         Q4     INVERT-3
INVERT-4  PHI 3  PHI 4
                              1275.330 1427.770    1     2     0   .013    15.900       .000  1428.840
    .000  45.000     .000
                                                                                              RADIUS
   ANGLE
                                                                                               .000
   .000
                                                        W S P G W
            PAGE NO   3
                              WATER SURFACE PROFILE - ELEMENT CARD LISTING
  REMARKS:   EXISTING TRIBUTARY TO LATERAL AB-2

  ELEMENT NO  10 IS A REACH             *         *     *
                      U/S DATA   STATION    INVERT  SECT               N                      RADIUS
   ANGLE     ANG PT  MAN H
                              1758.820 1429.460    1               .013                          .000
   .000      .000     0
  ELEMENT NO  11 IS A JUNCTION          *         *     *     *                *                  *
           *
                      U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3         Q4     INVERT-3
INVERT-4  PHI 3  PHI 4
                              1758.820 1429.470    1     3     0   .013    20.200       .000  1430.540
    .000  45.000     .000
                                                                                              RADIUS
   ANGLE
                                                                                               .000
   .000
  REMARKS:   EXISTING TRIBUTARY TO LATERAL AB-3

  ELEMENT NO  12 IS A REACH             *         *     *
                      U/S DATA   STATION    INVERT  SECT               N                      RADIUS
   ANGLE     ANG PT  MAN H
                              1771.510 1429.500    1               .013                          .000
   .000      .000     1
  ELEMENT NO  13 IS A JUNCTION          *         *     *     *                *                  *
           *
                      U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3         Q4     INVERT-3
INVERT-4  PHI 3  PHI 4
                              1777.510 1430.000    7     2     0   .013    12.800       .000  1430.000
    .000 -45.000     .000
                                                                                              RADIUS
   ANGLE
                                                                                               .000
   .000
  REMARKS:   EXISTING TRIBUTARY TO LATERAL AB-4

  ELEMENT NO  14 IS A REACH             *         *     *
                      U/S DATA   STATION    INVERT  SECT               N                      RADIUS
   ANGLE     ANG PT  MAN H
                              1841.890 1430.190    7               .013                          .000
   .000      .000     0
  ELEMENT NO  15 IS A JUNCTION          *         *     *     *                *                  *
           *
                      U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3         Q4     INVERT-3
INVERT-4  PHI 3  PHI 4
                              1841.890 1430.200    7     8     0   .013     2.000       .000  1431.690
```

.000 -45.000 .000

RADIUS

ANGLE

.000

.000

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

REMARKS: EXISTING TRIBUTARY TO LATERAL AB-5

ELEMENT NO 16 IS A REACH * * *

	U/S DATA	STATION	INVERT	SECT		N		RADIUS
ANGLE	ANG PT	MAN H						
		2236.210	1431.380	7		.013		.000
.000	.000	1						

ELEMENT NO 17 IS A JUNCTION * * * * * *

	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3
INVERT-4	PHI 3	PHI 4								
		2236.210	1431.390	7	6	0	.013	32.700	.000	1431.970
.000	45.000	.000								

RADIUS

ANGLE

.000

.000

REMARKS: EXISTING TRIBUTARY TO LATERAL AB-6

ELEMENT NO 18 IS A REACH * * *

	U/S DATA	STATION	INVERT	SECT		N		RADIUS
ANGLE	ANG PT	MAN H						
		2249.410	1431.420	7		.013		.000
.000	.000	0						

ELEMENT NO 19 IS A JUNCTION * * * * * *

