Appendix G

Redlands West Industrial Project DPR 20-00020
Preliminary Drainage Study

Albert A. Webb Associates

May 2021

FOR REVIEW ONLY

Redlands West Industrial Project
DPR 20-00020
Perris, County of Riverside, CA

Preliminary Drainage Study

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Original Date Prepared: May 2021
Revision Date(s):

[Stamp]

Engineer
Title

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SECTION 1 - SUMMARY

PURPOSE

The purpose of this report is to document the hydrologic and hydraulic analyses performed in support of the Redlands West Industrial Project located in the city of Perris, County of Riverside, California. The project is bounded by Redlands Ave to its east, vacant land to its northeast, an existing industrial building to its northwest, an existing residential tract (TR 04417) to its west, and vacant land to its south. The project proposes to build an industrial development on approximately 20.1 acres of currently vacant land. 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 storage 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 an industrial development on approximately 20.1 acres of vacant land. Existing elevations across the site vary from 1452 to 1444 (NAVD88 datum). The existing site is generally very flat and slopes gently from west to east. Larger storm events spill over Redlands Ave and continue to flow eastwards towards the Perris Valley Storm Drain (PVSD) Channel (located approximately 2500 feet east of the project site).

The project is located within the Perris Valley Commercial Center Specific Plan and is also within the Perris Valley Master Drainage Plan watershed area. Based on a technical memorandum titled "Perris Valley MDP: Line A-B and Line A-C Tributary Watershed Modification" dated February 12, 2020 (a copy can be found in Appendix D), tributary areas within the watershed areas have been reallocated. The existing MDP Line A-B (an RCB varying in size from 7'x5' to 8'x6') runs along E. Rider Street located north of the project site. MDP Line A-B conveys flows east towards the PVSD Channel.

Lateral A-B-10 is an existing stub-out located at the intersection of Redlands Ave and E. Rider St. Based on existing as-built plans for MDP Line A-B (Appendix D), this stub-out was originally designed to convey only 15.4 cfs of runoff towards MDP Line A-B. However, based on the revised tributary areas per the technical memorandum, MDP Line A-B can now receive up to 48.0 cfs of developed flows from Lat A-B-10.

PROPOSED CONDITIONS

In the proposed condition, onsite runoff will be collected via a network of catch basins and storm drain inlets provided at localized low points throughout the site. The Redlands West project consists of a proposed industrial building along with all associated utilities, drive aisles, parking stalls, walkways, and landscaped areas. Unlike the existing condition, onsite runoff will be collected and directed north along Redlands Ave via the proposed extension of Lat A-B-10. All captured flows onsite and on Redlands Ave will be treated for water quality requirements via proposed MWS treatment devices.

Based on the technical memorandum, Lat A-B-10 is able to convey 48.0 cfs of runoff towards MDP Line A-B from a tributary area of 24.1 acres. Approximately 7.8 acres of this 24.1 acres of tributary area (about 32%) comes from currently vacant land located directly north of the Redlands West project. The remaining 16.3 acres (about 68%) comes from a portion of the Redlands West project. In the ultimate condition, the Redlands East and Redlands West industrial projects will both convey developed flows towards MDP Line A-B via Lat A-B-10.

The 7.8-acre offsite area (32% of the total 24.1 acres) tributary to Lat A-B-10 corresponds to approximately 15.5 cfs of flow (32% of the total 48 cfs that can be conveyed towards the lateral). This means MDP Line A-B has a remaining capacity of about 32.5 cfs for the combined flows of the Redlands East and Redlands West projects as both projects will convey their developed flows towards MDP Line A-B via the extension of Lat A-B-10.

The combined area of the Redlands East and Redlands West projects total approximately 32.7 acres. As this combined area is larger than the remaining 16.3 acres that Lat A-B-10 can accept flows from, all onsite flows must be directed towards proposed underground storage chambers in order to be mitigated down to an acceptable flow rate that MDP Line A-B can receive. The Redlands East and Redlands West projects will each have separate underground storage chamber systems and separate preliminary pumps to mitigate flows for each project. The combined mitigated flow rate that Lat A-B-10 can accept from the Redlands East and Redlands West projects and ultimately convey to MDP Line A-B is 32.5 cfs.

The Redlands East project provides approximately 12.6 acres tributary to MDP Line A-B. This accounts for approximately 12.5 cfs of the remaining capacity for Lat A-B-10 to convey north. The Redlands West project provides approximately 20.1 acres tributary to MDP Line A-B. This accounts for approximately 20.0 cfs of the remaining capacity for Lat A-B-10 to convey north.

Due grading constraints, a preliminary pump with the capacity of 5.0 cfs has been proposed for the Redlands West industrial project. The proposed underground chambers have been preliminarily sized to detain large storm events. A preliminary outlet structure for the underground chambers in combination with a preliminarily sized pump have been proposed in order to limit the flow rate discharging off the site. As previously described, the Redlands West project has been allotted up to 20.0 cfs of flows to discharge into the proposed Lat A-B-10 extension. A pump of capacity of 5.0 cfs has been analyzed in the routing calculations within this report, however a larger pump can be used to discharge the onsite flows (which would result in significantly smaller underground chamber sizing) in final engineering.

METHODOLOGY

HYDROLOGY

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

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

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

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

The Unit Hydrograph Method was used to determine the peak flow rates and volumes associated with the 100-year storm events for the site. Calculations were performed for the developed condition to be

used in the analysis of the proposed underground chambers. See Section 4 for additional information and results regarding the hydrologic analyses performed for this project.

HYDRAULICS

Water quality calculations were performed using spreadsheets that were created by RCFC&WCD. Final calculations and additional details can be found in the Preliminary-WQMP.

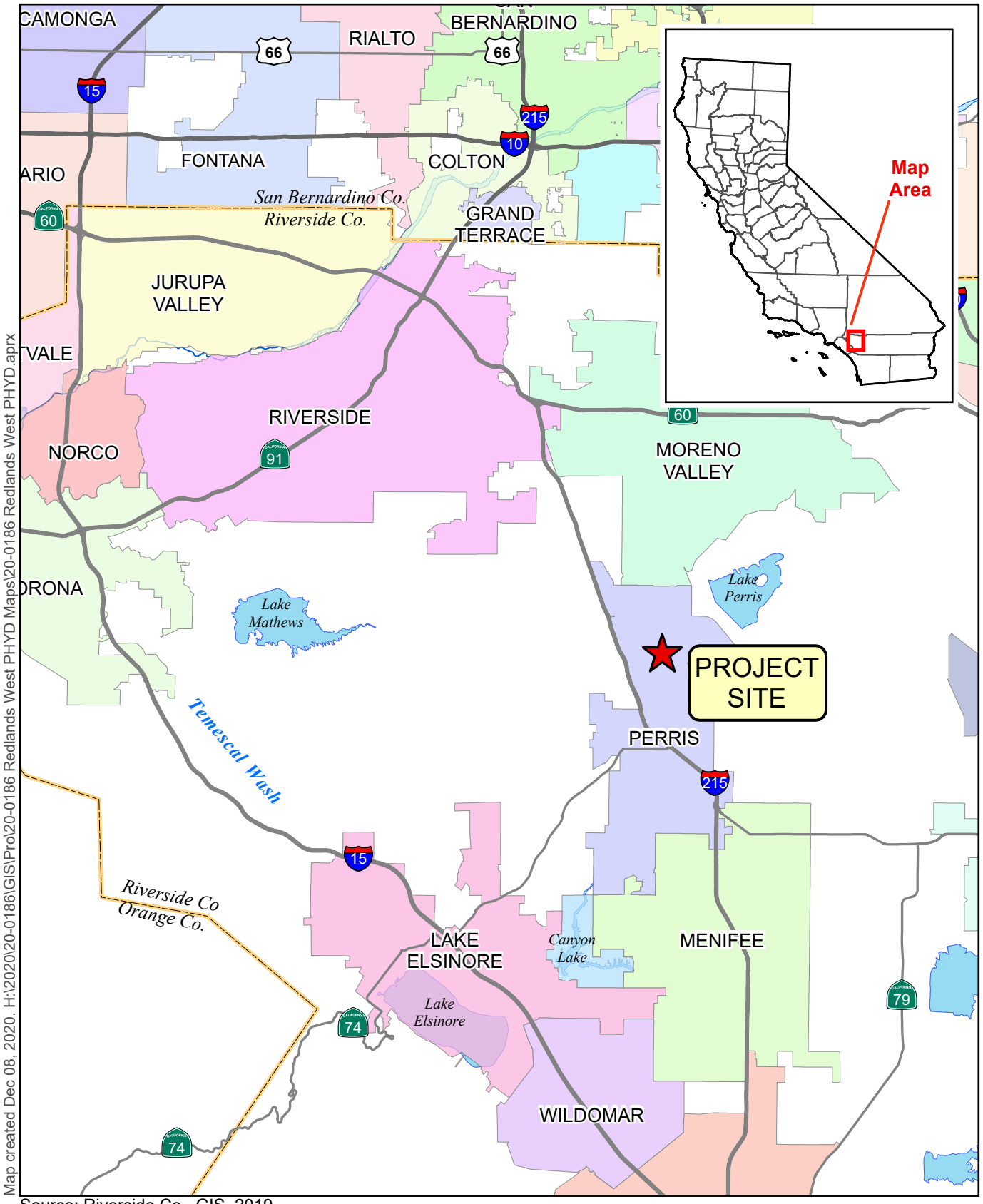
Routing calculations were performed using the CivilD computer program. The CivilD program utilizes the Modified-Puls methodology to routes unit hydrographs through a basin using the stage-storage and stage-discharge curves determined from the proposed underground chamber design. See Section 4 for additional discussion and results.

FIG. 1 VICINITY MAP

FIG. 2 USGS TOPOGRAPHY MAP

FIG. 3 AERIAL PHOTOGRAPH

FIG. 4 RECEIVING WATERBODIES



Map created Dec 08, 2020. H:\2020\20-0186\GIS\Pro\20-0186 Redlands West PHYD Maps\20-0186 Redlands West PHYD.aprx