	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3
INVERT-4	PHI 3	PHI 4								
		2249.410	1431.430	7	2	0	.013	11.300	.000	1432.000
.000	-45.000	.000								

RADIUS

ANGLE

.000

.000

REMARKS: EXISTING TRIBUTARY TO LATERAL AB-7

ELEMENT NO 20 IS A REACH * * *

	U/S DATA	STATION	INVERT	SECT		N		RADIUS
ANGLE	ANG PT	MAN H						
		2690.000	1432.740	7		.013		.000
.000	.000	1						

ELEMENT NO 21 IS A JUNCTION * * * * * *

	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3
INVERT-4	PHI 3	PHI 4								
		2690.000	1432.750	7	2	0	.013	11.000	.000	1433.830
.000	-60.000	.000								

RADIUS

ANGLE

.000

.000

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

REMARKS: EXISTING TRIBUTARY TO LATERAL AB-8

ELEMENT NO 22 IS A REACH * * *

	U/S DATA	STATION	INVERT	SECT		N		RADIUS
ANGLE	ANG PT	MAN H						
		3083.490	1433.930	7		.013		.000
.000	.000	1						

ELEMENT NO 23 IS A JUNCTION * * * * * *

	U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3
INVERT-4	PHI 3	PHI 4								
		3093.930	1433.960	4	9	0	.013	61.000	.000	1434.520
.000	45.000	.000								

RADIUS

ANGLE

.000

.000

```
 REMARKS:   EXISTING TRIBUTARY TO LATERAL AB-9

 ELEMENT NO  24 IS A REACH              *         *     *
                    U/S DATA   STATION    INVERT  SECT               N                           RADIUS
  ANGLE     ANG PT  MAN H
                               3116.470 1434.030    4               .013                           .000
  .000       .000     0
 ELEMENT NO  25 IS A JUNCTION           *         *     *     *                *                   *
          *
                    U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3         Q4      INVERT-3
INVERT-4   PHI 3   PHI 4
                               3116.470 1434.040    4     2     0   .013    13.000       .000  1434.620
    .000  45.000     .000
                                                                                               RADIUS
  ANGLE
                                                                                                .000
  .000
 REMARKS:   EXISTING TRIBUTARY TO LATERAL AB-10

 ELEMENT NO  26 IS A REACH              *         *     *
                    U/S DATA   STATION    INVERT  SECT               N                           RADIUS
  ANGLE     ANG PT  MAN H
                               3271.370 1434.490    4               .013                           .000
  .000       .000     1
 ELEMENT NO  27 IS A SYSTEM HEADWORKS                  *                     *
                    U/S DATA   STATION    INVERT  SECT                                    W S ELEV
                               3271.370 1434.490    4                                   1434.490
```

Program Package Serial Number: 1585

WATER SURFACE PROFILE LISTING Date: 1-27-2020 Time:10:17:40

LINE A-B HYDRAULIC MODEL - ORIGINAL TRIBUTARIES

FN:LINEABORIGINAL.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
997.600	1426.790	6.210	1433.000	483.00	9.81	1.49	1434.49	.00	4.89	8.00			1	0 .0
22.240	.0036					.0022	.05	6.21	.70	5.090	.013			IR-COV
1019.840	1426.870	6.148	1433.018	483.00	9.91	1.53	1434.54	.31	4.89	8.00			1	0 .0
35.340	.0034					.0026	.09	6.46	.71	5.512	.014			IR-COV
1055.180	1426.990	6.092	1433.082	483.00	10.00	1.55	1434.64	.00	4.89	8.00			1	0 .0
44.640	.0038					.0023	.10	6.09	.72	4.978	.013			IR-COV
1099.820	1427.160	5.951	1433.111	483.00	10.24	1.63	1434.74	.33	4.89	8.00			1	0 .0
54.260	.0035					.0028	.15	6.28	.74	5.447	.014			IR-COV
1154.080	1427.350	5.869	1433.219	483.00	10.39	1.67	1434.89	.00	4.89	8.00			1	0 .0
109.250	.0035					.0025	.27	5.87	.76	5.155	.013			IR-COV
1263.330	1427.730	5.631	1433.361	483.00	10.83	1.82	1435.18	.00	4.89	8.00			1	0 .0
JUNCT STR	.0000					.0020	.00	5.63	.81		.013			IR-COV

---------- WARNING - Junction Analysis - Irregular Channel----------

1263.330	1427.740	6.144	1433.884	461.90	9.48	1.40	1435.28	.00	4.75	8.00			1	0 .0
12.000	.0017					.0020	.02	6.14	.68	6.729	.013			IR-COV