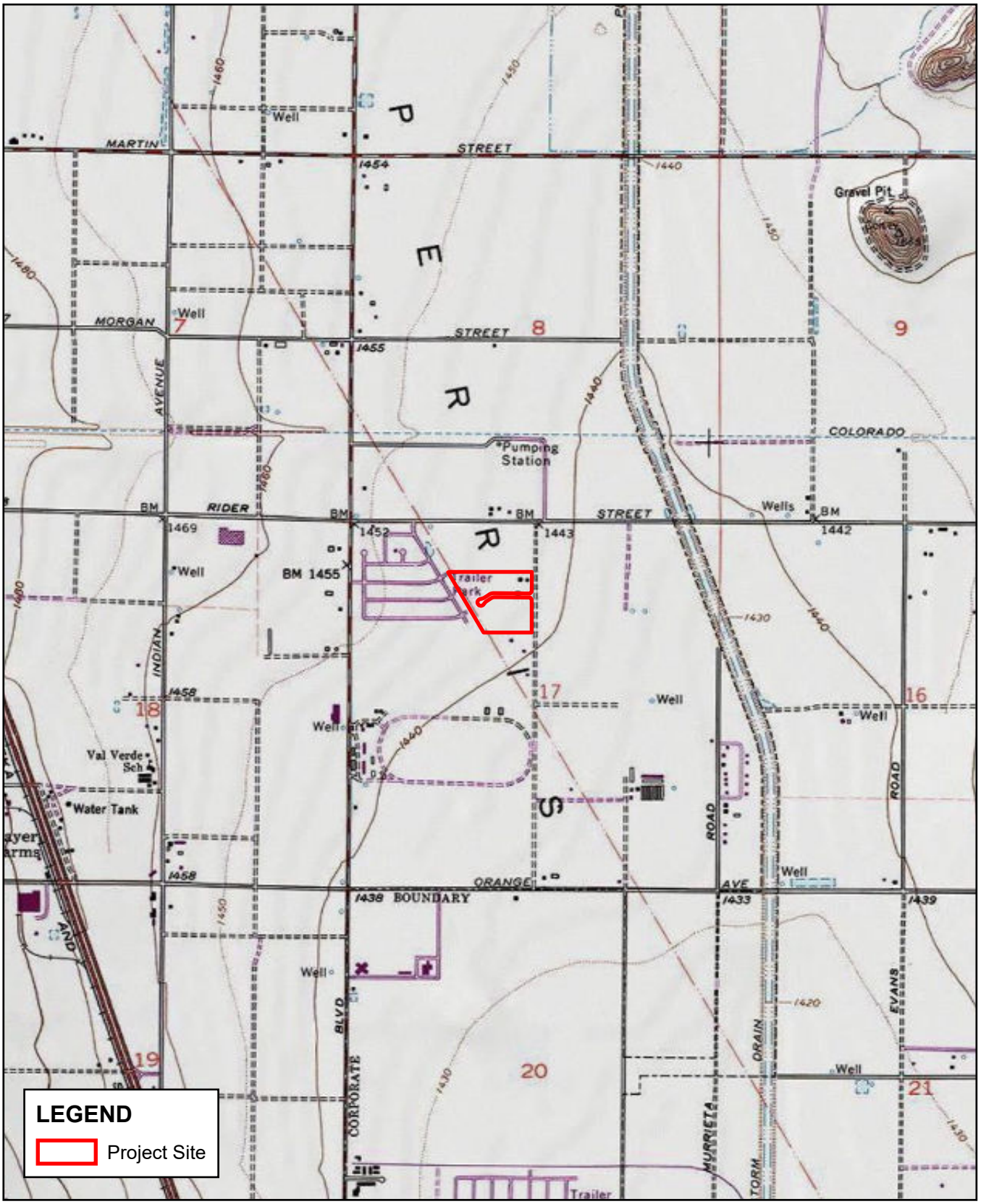
Source: Riverside Co. GIS, 2019

0 2 4 6 Miles

Figure 1 – Vicinity Map

20-0186 Redlands West Industrial

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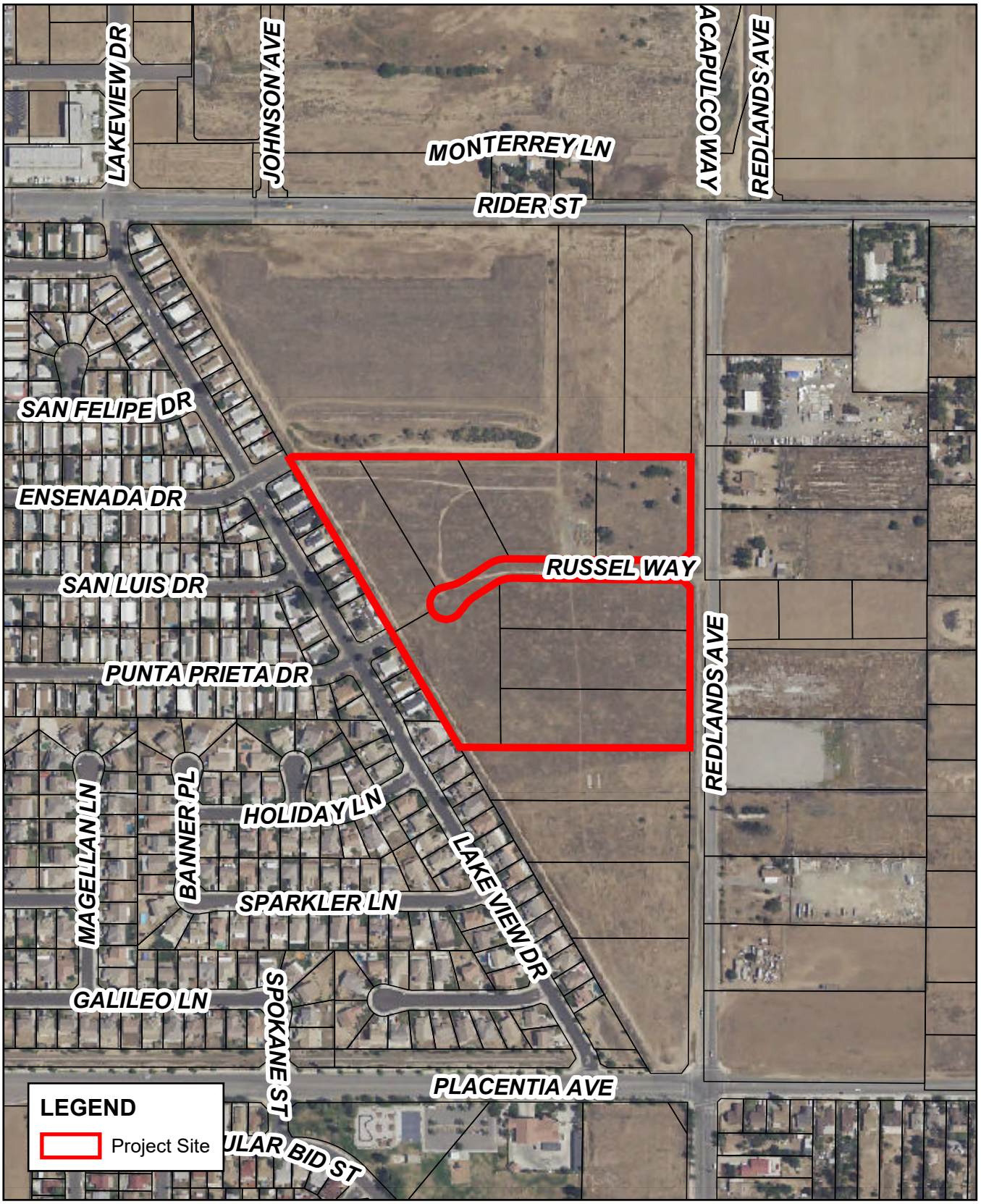
H:\2020\20-0186\GIS\Pro\20-0186 Redlands West PHYD Maps\20-0186 Redlands West PHYD.aprx; Map created 08 Dec 2020; AliS

Sources: ESRI / USGS 7.5min Quad
DRGs: PERRIS

0 1,000 2,000 3,000 Feet

Figure 2 - USGS Map
20-0186 Redlands West Industrial

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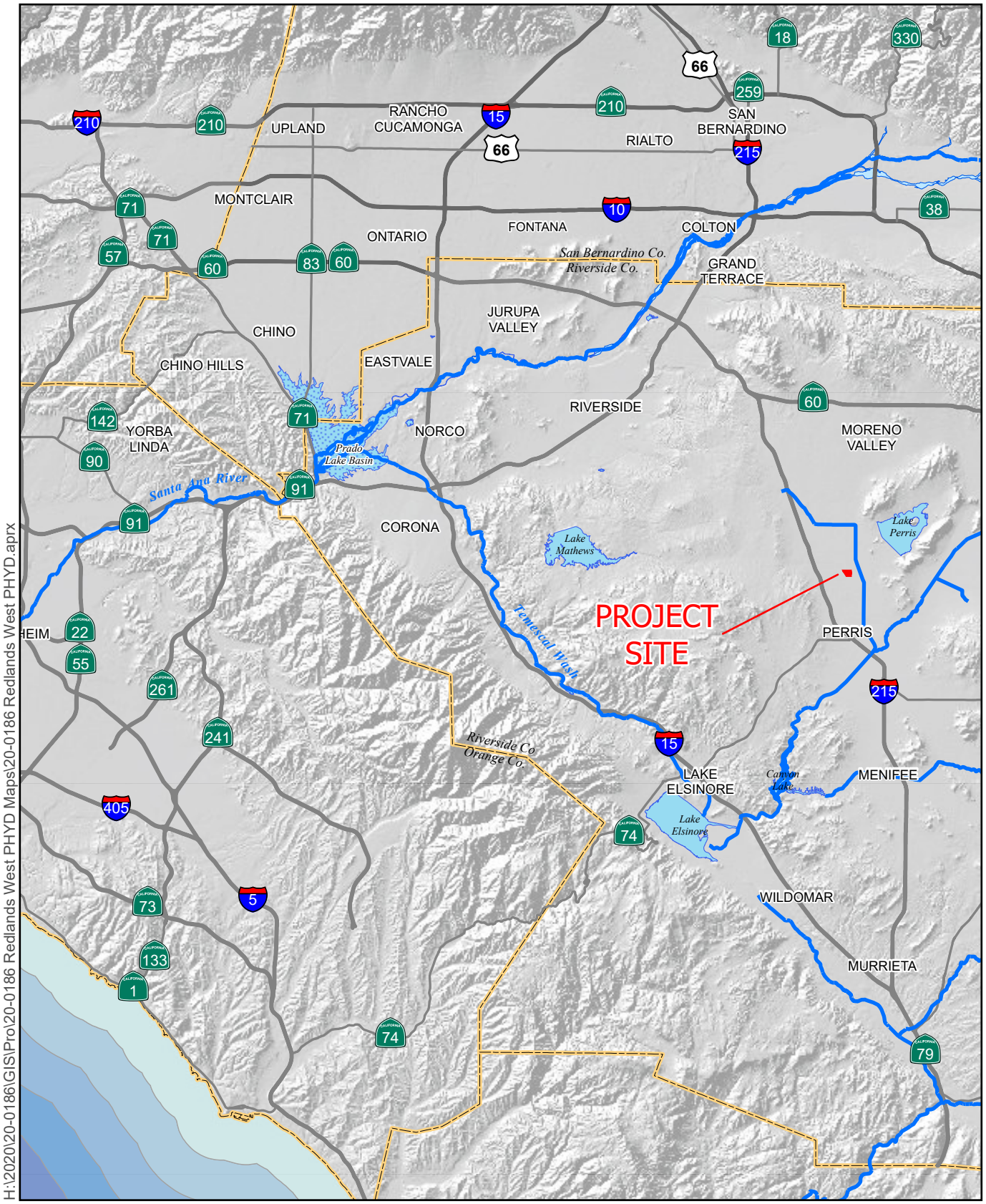
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Source: Riverside Co. GIS, Jan. 2020.

Figure 3 - Aerial Map

20-0186 Redlands West Industrial

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Sources: USGS DLG; USGS 30m DEM

Figure 4 – Receiving Waterbodies

20-0186 Redlands West Industrial

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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

Storm Event	Duration 1-Hour (inches)	Duration 24-Hour (inches)
2-Year	0.45	1.7
100-Year	1.2	4.25

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

Based on the Plate C-1.30, Perris in the RCFC&WCD Hydrology Manual, the project site is classified as soil types B and C. 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 'Urban Residential or Commercial Landscaping'. 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
Developed – Urban Residential or Commercial Landscaping	N/A	56	69	N/A	78.8

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 basins. Calculations were performed for approximately 20.1 acres of the developed area. This area includes the onsite development as well as improvements to Redlands Ave that are contained within the project boundaries. The rational method calculations for the Redlands East project were broken up into two main areas. The "300 Series" consists of approximately 19.9 acres of area consisting mainly of the onsite improvements that are proposed for development. The "400 Series" consists of approximately 1.5 acres of area tributary to the proposed inlets located on Redlands Ave.

Areas within the rational method calculations were further broken up based on the location of localized low points throughout the site. Most subareas will consist of a combination of the proposed building,

parking stalls, drive aisles, concrete walkways, and/or landscaped areas. All onsite areas within the calculations are considered as commercial subarea types.

A preliminary pump has been proposed to convey a constant flow rate of 5.0 cfs towards the proposed Lat A-B-10 extension. The proposed underground chambers have been sized to mitigate larger storm events and allow for the preliminary pump and outlet structure to limit the peak flow rate exiting the site.

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 355 – Total flow entering UG Chambers	25.6	37.5
Node 355* – Mitigated flow exiting UG Chambers	-	11.0
Node 465* – Mitigated flow from Redlands East & West	-	17.3

**Peak flow rate obtained from Routing analysis.*

The rational method output files and hydrology map have been included in Appendix A. Approximately 37.5 cfs of runoff enters the underground storage chambers for the 100-year, 1-hour storm event. The unit hydrograph analysis and routing analysis accounts for the full 20.1 acres of gross area within the Redlands East project boundary. This provides a conservative estimate of the proposed peak flow rates as the runoff collected within Redlands Ave will not actually enter the proposed underground chambers. The 400 Series accounts for the unmitigated flow rates collected along Redlands Ave.

The combination of underground storage chambers and a proposed pump (5.0 cfs capacity) results in a peak flow rate of 11.0 cfs exiting the site towards Lat A-B-10 (see Section 4 for additional details).

OFF-SITE RATIONAL METHOD HYDROLOGY

The "400 Series" provides calculations for the proposed storm drain conveying flows underneath Redlands Ave towards MDP Line A-B. These calculations combine the results of the rational method calculations regarding both the Redlands East and the Redlands West projects. The flow rates entering the storm drain from the Redlands East and Redlands West projects are entered as user-defined flow rates within the 400 Series. This allows the mitigated flow rates (see Section 4) for each project to be entered into Lat A-B-10 and compared to the 32.5 cfs allowable capacity.

See Appendix A for the output files of the off-site rational method analysis.

SECTION 3 - HYDRAULIC ANALYSIS

Hydraulic calculations will be performed in the Final Drainage Study.

SECTION 4 - BASIN ANALYSIS

ON-SITE UNIT HYDROGRAPH METHOD HYDROLOGY

The unit hydrograph method was used to determine the peak flow rates and volumes in order to adequately size the proposed underground storage chambers to address increased runoff mitigation. Unit hydrographs were performed for the developed condition. As previously stated, the revised capacity of Lat A-B-10 is 48.0 cfs. The combined flow rate from the development of the Redlands East and Redlands West projects totals 32.5 cfs. The Redlands West project is provided about 20.0 cfs of flow to discharge into Lat A-B-10.

The unit hydrograph analysis and routing analysis accounts for the full 20.1 acres of gross area within the Redlands West project boundary. This provides a conservative estimate of the proposed peak flow rates as the runoff collected within Redlands Ave will not actually enter the proposed underground chambers. The following table summarizes the results of the unit hydrograph analysis for both the Redlands East and Redlands West projects:

Table 4 – Unit Hydrograph Results

DEVELOPED CONDITION								
	EAST			WEST			COMBINED	
RETURN PERIOD *(yr)*	EVENT *(hrs)*	VOL *(ac-ft)*	*PEAK (cfs)*	EVENT *(hrs)*	VOL *(ac-ft)*	*PEAK (cfs)*	VOL *(ac-ft)*	*PEAK (cfs)*
100	**1**	**1.1**	***36.37***	1	1.8	*50.07*	2.9	*86.44*
	3	**1.6**	***20.47***	3	2.6	*31.52*	4.2	*51.99*
	6	**2.1**	***17.76***	6	3.3	*27.41*	5.4	*45.17*
	24	**3.3**	***5.81***	24	5.3	*9.47*	8.6	*15.28*

The unit hydrograph output files and hydrology map have been included in Appendix C. Table 4 above provides results for the Redlands West project (highlighted in yellow) and the Redlands East project (separate drainage study).

ROUTING ANALYSIS

Based on the unit hydrograph results shown in Table 4 above, the peak flow rates for the 100-year, 1/3/6-hour storm events are all greater than the allowable 20.0 cfs designated for the Redlands West project. In this preliminary drainage study, a routing analysis was completed for the 100-year, 1/3/6-hour storm events to demonstrate that the underground storage chambers contain substantial volume needed to mitigate flows down to the allowable peak flow rates.

The stage-storage-discharge table provides input data at select elevations in the underground chambers which will determine the storage and discharge at each point based on the mitigation configuration of the outlet structure. The following table presents the result of routing analysis for the 1-, 3-, and 6-hour, 100-year storm events to demonstrate that the chambers provide the necessary storage volume needed to restrict the outflow to acceptable flow rates. In order to show that the proposed chambers provide adequate storage, Table 5 shows results for the routing analysis of the Redlands East (highlighted in yellow) project and Redlands West project (separate drainage study).

Table 5 – Basin Routing Results

	Developed Condition		Basin Routing Results		
Storm Event	**Volume (Ac-ft)**	**Peak Flow (cfs)**	**Peak Flow (cfs)**	**Max Basin Depth (feet)**	**Water Surface Elevation (cfs)**
EAST 100-Year, 1-Hour	1.1	36.4	5.0	3.98	1434.98
WEST 100-Year, 1-Hour	1.8	50.1	5.0	5.38	1437.88
COMBINED 100-Year, 1-Hour	**2.9**	**86.5**	**10.0**	-	-
EAST 100-Year, 3-Hour	1.6	20.5	5.0	3.59	1434.59
WEST 100-Year, 3-Hour	2.6	31.5	11.0	6.12	1438.62
COMBINED 100-Year, 3-Hour	**4.2**	**52.0**	**16.0**	-	-
EAST 100-Year, 6-Hour	2.1	17.8	5.0	3.05	1434.05
WEST 100-Year, 6-Hour	3.3	27.4	8.6	5.93	1438.43
COMBINED 100-Year, 6-Hour	**5.4**	**45.2**	**13.6**	-	-
EAST 100-Year, 24-Hour	3.3	5.8	5.0	0.55	1431.55
WEST 100-Year, 24-Hour	5.3	9.5	5.0	2.30	1434.80
COMBINED 100-Year, 24-Hour	**8.6**	**15.3**	**10.0**	-	-

Redlands West elevation for bottom of storage chamber is 1432.5 (bottom of stone is 1431.75).
Redlands East maximum allotted flow rate to discharge towards Lat A-B-10 is Q=20.0 cfs.

A preliminary pump with the capacity of 5.0 cfs has been proposed for the Redlands West industrial project. The proposed underground chambers have been preliminarily sized to detain large storm events. A preliminary outlet structure for the underground chambers in combination with a preliminarily sized pump have been proposed to in order to limit the flow rate discharging off the site. As described in previous sections of the report, the Redlands West project has been allotted up to 20.0 cfs of flows to discharge into the proposed Lat A-B-10 extension. A pump of capacity of 5.0 cfs has been analyzed in the routing calculations within this report, however a larger pump can be used to discharge the onsite flows (which would result in significantly smaller underground chamber sizing) in final engineering.

The routing calculations and other hydraulic calculations have been provided in Appendix C. Based on the routing results in Table 5, the peak flow rate is 11.0 cfs (occurring in the 100-year, 3-hour storm event). The total combined flow rate entering Lat A-B-10 from the Redlands East and Redlands West projects totals 16.0 cfs which is below the allotted 32.5 cfs.