1275.330	1427.760	6.152	1433.912	461.90	9.47	1.39	1435.31	.00	4.75	8.00			1	0 .0
JUNCT STR	.0000					.0017	.00	6.15	.68		.013			IR-COV

---------- WARNING - Junction Analysis - Irregular Channel----------

Program Package Serial Number: 1585

WATER SURFACE PROFILE LISTING Date: 1-27-2020 Time:10:17:40

LINE A-B HYDRAULIC MODEL - ORIGINAL TRIBUTARIES

FN:LINEABORIGINAL.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
1275.330	1427.770	6.385	1434.155	446.00	8.81	1.20	1435.36	.00	4.64	7.89		1		0 .0
104.973	.0035					.0017	.18	6.39	.61	4.839	.013			IR-COV
1380.303	1428.137	6.090	1434.227	446.00	9.24	1.33	1435.55	.00	4.64	8.00		1		0 .0
103.418	.0035					.0019	.20	6.09	.66	4.839	.013			IR-COV
1483.721	1428.498	5.809	1434.307	446.00	9.69	1.46	1435.77	.00	4.64	8.00		1		0 .0
104.189	.0035					.0022	.23	5.81	.71	4.839	.013			IR-COV
1587.911	1428.863	5.541	1434.404	446.00	10.16	1.60	1436.01	.00	4.64	8.00		1		0 .0
108.172	.0035					.0025	.27	5.54	.76	4.839	.013			IR-COV
1696.083	1429.241	5.286	1434.527	446.00	10.66	1.76	1436.29	.00	4.64	8.00		1		0 .0
62.737	.0035					.0028	.17	5.29	.82	4.839	.013			IR-COV
1758.820	1429.460	5.156	1434.616	446.00	10.93	1.86	1436.47	.00	4.64	8.00		1		0 .0
JUNCT STR	.0000					.0020	.00	5.16	.85		.013			IR-COV
		---------- WARNING - Junction Analysis - Irregular Channel----------												
1758.820	1429.470	5.745	1435.215	425.80	9.36	1.36	1436.57	.00	4.50	8.00		1		0 .0
12.690	.0024					.0020	.03	5.75	.69	5.428	.013			IR-COV

LINE A-B HYDRAULIC MODEL - ORIGINAL TRIBUTARIES
FN:LINEABORIGINAL.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
1771.510	1429.500	5.738	1435.238	425.80	9.37	1.36	1436.60	.00	4.50	8.00		1		0 .0
JUNCT STR	.0833					.0021	.01	5.74	.69		.013			IR-COV
WARNING - Junction Analysis - Irregular Channel														
1777.510	1430.000	4.966	1434.966	413.00	10.51	1.72	1436.68	.00	4.41	8.00		7		0 .0
64.380	.0030					.0028	.18	4.97	.84	4.869	.013			IR-COV
1841.890	1430.190	4.939	1435.129	413.00	10.57	1.74	1436.86	.00	4.41	8.00		7		0 .0
JUNCT STR	.0000					.0027	.00	4.94	.84		.013			IR-COV
WARNING - Junction Analysis - Irregular Channel														
1841.890	1430.200	5.010	1435.210	411.00	10.37	1.67	1436.88	.00	4.40	8.00		7		0 .0
372.403	.0030					.0027	1.01	5.01	.82	4.824	.013			IR-COV
2214.293	1431.314	4.824	1436.138	411.00	10.78	1.80	1437.94	.00	4.40	8.00		7		0 .0
21.917	.0030					.0030	.07	4.82	.87	4.824	.013			IR-COV
2236.210	1431.380	4.824	1436.204	411.00	10.78	1.80	1438.01	.00	4.40	8.00		7		0 .0
JUNCT STR	.0000					.0017	.00	4.82	.87		.013			IR-COV
WARNING - Junction Analysis - Irregular Channel														

LINE A-B HYDRAULIC MODEL - ORIGINAL TRIBUTARIES
FN:LINEABORIGINAL.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
2236.210	1431.390	5.733	1437.123	378.30	8.36	1.09	1438.21	.00	4.17	7.19			7	0 .0
13.200	.0023					.0017	.02	5.73	.59	5.029	.013			IR-COV
2249.410	1431.420	5.721	1437.141	378.30	8.38	1.09	1438.23	.00	4.17	7.22			7	0 .0
JUNCT STR	.0000					.0015	.00	5.72	.59		.013			IR-COV
		WARNING - Junction Analysis - Irregular Channel												
2249.410	1431.430	5.862	1437.292	367.00	7.95	.98	1438.27	.00	4.08	6.94			7	0 .0
145.077	.0030					.0015	.22	5.86	.54	4.436	.013			IR-COV
2394.487	1431.861	5.565	1437.426	367.00	8.34	1.08	1438.51	.00	4.08	7.53			7	0 .0
129.256	.0030					.0017	.22	5.57	.61	4.436	.013			IR-COV
2523.743	1432.246	5.302	1437.548	367.00	8.74	1.19	1438.73	.00	4.08	8.00			7	0 .0
127.201	.0030					.0019	.24	5.30	.67	4.436	.013			IR-COV
2650.944	1432.624	5.058	1437.682	367.00	9.17	1.31	1438.99	.00	4.08	8.00			7	0 .0
39.056	.0030					.0021	.08	5.06	.72	4.436	.013			IR-COV
2690.000	1432.740	4.989	1437.729	367.00	9.30	1.34	1439.07	.00	4.08	8.00			7	0 .0
JUNCT STR	.0000					.0018	.00	4.99	.74		.013			IR-COV
		WARNING - Junction Analysis - Irregular Channel												

LINE A-B HYDRAULIC MODEL - ORIGINAL TRIBUTARIES
FN:LINEABORIGINAL.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
2690.000	1432.750	5.237	1437.987	356.00	8.59	1.15	1439.13	.00	4.00	8.00			7	0 .0
119.113	.0030					.0018	.22	5.24	.67	4.321	.013			IR-COV
2809.113	1433.107	4.995	1438.102	356.00	9.01	1.26	1439.36	.00	4.00	8.00			7	0 .0
127.524	.0030					.0020	.26	5.00	.71	4.321	.013			IR-COV
2936.636	1433.490	4.765	1438.255	356.00	9.45	1.39	1439.64	.00	4.00	8.00			7	0 .0
146.853	.0030					.0023	.34	4.77	.77	4.321	.013			IR-COV
3083.490	1433.930	4.553	1438.483	356.00	9.90	1.52	1440.00	.00	4.00	8.00			7	0 .0
JUNCT STR	.0029					.0033	.03	4.55	.82		.013			IR-COV
		---------- WARNING - Junction Analysis - Irregular Channel----------												
3093.930	1433.960	5.172	1439.132	295.00	8.65	1.16	1440.29	.00	3.87	5.66			4	0 .0
22.540	.0031					.0033	.07	5.17	.62	4.244	.013			IR-COV
3116.470	1434.030	5.176	1439.206	295.00	8.65	1.16	1440.37	.00	3.87	5.66			4	0 .0
JUNCT STR	.0000					.0030	.00	5.18	.62		.013			IR-COV
		---------- WARNING - Junction Analysis - Irregular Channel----------												
3116.470	1434.040	5.331	1439.371	282.00	8.27	1.06	1440.43	.00	3.76	5.66			4	0 .0
154.900	.0029					.0030	.46	5.33	.59	4.208	.013			IR-COV

Program Package Serial Number: 1585

WATER SURFACE PROFILE LISTING Date: 1-27-2020 Time:10:17:40

LINE A-B HYDRAULIC MODEL - ORIGINAL TRIBUTARIES

FN:LINEABORIGINAL.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
3271.370	1434.490	5.398	1439.888	282.00	8.27	1.06	1440.95	.00	3.76	5.66		4	0	.0

```
T1 LINE A-B HYDRAULIC MODEL - REVISED TRIBUTARIES
T2 FN:LINEABREVISED.WSW

SO    997.6001426.790  1                          1433.000
R    1019.8401426.870  1      .013                                .000    .000 0
R    1055.1801426.990  1      .014                              45.000    .000 0
R    1099.8201427.160  1      .013                                .000    .000 0
R    1154.0801427.350  1      .014                             -69.080    .000 0
R    1263.3301427.730  1      .013                                .000    .000 1
JX   1263.3301427.740  1  3   .013   21.100         1428.810       -45.0       0.000
REM  TRIBUTARY TO LATERAL AB-1
R    1275.3301427.760  1      .013                                .000    .000 0
JX   1275.3301427.770  1  2   .013   87.000         1428.840        45.0       0.000
REM  REVISED TRIBUTARY TO LATERAL AB-2 FROM RIDER II DISTRIBUTION CENTER,
REM  NO DISCHARGE FROM LATERAL AB-3 AND AB-6
R    1771.5101429.500  1      .013                                .000    .000 1
JX   1777.5101430.000  7  2   .013   25.000         1430.000       -45.0       0.000
REM  REVISED TRIBUTARY TO LATERAL AB-4 FROM CORE 5 RIDER INDUSTRIAL,
REM  NO DISCHARGE FROM LATERAL AB-5 AND AB-7
R    2500.0001432.170  7      .013                                .000    .000 0
JX   2510.0001432.180  7  2   .013   35.000         1432.800       -45.0       0.000
REM  TRIBUTARY TO LATERAL AB-7.5 AND TOTAL RUNOFF FROM FIRST RIDER INDUSTRIAL PROJECT,
REM  NO DISCHARGE FROM LATERAL AB-8
R    3083.4901433.930  7      .013                                .000    .000 1
JX   3093.9301433.960  4  9   .013    8.000         1434.520        45.0       0.000
REM  THE FLOW RATE FOR LATERAL AB-9 HAS BEEN CHANGED TO ACCOUNT FOR PUMPED FLOW LEAVING RIDER 3 SITE
R    3116.4701434.030  4      .013                                .000    .000 0
JX   3116.4701434.040  4  2   .013   48.000         1434.620        45.0       0.000
REM  REVISED TRIBUTARY TO LATERAL AB-10 FROM AREA BETWEEN RIDER I DISTRIBUTION CENTER AND
REM  PROPOSED MID-COUNTY-PARKWAY IMPACT AREA
R    3271.3701434.490  4      .013                                .000    .000 1
SH   3271.3701434.490  4                          1434.490
CD   1  6   0    .000             .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
CD   4  6   0    .000             .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
CD   7  6   0    .000             .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
CD   8  4   1    .000   1.500     .000  .000  .000   .00