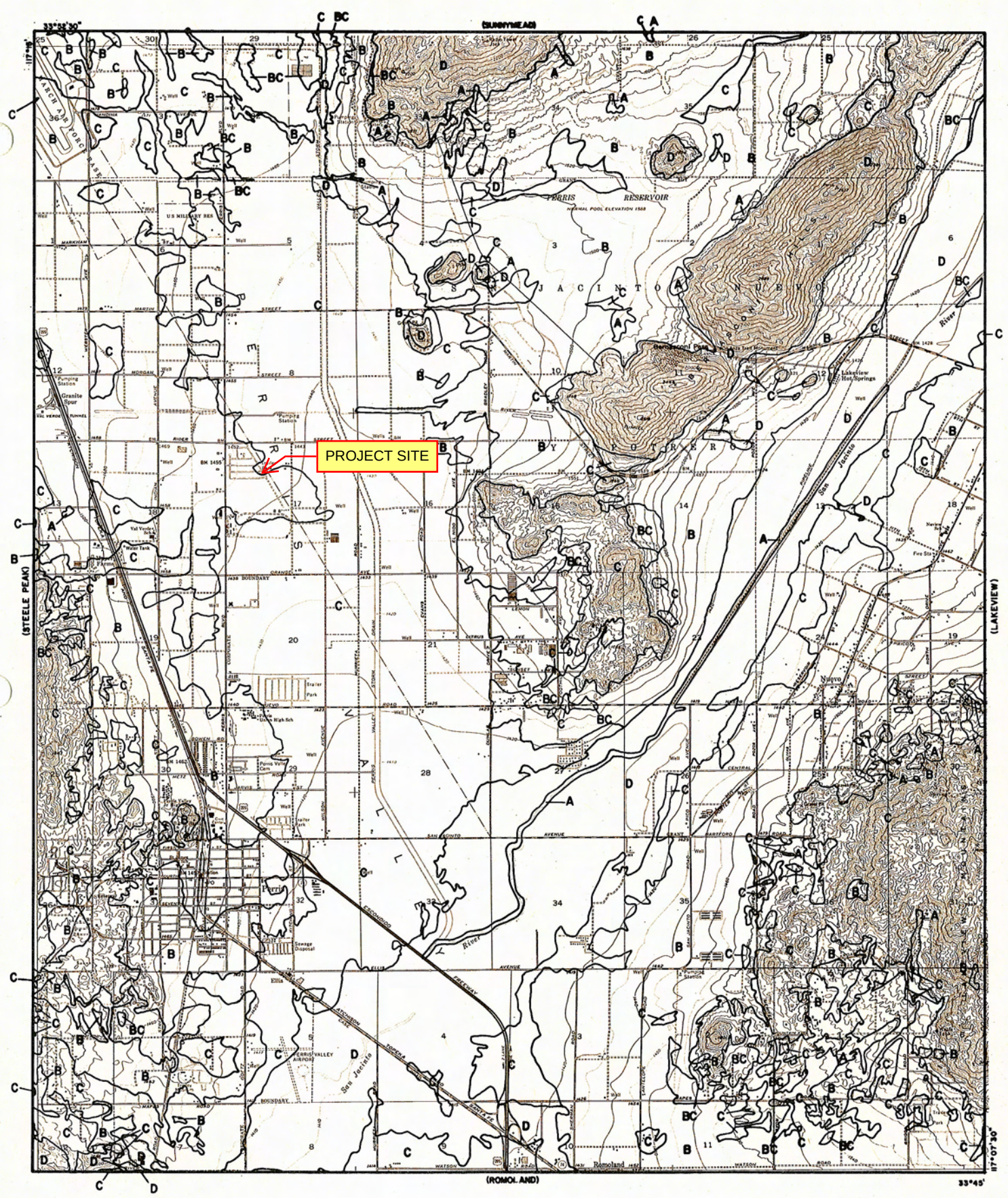
SECTION 5 - CONCLUSION

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 the underground storage chambers and provide flood protection for the 100-year storm event.
- The proposed underground chambers will provide adequate water quality treatment.
- The proposed project will not impact flooding condition to upstream or downstream properties.

APPENDIX A – HYDROLOGY ANALYSIS

HYDROLOGIC SOILS GROUP MAP (PLATE C-1.30)



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

PRECIPITATION VALUES

APPROXIMATE
PROJECT LOCATION
(i=0.45)

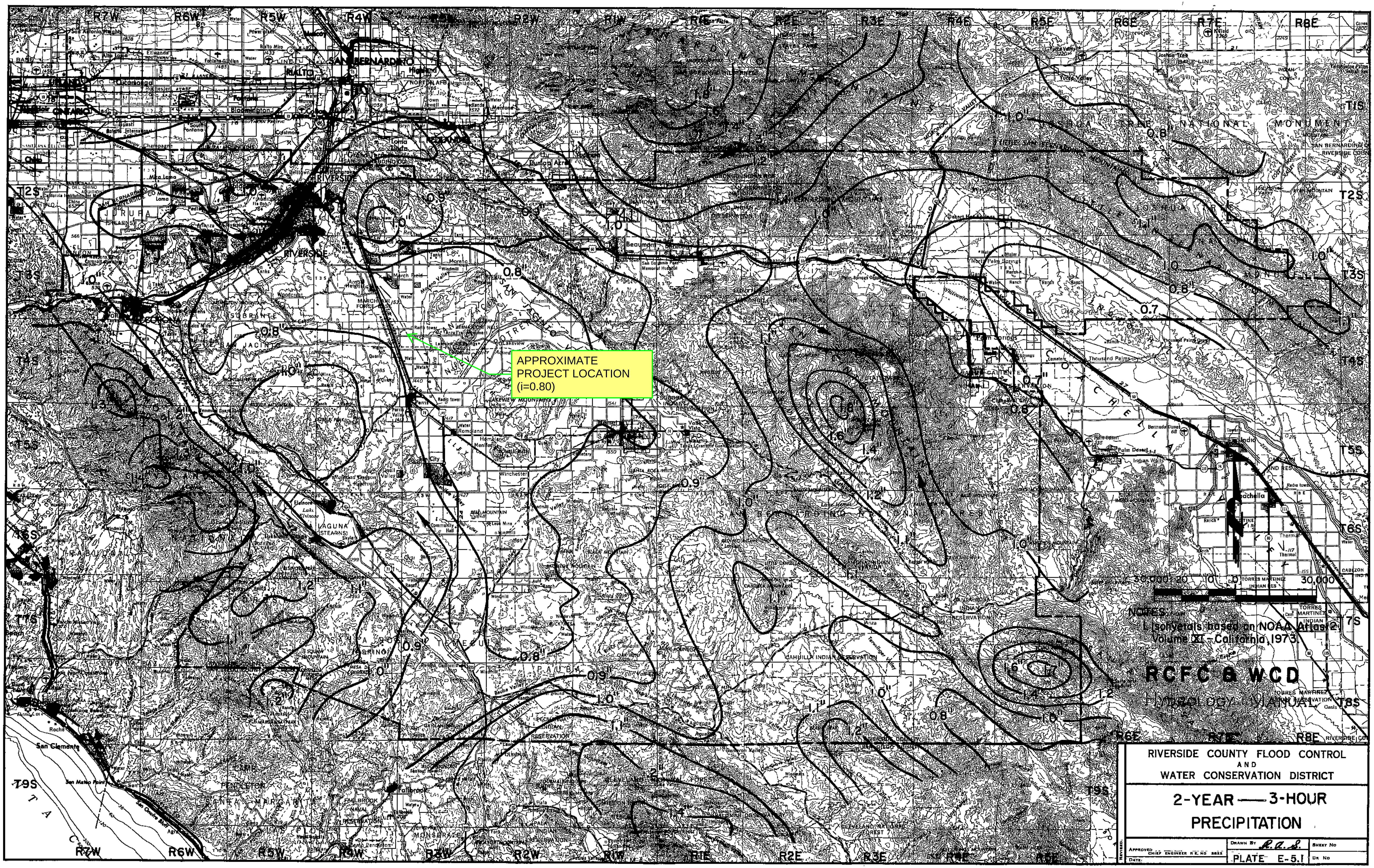
NOTES:
1. Isohyetals based on NOAA Atlas 2,
Volume XI - California, 1973

RCFC & WCD
HYDROLOGY MANUAL

RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

2-YEAR — 1-HOUR
PRECIPITATION

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


APPROXIMATE
PROJECT LOCATION
(i=0.80)
NOTES:
1. Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973.
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
2-YEAR —— 3-HOUR
PRECIPITATION
APPROVED CHIEF ENGINEER R.E. NO
DATE:
REVISED:
DRAWN BY R.A.S.
SHEET NO
PLATE E-5.1
DR. NO
30,000 20 10 0 30,000
R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E
R3E
R4E
R5E
R6E
R7E
R8E
T1S
T2S
T3S
T4S
T5S
T6S
T7S
T8S
T9S
SAN BERNARDINO
RIVERSIDE
CORONA
ONTARIO
RIALTO
JURUPA
SOBRANTE
SAN JACINTO
JOSHUA TREE NATIONAL MONUMENT
PENDLETON
SAN BERNARDINO NATIONAL FOREST
CAHUILLA INDIAN RESERVATION
San Clemente
Palm Springs
Palm Desert
Indio
Coachella
Fallbrook
Beaumont
Banning
Perris
Hemet
Temecula
Elsinore
Winchester
Thousand Palms
Bermuda Dunes
Indian Wells
Thermal
Anza

APPROXIMATE
PROJECT LOCATION
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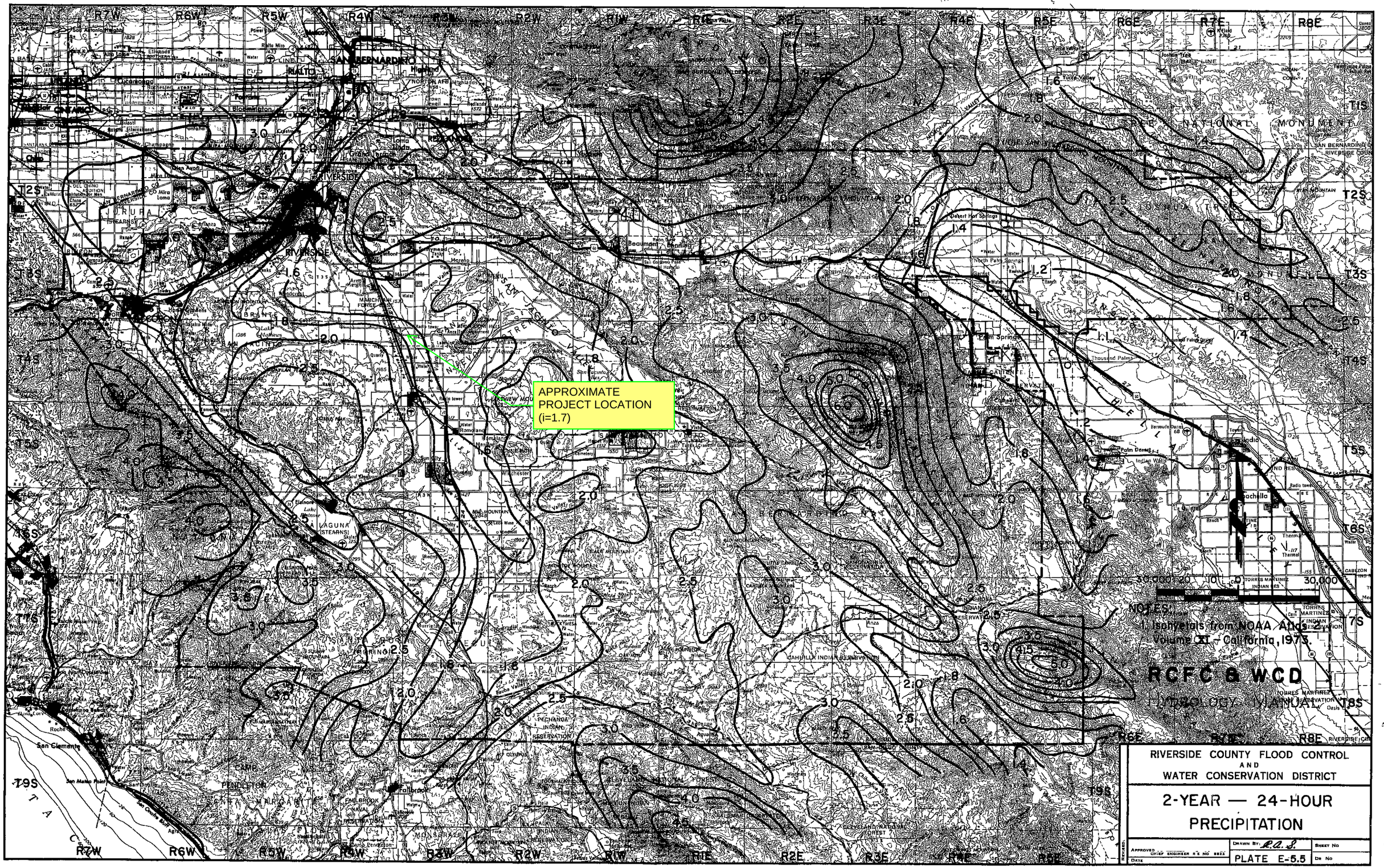
NOTES
1. Isohyetals from NOAA Atlas 2
Volume XI - California, 1973