CD   2  4   1    .000   2.000     .000  .000  .000   .00
CD   3  4   1    .000   2.500     .000  .000  .000   .00
CD   6  4   1    .000   3.000     .000  .000  .000   .00
CD   9  4   2    .000   2.000     .000  .000  .000   .00
PTS  1 8  1.000  7.330  1.000  1.670  1.670  1.000  8.330  1.000  9.000  1.670
PTS       9.000  7.330  8.330  8.000  1.670  8.000
PTS  4 8  1.000  5.330  1.000  1.670  1.670  1.000  7.330  1.000  8.000  1.670
PTS       8.000  5.330  7.330  6.000  1.670  6.000
PTS  7 8  1.000  6.330  1.000  1.670  1.670  1.000  8.330  1.000  9.000  1.670
PTS       9.000  6.330  8.330  7.000  1.670  7.000
Q           282.000   .0
```

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

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	6	0	.000															
CD	4	6	0	.000															
CD	7	6	0	.000															
CD	8	4	1		1.500														
CD	2	4	1		2.000														
CD	3	4	1		2.500														
CD	6	4	1		3.000														
CD	9	4	2		2.000														

WATER SURFACE PROFILE - CROSS SECTION POINT LISTING

CARD CODE	SECT NO	NO OF POINTS	X(1) , Y(1)		X(2) , Y(2)		X(3) , Y(3)		X(4) , Y(4)		X(5) , Y(5)		X(6) , Y(6)		X(7) , Y(7)	
			X(8) , Y(8)		X(9) , Y(9)		X(10) ,Y(10)		X(11) ,Y(11)		X(N) , Y(N)		X(N+1),Y(N+1)		X(35) ,Y(35)	
PTS	1	8	1.000	7.330	1.000	1.670	1.670	1.000	8.330	1.000	9.000	1.670	9.000	7.330	8.330	8.000
PTS			1.670	8.000												
PTS	4	8	1.000	5.330	1.000	1.670	1.670	1.000	7.330	1.000	8.000	1.670	8.000	5.330	7.330	6.000
PTS			1.670	6.000												
PTS	7	8	1.000	6.330	1.000	1.670	1.670	1.000	8.330	1.000	9.000	1.670	9.000	6.330	8.330	7.000
PTS			1.670	7.000												

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

LINE A-B HYDRAULIC MODEL - REVISED TRIBUTARIES

HEADING LINE NO 2 IS -

FN:LINEABREVISED.WSW

HEADING LINE NO 3 IS -

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	997.600	1426.790	1	1433.000

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1019.840	1426.870	1	.013	.000	.000	.000	0

ELEMENT NO 3 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1055.180	1426.990	1	.014	44.996	45.000	.000	0

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1099.820	1427.160	1	.013	.000	.000	.000	0

ELEMENT NO 5 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1154.080	1427.350	1	.014	45.004	-69.080	.000	0

ELEMENT NO 6 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1263.330	1427.730	1	.013	.000	.000	.000	1

ELEMENT NO 7 IS A JUNCTION * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	1263.330	1427.740	1	3	0	.013	21.100	.000	1428.810			

.000 -45.000 .000

RADIUS

ANGLE

.000

.000

REMARKS: TRIBUTARY TO LATERAL AB-1

ELEMENT NO 8 IS A REACH * * *

U/S DATA STATION INVERT SECT N RADIUS

ANGLE ANG PT MAN H

1275.330 1427.760 1 .013 .000

.000 .000 0

ELEMENT NO 9 IS A JUNCTION * * * * * *

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

INVERT-4 PHI 3 PHI 4

1275.330 1427.770 1 2 0 .013 87.000 .000 1428.840

.000 45.000 .000

RADIUS

ANGLE

.000

.000

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

REMARKS: REVISED TRIBUTARY TO LATERAL AB-2 FROM RIDER II DISTRIBUTION CENTER,

REMARKS: NO DISCHARGE FROM LATERAL AB-3 AND AB-6

ELEMENT NO 10 IS A REACH * * *

U/S DATA STATION INVERT SECT N RADIUS

ANGLE ANG PT MAN H

1771.510 1429.500 1 .013 .000

.000 .000 1

ELEMENT NO 11 IS A JUNCTION * * * * * *

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

INVERT-4 PHI 3 PHI 4

1777.510 1430.000 7 2 0 .013 25.000 .000 1430.000

.000 -45.000 .000

RADIUS

ANGLE

.000

.000

REMARKS: REVISED TRIBUTARY TO LATERAL AB-4 FROM CORE 5 RIDER INDUSTRIAL,

REMARKS: NO DISCHARGE FROM LATERAL AB-5 AND AB-7

ELEMENT NO 12 IS A REACH * * *

U/S DATA STATION INVERT SECT N RADIUS

ANGLE ANG PT MAN H

2500.000 1432.170 7 .013 .000

.000 .000 0

ELEMENT NO 13 IS A JUNCTION * * * * * *

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

INVERT-4 PHI 3 PHI 4

2510.000 1432.180 7 2 0 .013 35.000 .000 1432.800

.000 -45.000 .000

RADIUS

ANGLE

.000

.000

REMARKS: TRIBUTARY TO LATERAL AB-7.5 AND TOTAL RUNOFF FROM FIRST RIDER INDUSTRIAL PROJECT,

REMARKS: NO DISCHARGE FROM LATERAL AB-8

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 14 IS A REACH * * *

U/S DATA STATION INVERT SECT N RADIUS

ANGLE ANG PT MAN H

3083.490 1433.930 7 .013 .000

.000 .000 1

ELEMENT NO 15 IS A JUNCTION * * * * * *

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

INVERT-4 PHI 3 PHI 4

```
                                3093.930 1433.960    4     9     0   .013     8.000      .000  1434.520
    .000  45.000     .000
                                                                                                RADIUS
   ANGLE
                                                                                                 .000
   .000
  REMARKS:   THE FLOW RATE FOR LATERAL AB-9 HAS BEEN CHANGED TO ACCOUNT FOR PUMPED FLOW LEAVING RIDER 3
SITE
  ELEMENT NO  16 IS A REACH             *         *     *
                    U/S DATA   STATION    INVERT  SECT               N                            RADIUS
   ANGLE     ANG PT  MAN H
                                3116.470 1434.030    4               .013                          .000
   .000      .000     0
  ELEMENT NO  17 IS A JUNCTION          *         *     *     *                 *                   *
          *
                    U/S DATA   STATION    INVERT  SECT LAT-1 LAT-2   N      Q3        Q4     INVERT-3
INVERT-4  PHI 3  PHI 4
                                3116.470 1434.040    4     2     0   .013    48.000      .000  1434.620
    .000  45.000     .000
                                                                                                RADIUS
   ANGLE
                                                                                                 .000
   .000
  REMARKS:   REVISED TRIBUTARY TO LATERAL AB-10 FROM AREA BETWEEN RIDER I DISTRIBUTION CENTER AND

  REMARKS:   PROPOSED MID-COUNTY-PARKWAY IMPACT AREA

  ELEMENT NO  18 IS A REACH             *         *     *
                    U/S DATA   STATION    INVERT  SECT               N                            RADIUS
   ANGLE     ANG PT  MAN H
                                3271.370 1434.490    4               .013                          .000
   .000      .000     1
  ELEMENT NO  19 IS A SYSTEM HEADWORKS                *                     *
                    U/S DATA   STATION    INVERT  SECT                                  W S ELEV
                                3271.370 1434.490    4                                1434.490
```

Program Package Serial Number: 1585

WATER SURFACE PROFILE LISTING Date: 1-28-2020 Time: 2:52:38

LINE A-B HYDRAULIC MODEL - REVISED TRIBUTARIES

FN:LINEABREVISED.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
997.600	1426.790	6.210	1433.000	506.10	10.28	1.64	1434.64	.00	5.05	8.00		1		0 .0
22.240	.0036					.0024	.05	6.21	.73	5.277	.013			IR-COV
1019.840	1426.870	6.153	1433.023	506.10	10.38	1.67	1434.69	.34	5.05	8.00		1		0 .0
35.340	.0034					.0028	.10	6.49	.74	5.717	.014			IR-COV
1055.180	1426.990	6.109	1433.099	506.10	10.45	1.70	1434.80	.00	5.05	8.00		1		0 .0
44.640	.0038					.0025	.11	6.11	.75	5.160	.013			IR-COV
1099.820	1427.160	5.976	1433.136	506.10	10.69	1.77	1434.91	.36	5.05	8.00		1		0 .0
54.260	.0035					.0030	.16	6.34	.77	5.650	.014			IR-COV
1154.080	1427.350	5.917	1433.267	506.10	10.79	1.81	1435.08	.00	5.05	8.00		1		0 .0
109.250	.0035					.0027	.29	5.92	.79	5.345	.013			IR-COV
1263.330	1427.730	5.708	1433.438	506.10	11.19	1.95	1435.38	.00	5.05	8.00		1		0 .0
JUNCT STR	.0000					.0021	.00	5.71	.83		.013			IR-COV

---------- WARNING - Junction Analysis - Irregular Channel----------

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
1263.330	1427.740	6.263	1434.003	485.00	9.77	1.48	1435.48	.00	4.91	8.00		1		0 .0
12.000	.0017					.0021	.03	6.26	.69	7.000	.013			IR-COV