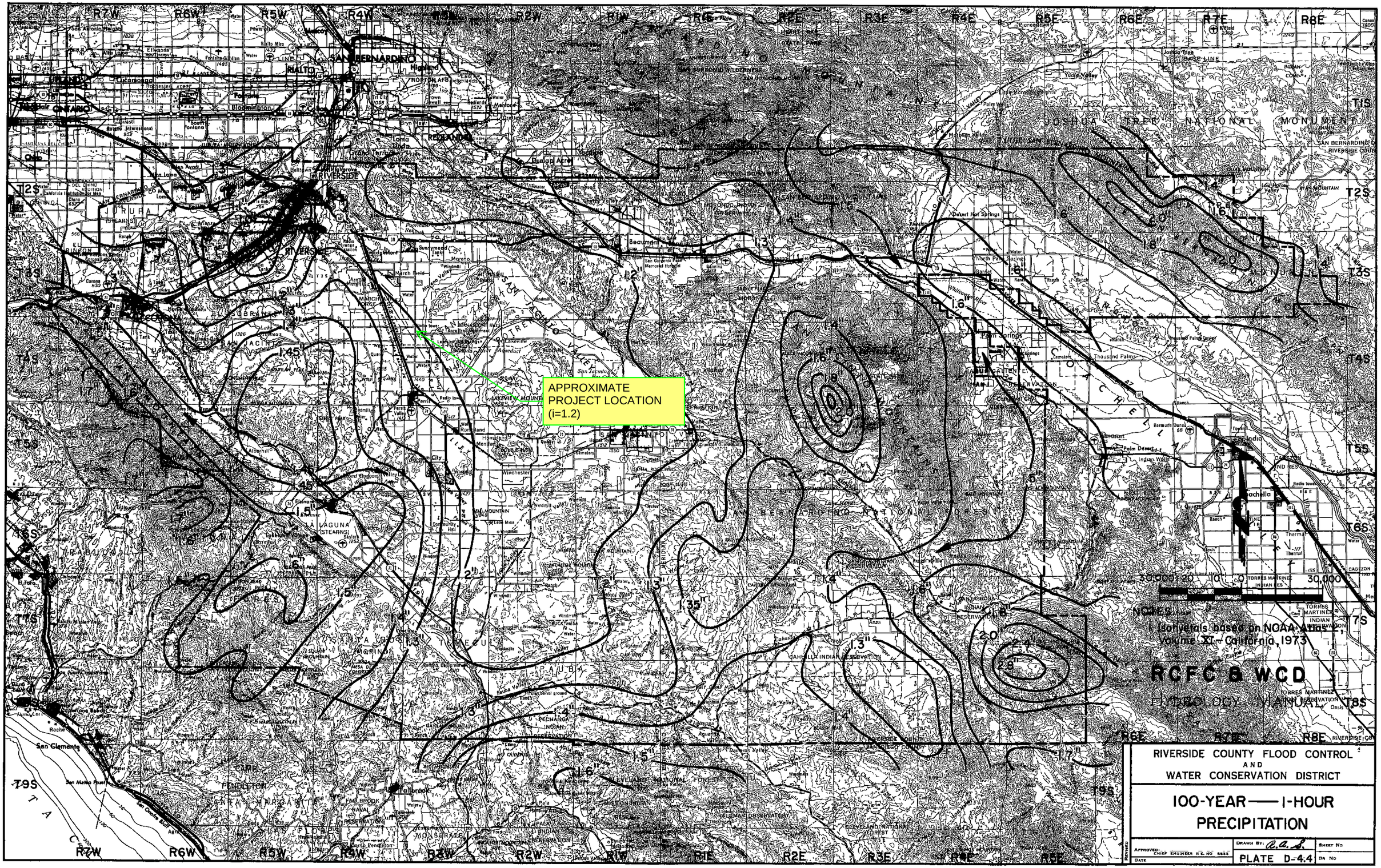
RCFC & WCD
HYDROLOGY MANUAL

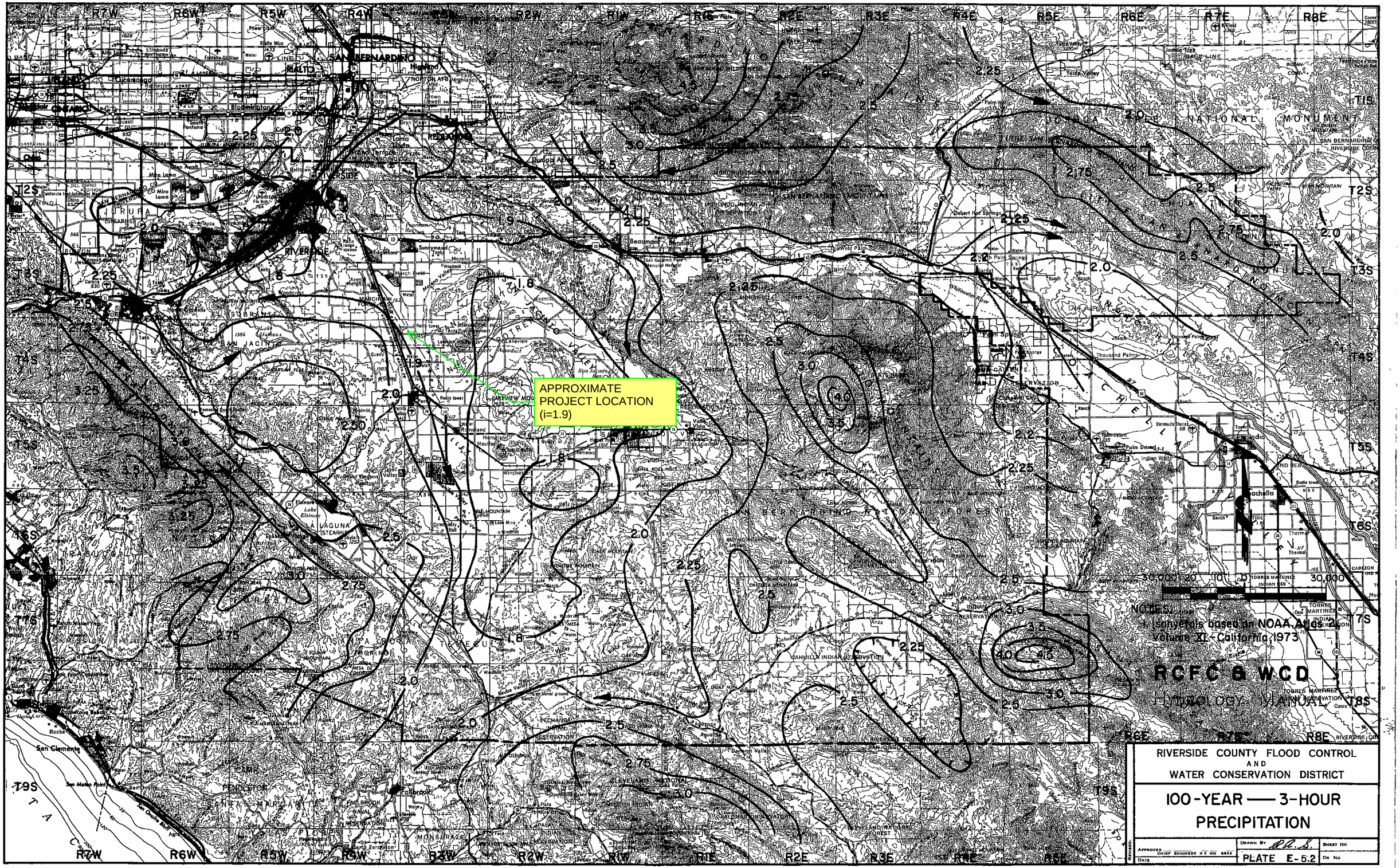
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

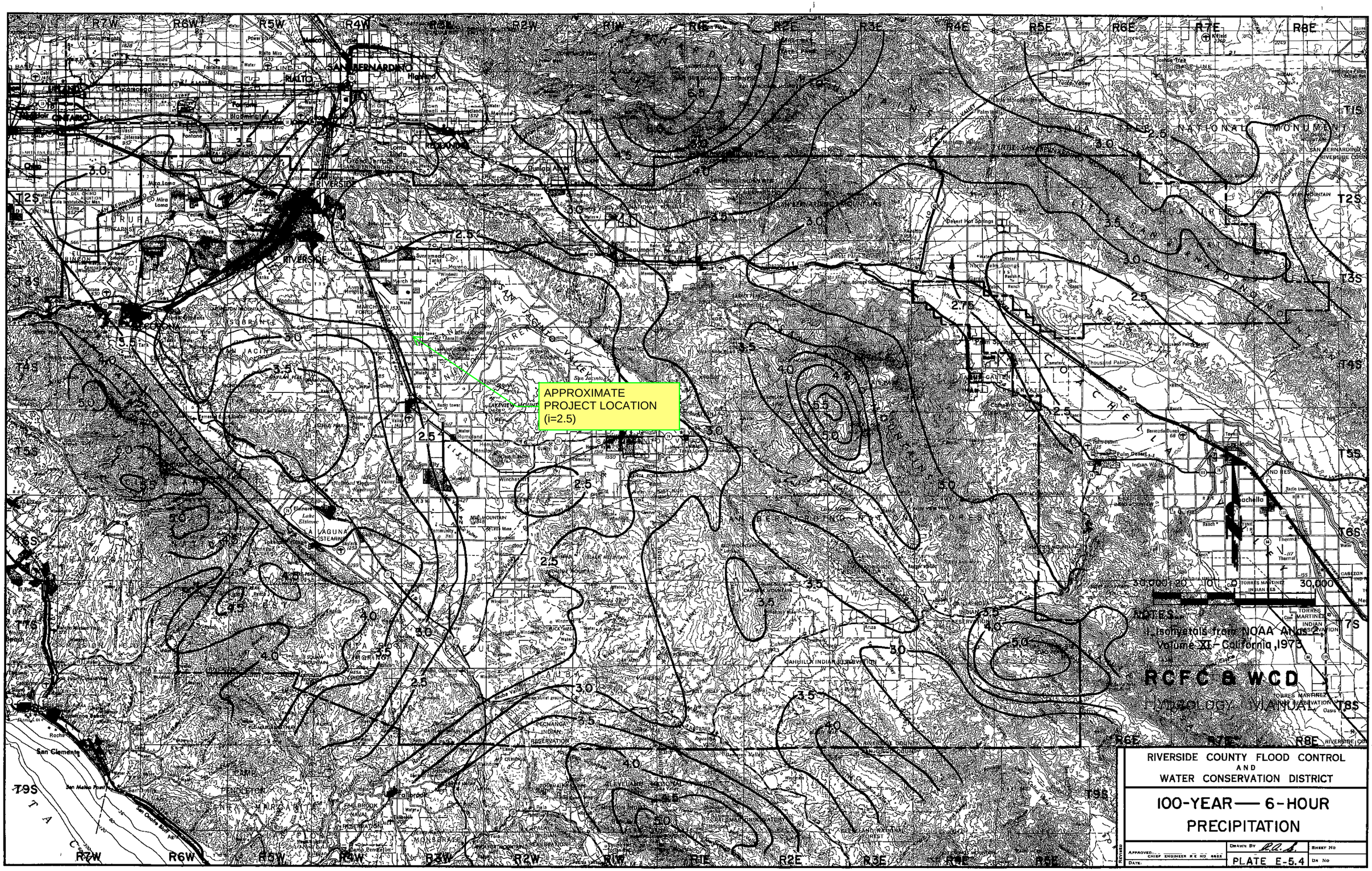
2-YEAR — 6-HOUR PRECIPITATION

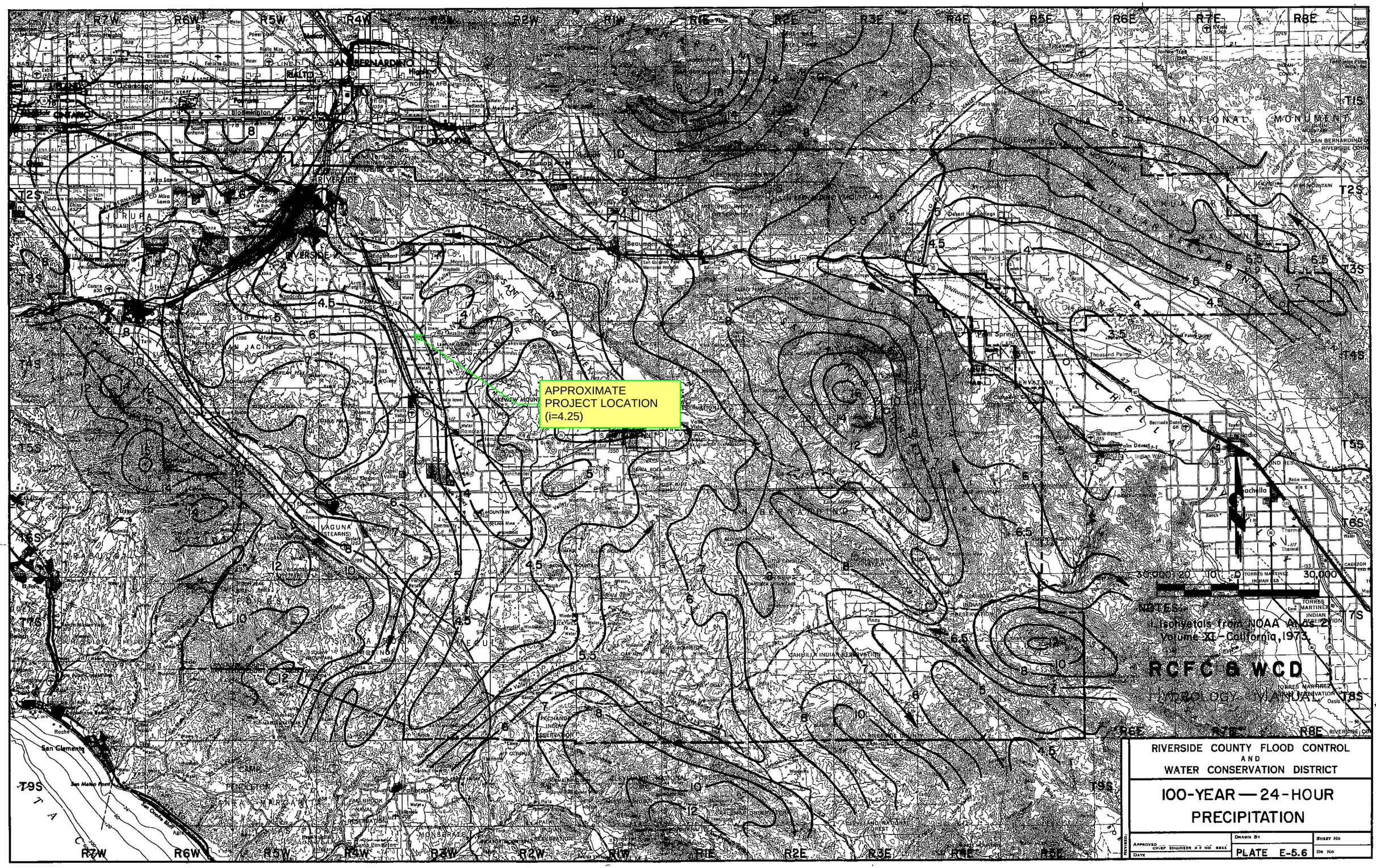
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DATE	PLATE E-5.3	DR NO
REVISED		