1275.330	1427.760	6.274	1434.034	485.00	9.75	1.48	1435.51	.00	4.91	8.00		1		0 .0
JUNCT STR	.0000					.0012	.00	6.27	.69		.013			IR-COV

---------- WARNING - Junction Analysis - Irregular Channel----------

Program Package Serial Number: 1585

WATER SURFACE PROFILE LISTING Date: 1-28-2020 Time: 2:52:38

LINE A-B HYDRAULIC MODEL - REVISED TRIBUTARIES

FN:LINEABREVISED.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
1275.330	1427.770	6.913	1434.683	398.00	7.30	.83	1435.51	.00	4.31	6.83		1		0 .0
120.346	.0035					.0012	.14	6.91	.46	4.441	.013			IR-COV
1395.676	1428.190	6.560	1434.750	398.00	7.66	.91	1435.66	.00	4.31	7.54		1		0 .0
103.079	.0035					.0013	.13	6.56	.51	4.441	.013			IR-COV
1498.755	1428.549	6.251	1434.800	398.00	8.03	1.00	1435.80	.00	4.31	8.00		1		0 .0
96.802	.0035					.0014	.14	6.25	.57	4.441	.013			IR-COV
1595.557	1428.886	5.962	1434.849	398.00	8.42	1.10	1435.95	.00	4.31	8.00		1		0 .0
93.881	.0035					.0016	.15	5.96	.61	4.441	.013			IR-COV
1689.438	1429.214	5.687	1434.901	398.00	8.83	1.21	1436.11	.00	4.31	8.00		1		0 .0
82.072	.0035					.0018	.15	5.69	.66	4.441	.013			IR-COV
1771.510	1429.500	5.452	1434.953	398.00	9.22	1.32	1436.27	.00	4.31	8.00		1		0 .0
JUNCT STR	.0833					.0020	.01	5.45	.70		.013			IR-COV
		WARNING - Junction Analysis - Irregular Channel												
1777.510	1430.000	4.942	1434.942	373.00	9.54	1.41	1436.36	.00	4.13	8.00		7		0 .0
161.308	.0030					.0023	.37	4.94	.76	4.474	.013			IR-COV

Program Package Serial Number: 1585

WATER SURFACE PROFILE LISTING Date: 1-28-2020 Time: 2:52:38

LINE A-B HYDRAULIC MODEL - REVISED TRIBUTARIES

FN:LINEABREVISED.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
1938.818	1430.484	4.714	1435.199	373.00	10.01	1.56	1436.75	.00	4.13	8.00			7	0 .0
281.505	.0030					.0026	.74	4.71	.82	4.474	.013			IR-COV
2220.323	1431.330	4.498	1435.828	373.00	10.50	1.71	1437.54	.00	4.13	8.00			7	0 .0
227.137	.0030					.0030	.67	4.50	.88	4.474	.013			IR-COV
2447.460	1432.012	4.474	1436.486	373.00	10.55	1.73	1438.22	.00	4.13	8.00			7	0 .0
52.540	.0030					.0030	.16	4.47	.88	4.474	.013			IR-COV
2500.000	1432.170	4.474	1436.644	373.00	10.55	1.73	1438.37	.00	4.13	8.00			7	0 .0
JUNCT STR	.0010					.0017	.02	4.47	.88		.013			IR-COV

---------- WARNING - Junction Analysis - Irregular Channel----------

2510.000	1432.180	5.209	1437.389	338.00	8.20	1.04	1438.43	.00	3.87	8.00			7	0 .0
105.844	.0031					.0017	.18	5.21	.64	4.129	.013			IR-COV
2615.844	1432.503	4.968	1437.471	338.00	8.60	1.15	1438.62	.00	3.87	8.00			7	0 .0
107.234	.0031					.0019	.20	4.97	.68	4.129	.013			IR-COV
2723.078	1432.830	4.740	1437.570	338.00	9.02	1.26	1438.83	.00	3.87	8.00			7	0 .0
115.552	.0031					.0021	.24	4.74	.73	4.129	.013			IR-COV
2838.630	1433.183	4.522	1437.705	338.00	9.46	1.39	1439.09	.00	3.87	8.00			7	0 .0
139.380	.0031					.0024	.33	4.52	.79	4.129	.013			IR-COV

LINE A-B HYDRAULIC MODEL - REVISED TRIBUTARIES
FN:LINEABREVISED.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
2978.010	1433.608	4.314	1437.922	338.00	9.92	1.53	1439.45	.00	3.87	8.00			7	0 .0
15.157	.0031					.0027	.04	4.31	.85	4.129	.013			IR-COV
2993.167	1433.655	4.300	1437.954	338.00	9.96	1.54	1439.49	.00	3.87	8.00			7	0 .0
HYDRAULIC JUMP														
2993.167	1433.655	3.467	1437.122	338.00	12.39	2.38	1439.50	.00	3.87	8.00			7	0 .0
14.318	.0031					.0050	.07	3.47	1.18	4.129	.013			IR-COV
3007.486	1433.698	3.408	1437.106	338.00	12.60	2.47	1439.57	.00	3.87	8.00			7	0 .0
37.368	.0031					.0055	.20	3.41	1.21	4.129	.013			IR-COV
3044.853	1433.812	3.252	1437.064	338.00	13.22	2.71	1439.78	.00	3.87	8.00			7	0 .0
38.637	.0031					.0062	.24	3.25	1.30	4.129	.013			IR-COV
3083.490	1433.930	3.104	1437.034	338.00	13.86	2.98	1440.02	.00	3.87	8.00			7	0 .0
JUNCT STR	.0029					.0054	.06	3.10	1.40		.013			IR-COV
		---------- WARNING - Junction Analysis - Irregular Channel----------												
3093.930	1433.960	4.166	1438.126	330.00	11.49	2.05	1440.18	.00	4.17	7.00			4	0 .0
18.333	.0031					.0036	.07	4.17	1.00	4.698	.013			IR-COV