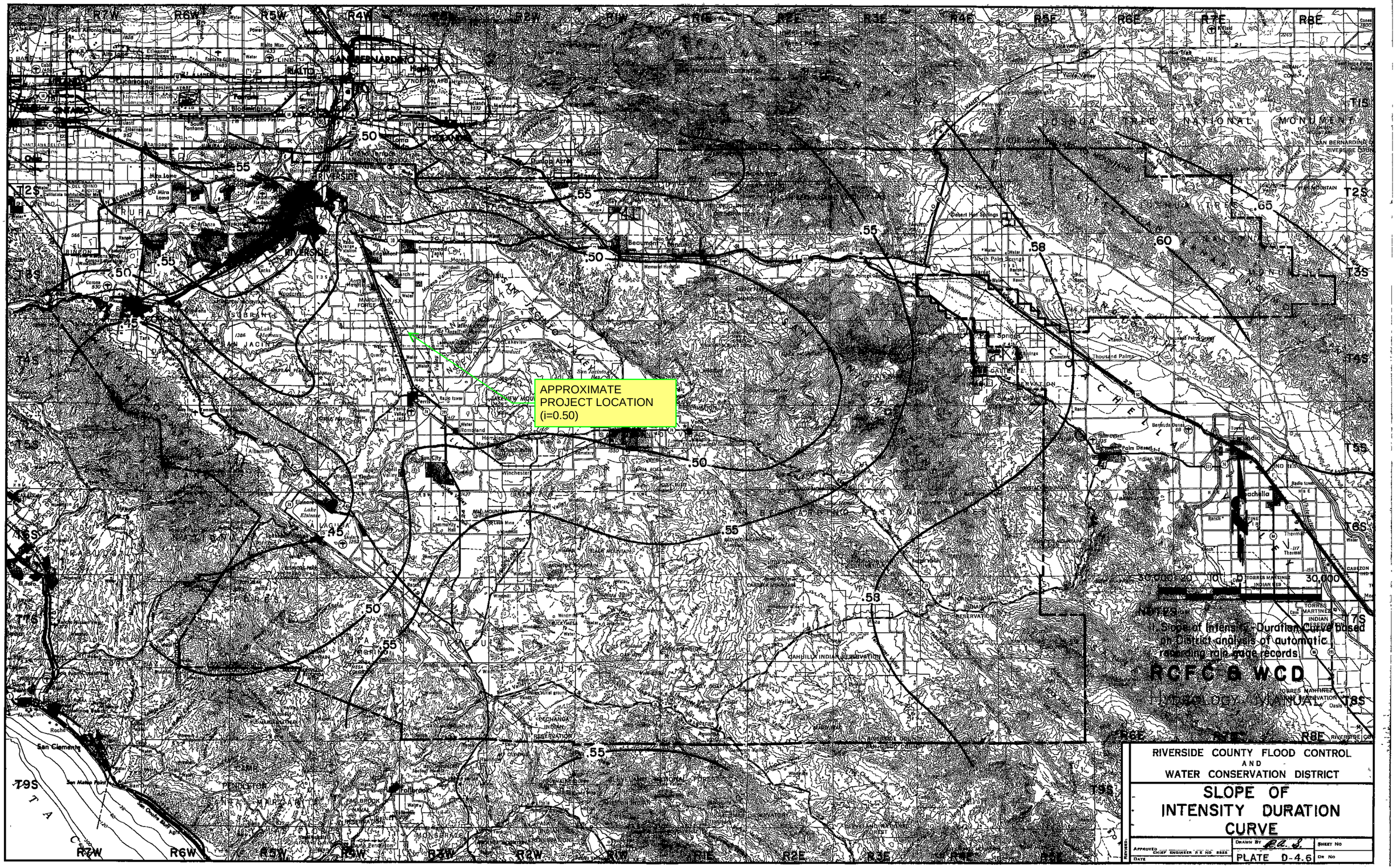

APPROXIMATE
PROJECT LOCATION
(i=1.7)
NOTES:
1. Isohyetals from NOAA Atlas
Volume XI - California, 1973.
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
2-YEAR — 24-HOUR
PRECIPITATION
DRAWN BY: R.A.S.
PLATE E-5.5
SAN BERNARDINO
RIVERSIDE
RIALTO
NORTON AFB
MARCH AFB
LAKE MATHEWS
LAKE PERRIS
SAN JACINTO MTNS
SAN BERNARDINO MTNS
SANTA ROSA MTNS
SAN JACINTO PEAK
SAN GORGONIO PASS
Beaumont
Banning
Desert Hot Springs
North Palm Springs
Palm Springs
Thousand Palms
Indian Wells
Palm Desert
Rancho Mirage
Thermal
Mecca
Oasis
Coachella
Yucca Valley
Joshua Tree
JOSHUA TREE NATIONAL MONUMENT
SAN JACINTO RANGE
SAN JACINTO FAULT
SAN ANDREAS FAULT
SAN JACINTO VALLEY
COACHELLA VALLEY
MORONGO VALLEY
MORENO VALLEY
PERRIS VALLEY
TEMECULA VALLEY
SANTA ANA RIVER
SANTA ANA MTNS
SANTA ANA
SAN JACINTO
TEMECULA
MURRIETA
ELSINORE
LAGUNA
PECHANGA INDIAN RESERVATION
CAHUILLA INDIAN RESERVATION
TORRES MARTINEZ INDIAN RES
CABAZON IND RES
SAN MANUEL IND RES
SAN TIMOTEO CANYON
SAN JACINTO WILDERNESS
CLEVELAND NATIONAL FOREST
CAMP PENDLETON
SAN CLEMENTE
San Mateo Point
San Onofre Bluff
PACIFIC OCEAN
R7W R6W R5W R4W R3W R2W R1W R1E R2E R3E R4E R5E R6E R7E R8E
T2S T3S T4S T5S T6S T7S T8S T9S


APPROXIMATE
PROJECT LOCATION
(i=1.2)
SAN BERNARDINO
RIVERSIDE
RIALTO
COLTON
REDLANDS
JURUPA
MARCH FIELD
NORTON AFB
JOSHUA TREE NATIONAL MONUMENT
SAN JACINTO MOUNTAINS
SAN JACINTO WILDERNESS
SAN BERNARDINO NATIONAL FOREST
CLEVELAND NATIONAL FOREST
PALM SPRINGS
COACHELLA
SAN CLEMENTE
CAMP PENDLETON
SANTA MARGARITA
TEMECULA
MURRIETA
LAKE ELSINORE
PECHANGA INDIAN RESERVATION
AGUA CALIENTE INDIAN RESERVATION
CAHUILLA INDIAN RESERVATION
TORRES MARTINEZ INDIAN RESERVATION
SAN JACINTO FAULT
SAN ANDREAS FAULT
NOTES
1. Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
100-YEAR — 1-HOUR PRECIPITATION
PLATE D-4.4
APPROVED
CHIEF ENGINEER R.E. NO. 6822
DATE
DRAWN BY: A.A.L.
SHEET NO
DR NO
REVISED


APPROXIMATE
PROJECT LOCATION
(i=1.9)
NOTES:
1. Isohyetals based on NOAA Atlas 2
Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
100-YEAR — 3-HOUR
PRECIPITATION
DRAWN BY
SHEET NO
APPROVED
CHIEF ENGINEER R.C.F.C. & W.C.D.
DATE
PLATE E-5.2
DR. NO
REVISED


APPROXIMATE
PROJECT LOCATION
(i=2.5)
Isohyetals from NOAA Atlas 2,
Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
100-YEAR — 6-HOUR
PRECIPITATION
DRAWN BY R.C.S.
PLATE E-5.4


APPROXIMATE
PROJECT LOCATION
(i=4.25)
NOTES:
1. Isohyetals from NOAA Atlas 2,
Volume XI - California, 1973.
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
100-YEAR — 24-HOUR
PRECIPITATION
APPROVED CHIEF ENGINEER R.E. NO. 8882
DATE
DRAWN BY
PLATE E-5.6
SHEET NO
DR NO
REVISED:


APPROXIMATE
PROJECT LOCATION
(i=0.50)
.45
.50
.53
.55
.58
.60
.65
SAN BERNARDINO
RIVERSIDE
JOSHUA TREE NATIONAL MONUMENT
SAN JACINTO MOUNTAINS
SAN JACINTO WILDERNESS
SAN GORGONIO WILDERNESS
SAN BERNARDINO & RIVERSIDE COUNTIES
1. Slope of Intensity-Duration Curve based on District analysis of automatic recording rain gage records
RCFC & WCD
MODEL CITY, CALIFORNIA
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
SLOPE OF INTENSITY DURATION CURVE
DRAWN BY
SHEET No
PLATE D-4.6
DR No
APPROVED CHIEF ENGINEER R E NO 8888
DATE
REVISED

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 - 2005 Version 7.1
Rational Hydrology Study Date: 05/13/21 File:30.out

REDLANDS WEST - 300 SERIES
10-YEAR STORM EVENT
20-0186 - DEVELOPED CONDITION
2021-05-13 AYS

********* 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 300.000 to Point/Station 301.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 535.000(Ft.)
Top (of initial area) elevation = 1449.700(Ft.)
Bottom (of initial area) elevation = 1444.400(Ft.)
Difference in elevation = 5.300(Ft.)
Slope = 0.00991 s(percent)= 0.99
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 9.317 min.
Rainfall intensity = 1.943(In/Hr) for a 10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.870
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.900
Decimal fraction soil group C = 0.100
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 57.30
Pervious area fraction = 0.100; Impervious fraction = 0.900
Initial subarea runoff = 3.548(CFS)
Total initial stream area = 2.100(Ac.)
Pervious area fraction = 0.100

++

Process from Point/Station 301.000 to Point/Station 350.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1441.400(Ft.)
Downstream point/station elevation = 1440.200(Ft.)
Pipe length = 235.00(Ft.) Manning's N = 0.013

```
No. of pipes = 1  Required pipe flow  =     3.548(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.548(CFS)
Normal flow depth in pipe =    9.86(In.)
Flow top width inside pipe =   14.24(In.)
Critical Depth =    9.13(In.)
Pipe flow velocity =      4.15(Ft/s)
Travel time through pipe =    0.94 min.
Time of concentration (TC) =    10.26 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      350.000 to Point/Station      350.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      2.100(Ac.)
Runoff from this stream =      3.548(CFS)
Time of concentration =   10.26 min.
Rainfall intensity =     1.853(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      302.000 to Point/Station      303.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   200.000(Ft.)
Top (of initial area) elevation =  1446.300(Ft.)
Bottom (of initial area) elevation =  1444.400(Ft.)
Difference in elevation =     1.900(Ft.)
Slope =    0.00950  s(percent)=       0.95
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.339 min.
Rainfall intensity =      2.346(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.872
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.661(CFS)
Total initial stream area =        1.300(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      303.000 to Point/Station      350.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1440.400(Ft.)
Downstream point/station elevation =  1440.200(Ft.)
Pipe length  =    10.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.661(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.661(CFS)
Normal flow depth in pipe =    6.20(In.)
Flow top width inside pipe =   11.99(In.)
Critical Depth =    8.39(In.)
Pipe flow velocity =      6.50(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =     6.36 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      350.000 to Point/Station      350.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.300(Ac.)
Runoff from this stream =      2.661(CFS)
Time of concentration =    6.36 min.
Rainfall intensity =     2.342(In/Hr)
Summary of stream data:
```

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


1        3.548     10.26                1.853
2        2.661      6.36                2.342
Largest stream flow has longer time of concentration
Qp =      3.548 + sum of
          Qb         Ia/Ib
           2.661 *    0.791 =      2.105
Qp =      5.653

Total of 2 streams to confluence:
Flow rates before confluence point:
       3.548       2.661
Area of streams before confluence:
        2.100        1.300
Results of confluence:
Total flow rate =      5.653(CFS)
Time of concentration =    10.261 min.
Effective stream area after confluence =      3.400(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      350.000 to Point/Station      351.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1440.200(Ft.)
Downstream point/station elevation =  1437.500(Ft.)
Pipe length  =   535.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.653(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     5.653(CFS)
Normal flow depth in pipe =   11.72(In.)
Flow top width inside pipe =   17.16(In.)
Critical Depth =   11.01(In.)
Pipe flow velocity =      4.64(Ft/s)
Travel time through pipe =    1.92 min.
Time of concentration (TC) =    12.18 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      351.000 to Point/Station      351.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      3.400(Ac.)
Runoff from this stream =      5.653(CFS)
Time of concentration =   12.18 min.
Rainfall intensity =     1.704(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      304.000 to Point/Station      305.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   260.000(Ft.)
Top (of initial area) elevation =  1450.600(Ft.)
Bottom (of initial area) elevation =  1446.700(Ft.)
Difference in elevation =     3.900(Ft.)
Slope =    0.01500  s(percent)=       1.50
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.425 min.
Rainfall intensity =      2.331(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.872
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.423(CFS)
Total initial stream area =        0.700(Ac.)
```

```
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      305.000 to Point/Station      351.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1438.700(Ft.)
Downstream point/station elevation =  1437.500(Ft.)
Pipe length  =    20.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.423(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.423(CFS)
Normal flow depth in pipe =    3.68(In.)
Flow top width inside pipe =    8.85(In.)
Critical Depth =    6.60(In.)
Pipe flow velocity =      8.37(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =     6.47 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      351.000 to Point/Station      351.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.700(Ac.)
Runoff from this stream =      1.423(CFS)
Time of concentration =    6.47 min.
Rainfall intensity =     2.324(In/Hr)
Summary of stream data:

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


1        5.653     12.18                 1.704
2        1.423      6.47                 2.324
Largest stream flow has longer time of concentration
Qp =      5.653 + sum of
          Qb         Ia/Ib
           1.423 *    0.733 =      1.043
Qp =      6.696

Total of 2 streams to confluence:
Flow rates before confluence point:
       5.653       1.423
Area of streams before confluence:
        3.400        0.700
Results of confluence:
Total flow rate =      6.696(CFS)
Time of concentration =    12.181 min.
Effective stream area after confluence =      4.100(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      351.000 to Point/Station      352.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1437.500(Ft.)
Downstream point/station elevation =  1436.200(Ft.)
Pipe length  =   265.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.696(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     6.696(CFS)
Normal flow depth in pipe =   13.48(In.)
Flow top width inside pipe =   15.62(In.)
Critical Depth =   12.02(In.)
Pipe flow velocity =      4.72(Ft/s)
Travel time through pipe =    0.94 min.
Time of concentration (TC) =    13.12 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      352.000 to Point/Station      352.000
```

**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 4.100(Ac.)
Runoff from this stream = 6.696(CFS)
Time of concentration = 13.12 min.
Rainfall intensity = 1.643(In/Hr)

++
Process from Point/Station 306.000 to Point/Station 307.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 205.000(Ft.)
Top (of initial area) elevation = 1449.100(Ft.)
Bottom (of initial area) elevation = 1445.500(Ft.)
Difference in elevation = 3.600(Ft.)
Slope = 0.01756 s(percent)= 1.76
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 5.661 min.
Rainfall intensity = 2.480(In/Hr) for a 10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.880
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.300
Decimal fraction soil group C = 0.700
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 65.10
Pervious area fraction = 0.100; Impervious fraction = 0.900
Initial subarea runoff = 1.527(CFS)
Total initial stream area = 0.700(Ac.)
Pervious area fraction = 0.100

++
Process from Point/Station 307.000 to Point/Station 352.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1437.500(Ft.)
Downstream point/station elevation = 1436.200(Ft.)
Pipe length = 25.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.527(CFS)
Nearest computed pipe diameter = 9.00(In.)
Calculated individual pipe flow = 1.527(CFS)
Normal flow depth in pipe = 3.98(In.)
Flow top width inside pipe = 8.94(In.)
Critical Depth = 6.83(In.)
Pipe flow velocity = 8.09(Ft/s)
Travel time through pipe = 0.05 min.
Time of concentration (TC) = 5.71 min.

++
Process from Point/Station 352.000 to Point/Station 352.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 0.700(Ac.)
Runoff from this stream = 1.527(CFS)
Time of concentration = 5.71 min.
Rainfall intensity = 2.469(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	6.696	13.12	1.643
2	1.527	5.71	2.469

Largest stream flow has longer time of concentration
Qp = 6.696 + sum of
Qb Ia/Ib
1.527 * 0.665 = 1.016
Qp = 7.713

```
Total of 2 streams to confluence:
Flow rates before confluence point:
       6.696       1.527
Area of streams before confluence:
        4.100        0.700
Results of confluence:
Total flow rate =      7.713(CFS)
Time of concentration =    13.118 min.
Effective stream area after confluence =      4.800(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      352.000 to Point/Station      353.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1436.200(Ft.)
Downstream point/station elevation =  1432.900(Ft.)
Pipe length  =   305.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.713(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     7.713(CFS)
Normal flow depth in pipe =   11.16(In.)
Flow top width inside pipe =   17.48(In.)
Critical Depth =   12.91(In.)
Pipe flow velocity =      6.70(Ft/s)
Travel time through pipe =    0.76 min.
Time of concentration (TC) =    13.88 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      353.000 to Point/Station      353.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      4.800(Ac.)
Runoff from this stream =      7.713(CFS)
Time of concentration =   13.88 min.
Rainfall intensity =     1.598(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      308.000 to Point/Station      309.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   595.000(Ft.)
Top (of initial area) elevation =  1450.600(Ft.)
Bottom (of initial area) elevation =  1447.600(Ft.)
Difference in elevation =     3.000(Ft.)
Slope =    0.00504  s(percent)=       0.50
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.128 min.
Rainfall intensity =      1.781(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.869
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.800
Decimal fraction soil group C = 0.200
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  58.60
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      6.035(CFS)
Total initial stream area =        3.900(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      309.000 to Point/Station      353.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1440.600(Ft.)
Downstream point/station elevation =  1432.900(Ft.)
Pipe length  =    95.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.035(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     6.035(CFS)
```

```
Normal flow depth in pipe =    6.67(In.)
Flow top width inside pipe =   11.93(In.)
Critical depth could not be calculated.
Pipe flow velocity =     13.47(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =    11.25 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      353.000 to Point/Station      353.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      3.900(Ac.)
Runoff from this stream =      6.035(CFS)
Time of concentration =   11.25 min.
Rainfall intensity =     1.772(In/Hr)
Summary of stream data:

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


1        7.713     13.88                 1.598
2        6.035     11.25                 1.772
Largest stream flow has longer time of concentration
Qp =      7.713 + sum of
          Qb          Ia/Ib
           6.035 *    0.902 =      5.444
Qp =     13.157

Total of 2 streams to confluence:
Flow rates before confluence point:
       7.713       6.035
Area of streams before confluence:
        4.800        3.900
Results of confluence:
Total flow rate =     13.157(CFS)
Time of concentration =    13.876 min.
Effective stream area after confluence =      8.700(Ac.)


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Process from Point/Station      353.000 to Point/Station      399.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1432.900(Ft.)
Downstream point/station elevation =  1432.500(Ft.)
Pipe length  =    35.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    13.157(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    13.157(CFS)
Normal flow depth in pipe =   13.90(In.)
Flow top width inside pipe =   19.87(In.)
Critical Depth =   16.19(In.)
Pipe flow velocity =      7.78(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =    13.95 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      399.000 to Point/Station      399.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      8.700(Ac.)
Runoff from this stream =     13.157(CFS)
Time of concentration =   13.95 min.
Rainfall intensity =     1.594(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      310.000 to Point/Station      311.000
```

```
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Initial area flow distance =   260.000(Ft.)
Top (of initial area) elevation =  1443.900(Ft.)
Bottom (of initial area) elevation =  1442.200(Ft.)
Difference in elevation =     1.700(Ft.)
Slope =    0.00654  s(percent)=       0.65
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.586 min.
Rainfall intensity =      2.149(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.880
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      3.405(CFS)
Total initial stream area =        1.800(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      311.000 to Point/Station      354.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1439.200(Ft.)
Downstream point/station elevation =  1436.400(Ft.)
Pipe length  =   280.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.405(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     3.405(CFS)
Normal flow depth in pipe =    9.40(In.)
Flow top width inside pipe =    9.89(In.)
Critical Depth =    9.47(In.)
Pipe flow velocity =      5.16(Ft/s)
Travel time through pipe =    0.90 min.
Time of concentration (TC) =     8.49 min.


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Process from Point/Station      354.000 to Point/Station      354.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      1.800(Ac.)
Runoff from this stream =      3.405(CFS)
Time of concentration =    8.49 min.
Rainfall intensity =     2.033(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      312.000 to Point/Station      313.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Initial area flow distance =   250.000(Ft.)
Top (of initial area) elevation =  1443.900(Ft.)
Bottom (of initial area) elevation =  1442.200(Ft.)
Difference in elevation =     1.700(Ft.)
Slope =    0.00680  s(percent)=       0.68
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.410 min.
Rainfall intensity =      2.174(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 = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.297(CFS)
Total initial stream area =        1.200(Ac.)
Pervious area fraction = 0.100
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      313.000 to Point/Station      354.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------------
Upstream point/station elevation =  1436.700(Ft.)
Downstream point/station elevation =  1436.400(Ft.)
Pipe length  =    10.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.297(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     2.297(CFS)
Normal flow depth in pipe =    6.09(In.)
Flow top width inside pipe =    8.42(In.)
Critical Depth =    8.11(In.)
Pipe flow velocity =      7.21(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =     7.43 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      354.000 to Point/Station      354.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.200(Ac.)
Runoff from this stream =      2.297(CFS)
Time of concentration =    7.43 min.
Rainfall intensity =     2.170(In/Hr)
Summary of stream data:

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


1        3.405      8.49                 2.033
2        2.297      7.43                 2.170
Largest stream flow has longer time of concentration
Qp =      3.405 + sum of
          Qb         Ia/Ib
           2.297 *    0.937 =      2.152
Qp =      5.557

Total of 2 streams to confluence:
Flow rates before confluence point:
       3.405       2.297
Area of streams before confluence:
        1.800        1.200
Results of confluence:
Total flow rate =      5.557(CFS)
Time of concentration =     8.490 min.
Effective stream area after confluence =      3.000(Ac.)


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Process from Point/Station      354.000 to Point/Station      399.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------------
Upstream point/station elevation =  1436.400(Ft.)
Downstream point/station elevation =  1432.500(Ft.)
Pipe length  =    45.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.557(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     5.557(CFS)
Normal flow depth in pipe =    6.21(In.)
Flow top width inside pipe =   11.99(In.)
Critical Depth =   11.30(In.)
Pipe flow velocity =     13.55(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =     8.54 min.


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Process from Point/Station      399.000 to Point/Station      399.000
**** CONFLUENCE OF MAIN STREAMS ****
```

```
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      3.000(Ac.)
Runoff from this stream =      5.557(CFS)
Time of concentration =    8.54 min.
Rainfall intensity =     2.027(In/Hr)
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      314.000 to Point/Station      315.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   525.000(Ft.)
Top (of initial area) elevation =  1450.300(Ft.)
Bottom (of initial area) elevation =  1447.900(Ft.)
Difference in elevation =     2.400(Ft.)
Slope =    0.00457  s(percent)=       0.46
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.794 min.
Rainfall intensity =      1.808(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.872
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.500
Decimal fraction soil group C = 0.500
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  62.50
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      5.835(CFS)
Total initial stream area =        3.700(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      315.000 to Point/Station      355.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1440.900(Ft.)
Downstream point/station elevation =  1434.500(Ft.)
Pipe length  =   150.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.835(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     5.835(CFS)
Normal flow depth in pipe =    8.06(In.)
Flow top width inside pipe =   11.27(In.)
Critical depth could not be calculated.
Pipe flow velocity =     10.39(Ft/s)
Travel time through pipe =    0.24 min.
Time of concentration (TC) =    11.03 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      355.000 to Point/Station      355.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 3 in normal stream number 1
Stream flow area =      3.700(Ac.)
Runoff from this stream =      5.835(CFS)
Time of concentration =   11.03 min.
Rainfall intensity =     1.788(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      316.000 to Point/Station      317.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   430.000(Ft.)
Top (of initial area) elevation =  1449.700(Ft.)
Bottom (of initial area) elevation =  1442.400(Ft.)
Difference in elevation =     7.300(Ft.)
Slope =    0.01698  s(percent)=       1.70
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.665 min.
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```
Rainfall intensity =      2.138(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.878
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.200
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  66.40
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      6.572(CFS)
Total initial stream area =        3.500(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      317.000 to Point/Station      355.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1438.400(Ft.)
Downstream point/station elevation =  1434.500(Ft.)
Pipe length  =   110.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.572(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     6.572(CFS)
Normal flow depth in pipe =    9.62(In.)
Flow top width inside pipe =    9.57(In.)
Critical depth could not be calculated.
Pipe flow velocity =      9.74(Ft/s)
Travel time through pipe =    0.19 min.
Time of concentration (TC) =     7.85 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      355.000 to Point/Station      355.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 3 in normal stream number 2
Stream flow area =      3.500(Ac.)
Runoff from this stream =      6.572(CFS)
Time of concentration =    7.85 min.
Rainfall intensity =     2.113(In/Hr)
Summary of stream data:

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


1        5.835     11.03                 1.788
2        6.572      7.85                 2.113
Largest stream flow has longer or shorter time of concentration
Qp =      6.572 + sum of
          Qa          Tb/Ta
           5.835 *    0.712 =      4.153
Qp =     10.726

Total of 2 streams to confluence:
Flow rates before confluence point:
       5.835       6.572
Area of streams before confluence:
        3.700        3.500
Results of confluence:
Total flow rate =     10.726(CFS)
Time of concentration =     7.854 min.
Effective stream area after confluence =      7.200(Ac.)


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Process from Point/Station      355.000 to Point/Station      399.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1434.500(Ft.)
Downstream point/station elevation =  1432.500(Ft.)
Pipe length  =    30.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    10.726(CFS)
Nearest computed pipe diameter  =     15.00(In.)
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Calculated individual pipe flow  =    10.726(CFS)
Normal flow depth in pipe =    8.75(In.)
Flow top width inside pipe =   14.79(In.)
Critical depth could not be calculated.
Pipe flow velocity =     14.44(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =     7.89 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      399.000 to Point/Station      399.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      7.200(Ac.)
Runoff from this stream =     10.726(CFS)
Time of concentration =    7.89 min.
Rainfall intensity =     2.108(In/Hr)
Summary of stream data:

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


1       13.157     13.95               1.594
2        5.557      8.54               2.027
3       10.726      7.89               2.108
Largest stream flow has longer time of concentration
Qp =     13.157 + sum of
          Qb         Ia/Ib
           5.557 *    0.786 =      4.370
          Qb         Ia/Ib
          10.726 *    0.756 =      8.111
Qp =     25.639

Total of 3 main streams to confluence:
Flow rates before confluence point:
      13.157       5.557      10.726
Area of streams before confluence:
        8.700        3.000        7.200


Results of confluence:
Total flow rate =     25.639(CFS)
Time of concentration =    13.951 min.
Effective stream area after confluence  =     18.900(Ac.)
End of computations, total study area =           18.90 (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 =  62.3
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Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 05/13/21 File:40W.out

REDLANDS WEST- 400 SERIES (REDLANDS AVE)
10-YEAR STORM EVENT
20-0186 - DEVELOPED CONDITION
2021-05-13 AYS

********* 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 410.000 to Point/Station 411.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 380.000(Ft.)
Top (of initial area) elevation = 1447.000(Ft.)
Bottom (of initial area) elevation = 1444.600(Ft.)
Difference in elevation = 2.400(Ft.)
Slope = 0.00632 s(percent)= 0.63
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 8.891 min.
Rainfall intensity = 1.988(In/Hr) for a 10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.869
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 56.00
Pervious area fraction = 0.100; Impervious fraction = 0.900
Initial subarea runoff = 1.382(CFS)
Total initial stream area = 0.800(Ac.)
Pervious area fraction = 0.100

++

Process from Point/Station 411.000 to Point/Station 450.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1438.800(Ft.)
Downstream point/station elevation = 1438.600(Ft.)
Pipe length = 60.00(Ft.) Manning's N = 0.013

```
No. of pipes = 1  Required pipe flow  =     1.382(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     1.382(CFS)
Normal flow depth in pipe =    7.20(In.)
Flow top width inside pipe =   11.76(In.)
Critical Depth =    5.97(In.)
Pipe flow velocity =      2.81(Ft/s)
Travel time through pipe =    0.36 min.
Time of concentration (TC) =     9.25 min.


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Process from Point/Station      450.000 to Point/Station      450.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      0.800(Ac.)
Runoff from this stream =      1.382(CFS)
Time of concentration =    9.25 min.
Rainfall intensity =     1.950(In/Hr)


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Process from Point/Station      501.000 to Point/Station      450.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________________
Rainfall intensity =      1.765(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.866
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
User specified values are as follows:
TC =  11.33 min.  Rain intensity =       1.77(In/Hr)
Total area =         1.00(Ac.)  Total runoff =      1.54(CFS)


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Process from Point/Station      450.000 to Point/Station      450.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.000(Ac.)
Runoff from this stream =      1.545(CFS)
Time of concentration =   11.33 min.
Rainfall intensity =     1.765(In/Hr)
Summary of stream data:

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


1        1.382      9.25                 1.950
2        1.545     11.33                 1.765
Largest stream flow has longer time of concentration
Qp =      1.545 + sum of
          Qb         Ia/Ib
           1.382 *    0.905 =      1.251
Qp =      2.796

Total of 2 streams to confluence:
Flow rates before confluence point:
       1.382       1.545
Area of streams before confluence:
        0.800        1.000
Results of confluence:
Total flow rate =      2.796(CFS)
Time of concentration =    11.330 min.
Effective stream area after confluence =      1.800(Ac.)


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Process from Point/Station      450.000 to Point/Station      455.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1438.600(Ft.)
Downstream point/station elevation =  1438.000(Ft.)
Pipe length  =   210.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.796(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     2.796(CFS)
Normal flow depth in pipe =   10.24(In.)
Flow top width inside pipe =   13.96(In.)
Critical Depth =    8.05(In.)
Pipe flow velocity =      3.13(Ft/s)
Travel time through pipe =    1.12 min.
Time of concentration (TC) =    12.45 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      455.000 to Point/Station      455.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      1.800(Ac.)
Runoff from this stream =      2.796(CFS)
Time of concentration =   12.45 min.
Rainfall intensity =     1.686(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      299.100 to Point/Station      299.100
**** USER DEFINED FLOW INFORMATION AT A POINT ****
------------------------------------------------------------------------
Rainfall intensity =      1.360(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.862
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.900
Decimal fraction soil group C = 0.100
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  57.30
Pervious area fraction =  0.100; Impervious fraction =  0.900
User specified values are as follows:
TC =  19.30 min.  Rain intensity =       1.36(In/Hr)
Total area =        11.70(Ac.)  Total runoff =      5.00(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      299.100 to Point/Station      455.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1438.500(Ft.)
Downstream point/station elevation =  1438.000(Ft.)
Pipe length  =   110.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.000(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     5.000(CFS)
Normal flow depth in pipe =   11.16(In.)
Flow top width inside pipe =   17.48(In.)
Critical Depth =   10.32(In.)
Pipe flow velocity =      4.34(Ft/s)
Travel time through pipe =    0.42 min.
Time of concentration (TC) =    19.72 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      455.000 to Point/Station      455.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     11.700(Ac.)
Runoff from this stream =      5.000(CFS)
Time of concentration =   19.72 min.
Rainfall intensity =     1.345(In/Hr)
Summary of stream data:
```

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


1        2.796     12.45                 1.686
2        5.000     19.72                 1.345
Largest stream flow has longer time of concentration
Qp =      5.000 + sum of
         Qb         Ia/Ib
          2.796 *    0.798 =      2.231
Qp =      7.231