3112.263	1434.017	4.366	1438.383	330.00	10.96	1.86	1440.25	.00	4.17	6.93			4	0 .0
4.207	.0031					.0036	.02	4.37	.93	4.698	.013			IR-COV

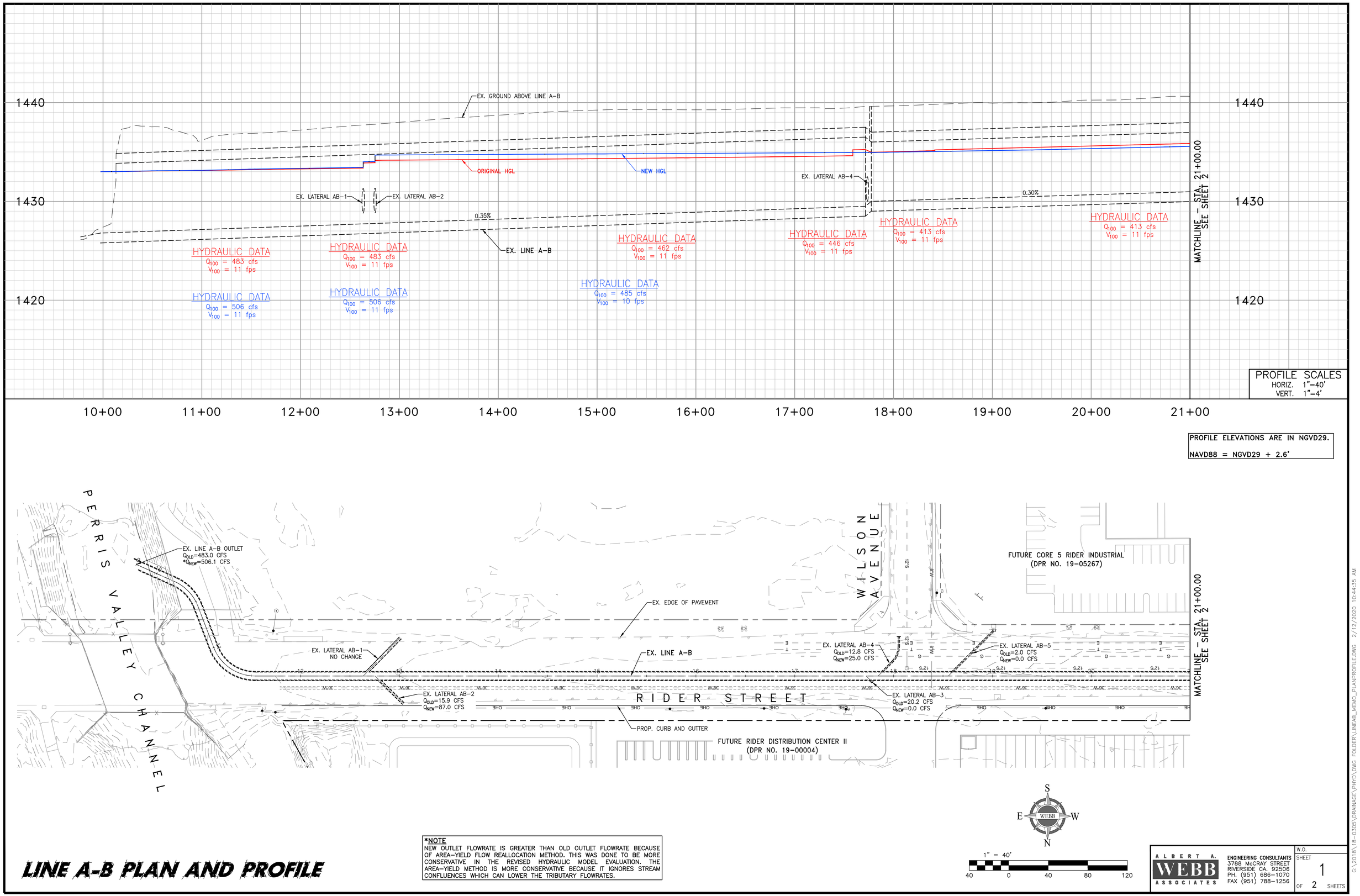
Program Package Serial Number: 1585

WATER SURFACE PROFILE LISTING Date: 1-28-2020 Time: 2:52:38

LINE A-B HYDRAULIC MODEL - REVISED TRIBUTARIES

FN:LINEABREVISED.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
3116.470	1434.030	4.380	1438.410	330.00	10.92	1.85	1440.26	.00	4.17	6.90		4	0	.0
JUNCT STR	.0000					.0030	.00	4.38	.92		.013			IR-COV
WARNING - Junction Analysis - Irregular Channel														
3116.470	1434.040	5.161	1439.201	282.00	8.27	1.06	1440.26	.00	3.76	5.66		4	0	.0
154.900	.0029					.0030	.46	5.16	.59	4.208	.013			IR-COV
3271.370	1434.490	5.228	1439.718	282.00	8.27	1.06	1440.78	.00	3.76	5.66		4	0	.0



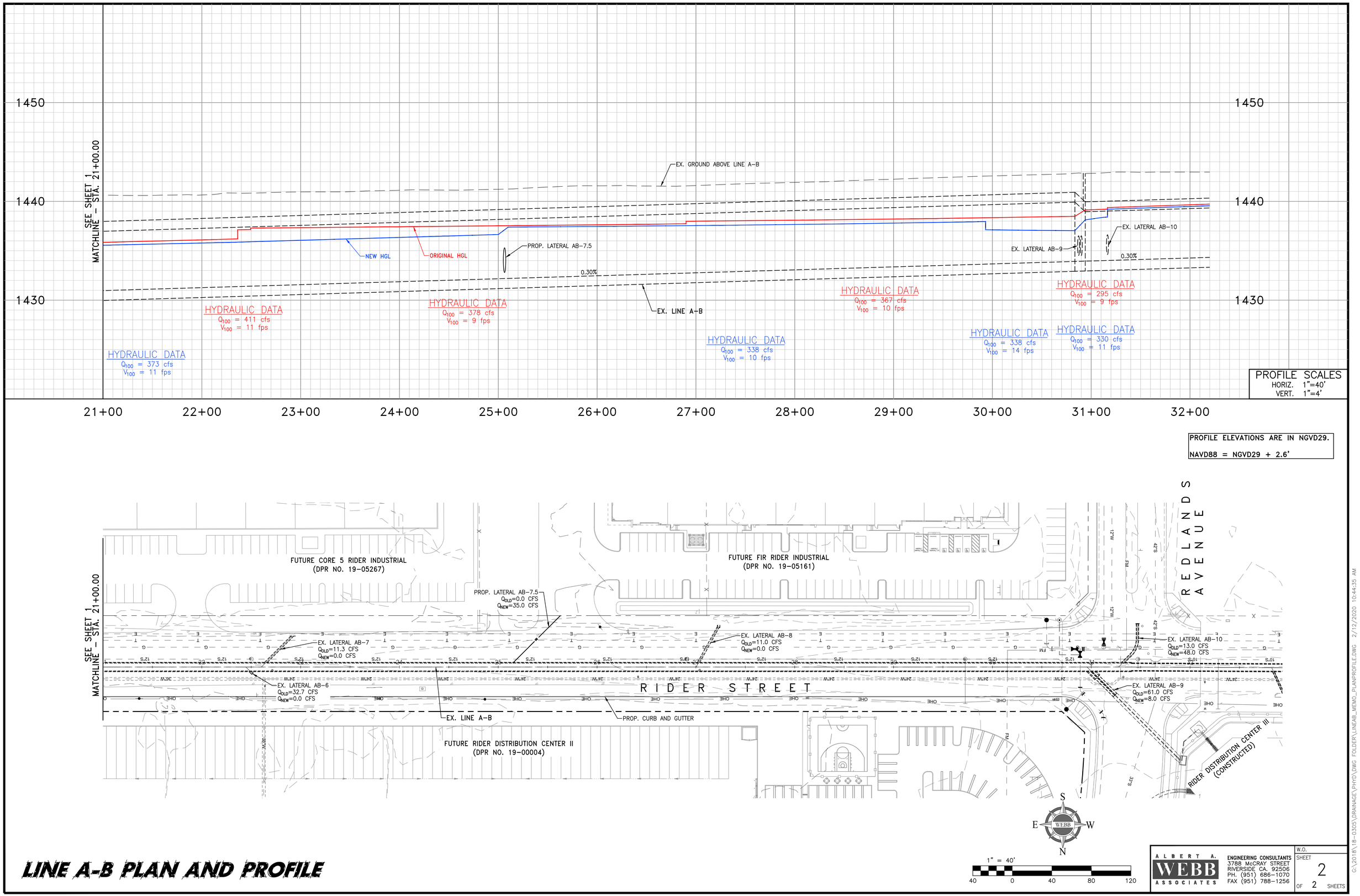
LINE A-B PLAN AND PROFILE

***NOTE**
NEW OUTLET FLOWRATE IS GREATER THAN OLD OUTLET FLOWRATE BECAUSE OF AREA–YIELD FLOW REALLOCATION METHOD. THIS WAS DONE TO BE MORE CONSERVATIVE IN THE REVISED HYDRAULIC MODEL EVALUATION. THE AREA–YIELD METHOD IS MORE CONSERVATIVE BECAUSE IT IGNORES STREAM CONFLUENCES WHICH CAN LOWER THE TRIBUTARY FLOWRATES.

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

W.O.
SHEET 1 OF 2 SHEETS

G:\2018\18-0305\DRAINAGE\PHYD\DWG FOLDER\LINEAB_MEMO_PLANPROFILE.DWG 2/12/2020 10:44:35 AM



LINE A-B PLAN AND PROFILE

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

W.O.

SHEET 2 OF 2 SHEETS

Appendix C: Line A-C Hydraulics, Plan and Profile

```
T1 LINE A-C HYDRAULIC MODEL
T2 FN:LINEAC.WSW
SO   1000.0001428.040  1                          1432.600
R    1133.4701428.440  1      .013                                .000    .000
JX   1133.4701428.440  1  1   .013   31.200          1428.440     -30.0        0.000
R    1143.4701428.480  1      .013                                .000    .000
R    1176.3001428.570  1      .013                                .000    .000 1
JX   1176.3001428.570  2  2   .013   19.200          1428.570      30.0        0.000
R    1186.3001429.070  2      .013                                .000    .000
R    2100.0001431.810  2      .013                                .000    .000 1
SH   2100.0001431.810  2                          1431.810
CD   1  4   1    .000   3.500     .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
Q            22.200   .0
```

FILE: LINEAC.WSW W S P G W - EDIT LISTING - Version 14.06
Date: 1-29-2020 Time: 3:25:43

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		3.500														
CD	2	4	1		3.000														
CD	3	4	1		2.500														

W S P G W

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -
LINE A-C HYDRAULIC MODEL
HEADING LINE NO 2 IS -
FN:LINEAC.WSW
HEADING LINE NO 3 IS -

W S P G W

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1000.000	1428.040	1	1432.600

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1133.470	1428.440	1	.013	.000	.000	.000	0

ELEMENT NO 3 IS A JUNCTION * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	1133.470	1428.440	1	1	0	.013	31.200	.000	1428.440	.000	-30.000	.000

RADIUS	ANGLE
.000	

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

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1143.470	1428.480	1	.013	.000	.000	.000	0

ELEMENT NO 5 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1176.300	1428.570	1	.013	.000	.000	.000	1

ELEMENT NO 6 IS A JUNCTION * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	1176.300	1428.570	2	2	0	.013	19.200	.000	1428.570	.000	30.000	.000

RADIUS	ANGLE
.000	

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

ELEMENT NO 7 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1186.300	1429.070	2	.013	.000	.000	.000	0

ELEMENT NO 8 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2100.000	1431.810	2	.013	.000	.000	.000	1

ELEMENT NO 9 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	2100.000	1431.810	2	1431.810

W S P G W