Total of 2 streams to confluence:
Flow rates before confluence point:
       2.796       5.000
Area of streams before confluence:
        1.800       11.700
Results of confluence:
Total flow rate =      7.231(CFS)
Time of concentration =    19.722 min.
Effective stream area after confluence =     13.500(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      455.000 to Point/Station      460.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1438.000(Ft.)
Downstream point/station elevation =  1437.600(Ft.)
Pipe length  =   135.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.231(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     7.231(CFS)
Normal flow depth in pipe =   14.72(In.)
Flow top width inside pipe =   19.23(In.)
Critical Depth =   11.93(In.)
Pipe flow velocity =      4.02(Ft/s)
Travel time through pipe =    0.56 min.
Time of concentration (TC) =    20.28 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      460.000 to Point/Station      460.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     13.500(Ac.)
Runoff from this stream =      7.231(CFS)
Time of concentration =   20.28 min.
Rainfall intensity =     1.327(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      412.000 to Point/Station      413.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   250.000(Ft.)
Top (of initial area) elevation =  1447.300(Ft.)
Bottom (of initial area) elevation =  1445.500(Ft.)
Difference in elevation =     1.800(Ft.)
Slope =    0.00720  s(percent)=       0.72
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.325 min.
Rainfall intensity =      2.186(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.876
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.500
Decimal fraction soil group C = 0.500
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  62.50
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      0.766(CFS)
Total initial stream area =        0.400(Ac.)
Pervious area fraction = 0.100
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      413.000 to Point/Station      460.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------------
Upstream point/station elevation =  1437.800(Ft.)
Downstream point/station elevation =  1437.600(Ft.)
Pipe length  =    40.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.766(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     0.766(CFS)
Normal flow depth in pipe =    5.31(In.)
Flow top width inside pipe =    8.85(In.)
Critical Depth =    4.79(In.)
Pipe flow velocity =      2.82(Ft/s)
Travel time through pipe =    0.24 min.
Time of concentration (TC) =     7.56 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      460.000 to Point/Station      460.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.400(Ac.)
Runoff from this stream =      0.766(CFS)
Time of concentration =    7.56 min.
Rainfall intensity =     2.152(In/Hr)
Summary of stream data:

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


1        7.231     20.28                 1.327
2        0.766      7.56                 2.152
Largest stream flow has longer time of concentration
Qp =      7.231 + sum of
          Qb         Ia/Ib
           0.766 *    0.617 =      0.472
Qp =      7.704

Total of 2 streams to confluence:
Flow rates before confluence point:
       7.231       0.766
Area of streams before confluence:
       13.500        0.400
Results of confluence:
Total flow rate =      7.704(CFS)
Time of concentration =    20.282 min.
Effective stream area after confluence =     13.900(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      460.000 to Point/Station      465.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------------
Upstream point/station elevation =  1437.600(Ft.)
Downstream point/station elevation =  1436.900(Ft.)
Pipe length  =   240.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.704(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     7.704(CFS)
Normal flow depth in pipe =   15.59(In.)
Flow top width inside pipe =   18.37(In.)
Critical Depth =   12.35(In.)
Pipe flow velocity =      4.03(Ft/s)
Travel time through pipe =    0.99 min.
Time of concentration (TC) =    21.28 min.


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Process from Point/Station      465.000 to Point/Station      465.000
**** CONFLUENCE OF MINOR STREAMS ****
```

```
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     13.900(Ac.)
Runoff from this stream =      7.704(CFS)
Time of concentration =   21.28 min.
Rainfall intensity =     1.296(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      399.000 to Point/Station      399.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
----------------------------------------------------------------------
Rainfall intensity =      1.594(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.870
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.500
Decimal fraction soil group C = 0.500
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  62.50
Pervious area fraction =  0.100; Impervious fraction =  0.900
User specified values are as follows:
TC =  13.95 min.  Rain intensity =       1.59(In/Hr)
Total area =        18.90(Ac.)  Total runoff =     11.00(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      399.000 to Point/Station      465.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------
Upstream point/station elevation =  1438.000(Ft.)
Downstream point/station elevation =  1437.000(Ft.)
Pipe length  =   260.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.000(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    11.000(CFS)
Normal flow depth in pipe =   16.01(In.)
Flow top width inside pipe =   22.62(In.)
Critical Depth =   14.27(In.)
Pipe flow velocity =      4.94(Ft/s)
Travel time through pipe =    0.88 min.
Time of concentration (TC) =    14.83 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      465.000 to Point/Station      465.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     18.900(Ac.)
Runoff from this stream =     11.000(CFS)
Time of concentration =   14.83 min.
Rainfall intensity =     1.547(In/Hr)
Summary of stream data:

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


1        7.704     21.28                 1.296
2       11.000     14.83                 1.547
Largest stream flow has longer or shorter time of concentration
Qp =     11.000 + sum of
          Qa           Tb/Ta
           7.704 *    0.697 =      5.369
Qp =     16.369

Total of 2 streams to confluence:
Flow rates before confluence point:
       7.704      11.000
Area of streams before confluence:
       13.900       18.900
Results of confluence:
Total flow rate =     16.369(CFS)
Time of concentration =    14.828 min.
```

Effective stream area after confluence = 32.800(Ac.)
End of computations, total study area = 32.80 (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 = 60.3

100-YEAR ONSITE HYDROLOGY (RATIONAL METHOD)

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 05/13/21 File:300.out

REDLANDS WEST - 300 SERIES
100-YEAR STORM EVENT
20-0186 - DEVELOPED CONDITION
2021-05-13 AYS

********* 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 300.000 to Point/Station 301.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 535.000(Ft.)
Top (of initial area) elevation = 1449.700(Ft.)
Bottom (of initial area) elevation = 1444.400(Ft.)
Difference in elevation = 5.300(Ft.)
Slope = 0.00991 s(percent)= 0.99
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 9.317 min.
Rainfall intensity = 2.790(In/Hr) for a 100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.876
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.900
Decimal fraction soil group C = 0.100
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 57.30
Pervious area fraction = 0.100; Impervious fraction = 0.900
Initial subarea runoff = 5.134(CFS)
Total initial stream area = 2.100(Ac.)
Pervious area fraction = 0.100

++

Process from Point/Station 301.000 to Point/Station 350.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1441.400(Ft.)
Downstream point/station elevation = 1440.200(Ft.)
Pipe length = 235.00(Ft.) Manning's N = 0.013

```
No. of pipes = 1  Required pipe flow  =     5.134(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     5.134(CFS)
Normal flow depth in pipe =   10.92(In.)
Flow top width inside pipe =   17.58(In.)
Critical Depth =   10.48(In.)
Pipe flow velocity =      4.57(Ft/s)
Travel time through pipe =    0.86 min.
Time of concentration (TC) =    10.17 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      350.000 to Point/Station      350.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      2.100(Ac.)
Runoff from this stream =      5.134(CFS)
Time of concentration =   10.17 min.
Rainfall intensity =     2.672(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      302.000 to Point/Station      303.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   200.000(Ft.)
Top (of initial area) elevation =  1446.300(Ft.)
Bottom (of initial area) elevation =  1444.400(Ft.)
Difference in elevation =     1.900(Ft.)
Slope =    0.00950  s(percent)=       0.95
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.339 min.
Rainfall intensity =      3.369(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.879
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      3.849(CFS)
Total initial stream area =        1.300(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      303.000 to Point/Station      350.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1440.400(Ft.)
Downstream point/station elevation =  1440.200(Ft.)
Pipe length  =    10.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.849(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     3.849(CFS)
Normal flow depth in pipe =    7.85(In.)
Flow top width inside pipe =   11.41(In.)
Critical Depth =   10.00(In.)
Pipe flow velocity =      7.07(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =     6.36 min.


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Process from Point/Station      350.000 to Point/Station      350.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.300(Ac.)
Runoff from this stream =      3.849(CFS)
Time of concentration =    6.36 min.
Rainfall intensity =     3.363(In/Hr)
Summary of stream data:
```

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


1        5.134     10.17                2.672
2        3.849      6.36                3.363
Largest stream flow has longer time of concentration
Qp =      5.134 + sum of
          Qb         Ia/Ib
           3.849 *    0.795 =      3.058
Qp =      8.192

Total of 2 streams to confluence:
Flow rates before confluence point:
       5.134       3.849
Area of streams before confluence:
        2.100        1.300
Results of confluence:
Total flow rate =      8.192(CFS)
Time of concentration =    10.174 min.
Effective stream area after confluence =      3.400(Ac.)


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Process from Point/Station      350.000 to Point/Station      351.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1440.200(Ft.)
Downstream point/station elevation =  1437.500(Ft.)
Pipe length  =   535.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.192(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     8.192(CFS)
Normal flow depth in pipe =   13.29(In.)
Flow top width inside pipe =   20.25(In.)
Critical Depth =   12.75(In.)
Pipe flow velocity =      5.10(Ft/s)
Travel time through pipe =    1.75 min.
Time of concentration (TC) =    11.92 min.


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Process from Point/Station      351.000 to Point/Station      351.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      3.400(Ac.)
Runoff from this stream =      8.192(CFS)
Time of concentration =   11.92 min.
Rainfall intensity =     2.472(In/Hr)


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Process from Point/Station      304.000 to Point/Station      305.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   260.000(Ft.)
Top (of initial area) elevation =  1450.600(Ft.)
Bottom (of initial area) elevation =  1446.700(Ft.)
Difference in elevation =     3.900(Ft.)
Slope =    0.01500  s(percent)=       1.50
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.425 min.
Rainfall intensity =      3.347(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.879
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.058(CFS)
Total initial stream area =        0.700(Ac.)
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Pervious area fraction = 0.100


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Process from Point/Station      305.000 to Point/Station      351.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1438.700(Ft.)
Downstream point/station elevation =  1437.500(Ft.)
Pipe length  =    20.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.058(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     2.058(CFS)
Normal flow depth in pipe =    4.54(In.)
Flow top width inside pipe =    9.00(In.)
Critical Depth =    7.80(In.)
Pipe flow velocity =      9.21(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =     6.46 min.


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Process from Point/Station      351.000 to Point/Station      351.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.700(Ac.)
Runoff from this stream =      2.058(CFS)
Time of concentration =    6.46 min.
Rainfall intensity =     3.338(In/Hr)
Summary of stream data:

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


1        8.192     11.92                 2.472
2        2.058      6.46                 3.338
Largest stream flow has longer time of concentration
Qp =      8.192 + sum of
          Qb         Ia/Ib
           2.058 *    0.741 =      1.525
Qp =      9.717

Total of 2 streams to confluence:
Flow rates before confluence point:
       8.192       2.058
Area of streams before confluence:
        3.400        0.700
Results of confluence:
Total flow rate =      9.717(CFS)
Time of concentration =    11.920 min.
Effective stream area after confluence =      4.100(Ac.)


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Process from Point/Station      351.000 to Point/Station      352.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1437.500(Ft.)
Downstream point/station elevation =  1436.200(Ft.)
Pipe length  =   265.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.717(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     9.717(CFS)
Normal flow depth in pipe =   15.23(In.)
Flow top width inside pipe =   18.74(In.)
Critical Depth =   13.93(In.)
Pipe flow velocity =      5.20(Ft/s)
Travel time through pipe =    0.85 min.
Time of concentration (TC) =    12.77 min.


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Process from Point/Station      352.000 to Point/Station      352.000
```

**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 4.100(Ac.)
Runoff from this stream = 9.717(CFS)
Time of concentration = 12.77 min.
Rainfall intensity = 2.391(In/Hr)

++
Process from Point/Station 306.000 to Point/Station 307.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 205.000(Ft.)
Top (of initial area) elevation = 1449.100(Ft.)
Bottom (of initial area) elevation = 1445.500(Ft.)
Difference in elevation = 3.600(Ft.)
Slope = 0.01756 s(percent)= 1.76
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 5.661 min.
Rainfall intensity = 3.561(In/Hr) for a 100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.885
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.300
Decimal fraction soil group C = 0.700
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 65.10
Pervious area fraction = 0.100; Impervious fraction = 0.900
Initial subarea runoff = 2.206(CFS)
Total initial stream area = 0.700(Ac.)
Pervious area fraction = 0.100

++
Process from Point/Station 307.000 to Point/Station 352.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1437.500(Ft.)
Downstream point/station elevation = 1436.200(Ft.)
Pipe length = 25.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 2.206(CFS)
Nearest computed pipe diameter = 9.00(In.)
Calculated individual pipe flow = 2.206(CFS)
Normal flow depth in pipe = 4.95(In.)
Flow top width inside pipe = 8.96(In.)
Critical Depth = 7.99(In.)
Pipe flow velocity = 8.87(Ft/s)
Travel time through pipe = 0.05 min.
Time of concentration (TC) = 5.71 min.

++
Process from Point/Station 352.000 to Point/Station 352.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 0.700(Ac.)
Runoff from this stream = 2.206(CFS)
Time of concentration = 5.71 min.
Rainfall intensity = 3.547(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	9.717	12.77	2.391
2	2.206	5.71	3.547

Largest stream flow has longer time of concentration
Qp = 9.717 + sum of
Qb Ia/Ib
2.206 * 0.674 = 1.487
Qp = 11.203

```
Total of 2 streams to confluence:
Flow rates before confluence point:
       9.717       2.206
Area of streams before confluence:
        4.100        0.700
Results of confluence:
Total flow rate =     11.203(CFS)
Time of concentration =    12.769 min.
Effective stream area after confluence =      4.800(Ac.)


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Process from Point/Station      352.000 to Point/Station      353.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1436.200(Ft.)
Downstream point/station elevation =  1432.900(Ft.)
Pipe length  =   305.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.203(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    11.203(CFS)
Normal flow depth in pipe =   12.70(In.)
Flow top width inside pipe =   20.53(In.)
Critical Depth =   14.98(In.)
Pipe flow velocity =      7.37(Ft/s)
Travel time through pipe =    0.69 min.
Time of concentration (TC) =    13.46 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      353.000 to Point/Station      353.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      4.800(Ac.)
Runoff from this stream =     11.203(CFS)
Time of concentration =   13.46 min.
Rainfall intensity =     2.330(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      308.000 to Point/Station      309.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   595.000(Ft.)
Top (of initial area) elevation =  1450.600(Ft.)
Bottom (of initial area) elevation =  1447.600(Ft.)
Difference in elevation =     3.000(Ft.)
Slope =    0.00504  s(percent)=       0.50
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.128 min.
Rainfall intensity =      2.557(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.876
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.800
Decimal fraction soil group C = 0.200
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  58.60
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      8.734(CFS)
Total initial stream area =        3.900(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station      309.000 to Point/Station      353.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1440.600(Ft.)
Downstream point/station elevation =  1432.900(Ft.)
Pipe length  =    95.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.734(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     8.734(CFS)
```

```
Normal flow depth in pipe =    8.59(In.)
Flow top width inside pipe =   10.82(In.)
Critical depth could not be calculated.
Pipe flow velocity =     14.53(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =    11.24 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      353.000 to Point/Station      353.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      3.900(Ac.)
Runoff from this stream =      8.734(CFS)
Time of concentration =   11.24 min.
Rainfall intensity =     2.545(In/Hr)
Summary of stream data:

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


1       11.203     13.46                 2.330
2        8.734     11.24                 2.545
Largest stream flow has longer time of concentration
Qp =     11.203 + sum of
          Qb         Ia/Ib
           8.734 *    0.915 =      7.995
Qp =     19.199

Total of 2 streams to confluence:
Flow rates before confluence point:
      11.203       8.734
Area of streams before confluence:
       4.800        3.900
Results of confluence:
Total flow rate =     19.199(CFS)
Time of concentration =    13.459 min.
Effective stream area after confluence =      8.700(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      353.000 to Point/Station      399.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1432.900(Ft.)
Downstream point/station elevation =  1432.500(Ft.)
Pipe length  =    35.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    19.199(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    19.199(CFS)
Normal flow depth in pipe =   16.15(In.)
Flow top width inside pipe =   22.52(In.)
Critical Depth =   18.92(In.)
Pipe flow velocity =      8.54(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =    13.53 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      399.000 to Point/Station      399.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      8.700(Ac.)
Runoff from this stream =     19.199(CFS)
Time of concentration =   13.53 min.
Rainfall intensity =     2.324(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      310.000 to Point/Station      311.000
```

```
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Initial area flow distance =   260.000(Ft.)
Top (of initial area) elevation =  1443.900(Ft.)
Bottom (of initial area) elevation =  1442.200(Ft.)
Difference in elevation =     1.700(Ft.)
Slope =    0.00654  s(percent)=       0.65
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.586 min.
Rainfall intensity =      3.085(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.885
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      4.917(CFS)
Total initial stream area =        1.800(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station      311.000 to Point/Station      354.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1439.200(Ft.)
Downstream point/station elevation =  1436.400(Ft.)
Pipe length  =   280.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.917(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.917(CFS)
Normal flow depth in pipe =    9.80(In.)
Flow top width inside pipe =   14.28(In.)
Critical Depth =   10.79(In.)
Pipe flow velocity =      5.79(Ft/s)
Travel time through pipe =    0.81 min.
Time of concentration (TC) =     8.39 min.


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Process from Point/Station      354.000 to Point/Station      354.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      1.800(Ac.)
Runoff from this stream =      4.917(CFS)
Time of concentration =    8.39 min.
Rainfall intensity =     2.937(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      312.000 to Point/Station      313.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
Initial area flow distance =   250.000(Ft.)
Top (of initial area) elevation =  1443.900(Ft.)
Bottom (of initial area) elevation =  1442.200(Ft.)
Difference in elevation =     1.700(Ft.)
Slope =    0.00680  s(percent)=       0.68
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.410 min.
Rainfall intensity =      3.121(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.886
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      3.317(CFS)
Total initial stream area =        1.200(Ac.)
Pervious area fraction = 0.100
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      313.000 to Point/Station      354.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------------
Upstream point/station elevation =  1436.700(Ft.)
Downstream point/station elevation =  1436.400(Ft.)
Pipe length  =    10.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.317(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     3.317(CFS)
Normal flow depth in pipe =    6.26(In.)
Flow top width inside pipe =   11.99(In.)
Critical Depth =    9.35(In.)
Pipe flow velocity =      8.00(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =     7.43 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      354.000 to Point/Station      354.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.200(Ac.)
Runoff from this stream =      3.317(CFS)
Time of concentration =    7.43 min.
Rainfall intensity =     3.117(In/Hr)
Summary of stream data:

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


1        4.917      8.39                 2.937
2        3.317      7.43                 3.117
Largest stream flow has longer time of concentration
Qp =      4.917 + sum of
          Qb          Ia/Ib
           3.317 *    0.942 =      3.125
Qp =      8.042

Total of 2 streams to confluence:
Flow rates before confluence point:
       4.917       3.317
Area of streams before confluence:
        1.800        1.200
Results of confluence:
Total flow rate =      8.042(CFS)
Time of concentration =     8.391 min.
Effective stream area after confluence =      3.000(Ac.)


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Process from Point/Station      354.000 to Point/Station      399.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------------
Upstream point/station elevation =  1436.400(Ft.)
Downstream point/station elevation =  1432.500(Ft.)
Pipe length  =    45.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.042(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     8.042(CFS)
Normal flow depth in pipe =    7.88(In.)
Flow top width inside pipe =   11.40(In.)
Critical depth could not be calculated.
Pipe flow velocity =     14.72(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =     8.44 min.


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Process from Point/Station      399.000 to Point/Station      399.000
**** CONFLUENCE OF MAIN STREAMS ****
```

```
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      3.000(Ac.)
Runoff from this stream =      8.042(CFS)
Time of concentration =    8.44 min.
Rainfall intensity =     2.928(In/Hr)
Program is now starting with Main Stream No. 3


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Process from Point/Station      314.000 to Point/Station      315.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   525.000(Ft.)
Top (of initial area) elevation =  1450.300(Ft.)
Bottom (of initial area) elevation =  1447.900(Ft.)
Difference in elevation =     2.400(Ft.)
Slope =    0.00457  s(percent)=       0.46
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.794 min.
Rainfall intensity =      2.596(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.879
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.500
Decimal fraction soil group C = 0.500
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  62.50
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      8.440(CFS)
Total initial stream area =        3.700(Ac.)
Pervious area fraction = 0.100


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Process from Point/Station      315.000 to Point/Station      355.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1440.900(Ft.)
Downstream point/station elevation =  1434.500(Ft.)
Pipe length  =   150.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.440(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     8.440(CFS)
Normal flow depth in pipe =    8.66(In.)
Flow top width inside pipe =   14.82(In.)
Critical Depth =   13.61(In.)
Pipe flow velocity =     11.51(Ft/s)
Travel time through pipe =    0.22 min.
Time of concentration (TC) =    11.01 min.


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Process from Point/Station      355.000 to Point/Station      355.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 3 in normal stream number 1
Stream flow area =      3.700(Ac.)
Runoff from this stream =      8.440(CFS)
Time of concentration =   11.01 min.
Rainfall intensity =     2.570(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      316.000 to Point/Station      317.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   430.000(Ft.)
Top (of initial area) elevation =  1449.700(Ft.)
Bottom (of initial area) elevation =  1442.400(Ft.)
Difference in elevation =     7.300(Ft.)
Slope =    0.01698  s(percent)=       1.70
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.665 min.
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Rainfall intensity =      3.070(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.884
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.200
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  66.40
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      9.495(CFS)
Total initial stream area =        3.500(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      317.000 to Point/Station      355.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1438.400(Ft.)
Downstream point/station elevation =  1434.500(Ft.)
Pipe length  =   110.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.495(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     9.495(CFS)
Normal flow depth in pipe =    9.97(In.)
Flow top width inside pipe =   14.16(In.)
Critical Depth =   14.05(In.)
Pipe flow velocity =     10.96(Ft/s)
Travel time through pipe =    0.17 min.
Time of concentration (TC) =     7.83 min.


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Process from Point/Station      355.000 to Point/Station      355.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 3 in normal stream number 2
Stream flow area =      3.500(Ac.)
Runoff from this stream =      9.495(CFS)
Time of concentration =    7.83 min.
Rainfall intensity =     3.037(In/Hr)
Summary of stream data:

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


1        8.440     11.01                2.570
2        9.495      7.83                3.037
Largest stream flow has longer or shorter time of concentration
Qp =      9.495 + sum of
          Qa          Tb/Ta
           8.440 *    0.711 =      6.004
Qp =     15.499

Total of 2 streams to confluence:
Flow rates before confluence point:
       8.440       9.495
Area of streams before confluence:
        3.700        3.500
Results of confluence:
Total flow rate =     15.499(CFS)
Time of concentration =     7.833 min.
Effective stream area after confluence =      7.200(Ac.)


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Process from Point/Station      355.000 to Point/Station      399.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1434.500(Ft.)
Downstream point/station elevation =  1432.500(Ft.)
Pipe length  =    30.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    15.499(CFS)
Nearest computed pipe diameter  =     15.00(In.)
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Calculated individual pipe flow  =    15.499(CFS)
Normal flow depth in pipe =   11.44(In.)
Flow top width inside pipe =   12.77(In.)
Critical depth could not be calculated.
Pipe flow velocity =     15.44(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =     7.87 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      399.000 to Point/Station      399.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      7.200(Ac.)
Runoff from this stream =     15.499(CFS)
Time of concentration =    7.87 min.
Rainfall intensity =     3.031(In/Hr)
Summary of stream data:

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


1       19.199     13.53               2.324
2        8.042      8.44               2.928
3       15.499      7.87               3.031
Largest stream flow has longer time of concentration
Qp =     19.199 + sum of
          Qb         Ia/Ib
           8.042 *    0.794 =      6.383
          Qb         Ia/Ib
          15.499 *    0.767 =     11.882
Qp =     37.464

Total of 3 main streams to confluence:
Flow rates before confluence point:
      19.199       8.042      15.499
Area of streams before confluence:
        8.700        3.000        7.200


Results of confluence:
Total flow rate =     37.464(CFS)
Time of concentration =    13.527 min.
Effective stream area after confluence  =     18.900(Ac.)
End of computations, total study area =           18.90 (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 =  62.3
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Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 05/13/21 File:400W.out

REDLANDS WEST- 400 SERIES (REDLANDS AVE)
100-YEAR STORM EVENT
20-0186 - DEVELOPED CONDITION
2021-05-13 AYS

********* 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

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Process from Point/Station 410.000 to Point/Station 411.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance = 380.000(Ft.)
Top (of initial area) elevation = 1447.000(Ft.)
Bottom (of initial area) elevation = 1444.600(Ft.)
Difference in elevation = 2.400(Ft.)
Slope = 0.00632 s(percent)= 0.63
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 8.891 min.
Rainfall intensity = 2.854(In/Hr) for a 100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.876
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2) = 56.00
Pervious area fraction = 0.100; Impervious fraction = 0.900
Initial subarea runoff = 2.000(CFS)
Total initial stream area = 0.800(Ac.)
Pervious area fraction = 0.100

++

Process from Point/Station 411.000 to Point/Station 450.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1438.800(Ft.)
Downstream point/station elevation = 1438.600(Ft.)
Pipe length = 60.00(Ft.) Manning's N = 0.013

```
No. of pipes = 1  Required pipe flow  =     2.000(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.000(CFS)
Normal flow depth in pipe =    9.55(In.)
Flow top width inside pipe =    9.67(In.)
Critical Depth =    7.25(In.)
Pipe flow velocity =      2.98(Ft/s)
Travel time through pipe =    0.34 min.
Time of concentration (TC) =     9.23 min.


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Process from Point/Station      450.000 to Point/Station      450.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      0.800(Ac.)
Runoff from this stream =      2.000(CFS)
Time of concentration =    9.23 min.
Rainfall intensity =     2.803(In/Hr)


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Process from Point/Station      501.000 to Point/Station      450.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________________
Rainfall intensity =      2.521(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.874
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
User specified values are as follows:
TC =  11.46 min.  Rain intensity =       2.52(In/Hr)
Total area =         1.00(Ac.)  Total runoff =      2.24(CFS)


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Process from Point/Station      450.000 to Point/Station      450.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.000(Ac.)
Runoff from this stream =      2.236(CFS)
Time of concentration =   11.46 min.
Rainfall intensity =     2.521(In/Hr)
Summary of stream data:

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


1        2.000      9.23                 2.803
2        2.236     11.46                 2.521
Largest stream flow has longer time of concentration
Qp =      2.236 + sum of
          Qb         Ia/Ib
           2.000 *    0.899 =      1.798
Qp =      4.034

Total of 2 streams to confluence:
Flow rates before confluence point:
       2.000       2.236
Area of streams before confluence:
        0.800        1.000
Results of confluence:
Total flow rate =      4.034(CFS)
Time of concentration =    11.460 min.
Effective stream area after confluence =      1.800(Ac.)


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Process from Point/Station      450.000 to Point/Station      455.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1438.600(Ft.)
Downstream point/station elevation =  1438.000(Ft.)
Pipe length  =   210.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.034(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     4.034(CFS)
Normal flow depth in pipe =   11.30(In.)
Flow top width inside pipe =   17.40(In.)
Critical Depth =    9.22(In.)
Pipe flow velocity =      3.46(Ft/s)
Travel time through pipe =    1.01 min.
Time of concentration (TC) =    12.47 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      455.000 to Point/Station      455.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      1.800(Ac.)
Runoff from this stream =      4.034(CFS)
Time of concentration =   12.47 min.
Rainfall intensity =     2.418(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      299.100 to Point/Station      299.100
**** USER DEFINED FLOW INFORMATION AT A POINT ****
------------------------------------------------------------------------
Rainfall intensity =      1.983(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.870
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.900
Decimal fraction soil group C = 0.100
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  57.30
Pervious area fraction =  0.100; Impervious fraction =  0.900
User specified values are as follows:
TC =  18.69 min.  Rain intensity =       1.98(In/Hr)
Total area =        11.70(Ac.)  Total runoff =      5.00(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      299.100 to Point/Station      455.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1438.500(Ft.)
Downstream point/station elevation =  1438.000(Ft.)
Pipe length  =   110.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.000(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     5.000(CFS)
Normal flow depth in pipe =   11.16(In.)
Flow top width inside pipe =   17.48(In.)
Critical Depth =   10.32(In.)
Pipe flow velocity =      4.34(Ft/s)
Travel time through pipe =    0.42 min.
Time of concentration (TC) =    19.11 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      455.000 to Point/Station      455.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     11.700(Ac.)
Runoff from this stream =      5.000(CFS)
Time of concentration =   19.11 min.
Rainfall intensity =     1.962(In/Hr)
Summary of stream data:
```

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


1        4.034     12.47                 2.418
2        5.000     19.11                 1.962
Largest stream flow has longer time of concentration
Qp =      5.000 + sum of
          Qb         Ia/Ib
           4.034 *    0.811 =      3.273
Qp =      8.273

Total of 2 streams to confluence:
Flow rates before confluence point:
       4.034       5.000
Area of streams before confluence:
        1.800       11.700
Results of confluence:
Total flow rate =      8.273(CFS)
Time of concentration =    19.112 min.
Effective stream area after confluence =     13.500(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      455.000 to Point/Station      460.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1438.000(Ft.)
Downstream point/station elevation =  1437.600(Ft.)
Pipe length  =   135.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.273(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     8.273(CFS)
Normal flow depth in pipe =   16.50(In.)
Flow top width inside pipe =   17.23(In.)
Critical Depth =   12.81(In.)
Pipe flow velocity =      4.08(Ft/s)
Travel time through pipe =    0.55 min.
Time of concentration (TC) =    19.66 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      460.000 to Point/Station      460.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     13.500(Ac.)
Runoff from this stream =      8.273(CFS)
Time of concentration =   19.66 min.
Rainfall intensity =     1.935(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      412.000 to Point/Station      413.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Initial area flow distance =   250.000(Ft.)
Top (of initial area) elevation =  1447.300(Ft.)
Bottom (of initial area) elevation =  1445.500(Ft.)
Difference in elevation =     1.800(Ft.)
Slope =    0.00720  s(percent)=       0.72
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.325 min.
Rainfall intensity =      3.139(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.882
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.500
Decimal fraction soil group C = 0.500
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  62.50
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.107(CFS)
Total initial stream area =        0.400(Ac.)
Pervious area fraction = 0.100
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      413.000 to Point/Station      460.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------------
Upstream point/station elevation =  1437.800(Ft.)
Downstream point/station elevation =  1437.600(Ft.)
Pipe length  =    40.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.107(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.107(CFS)
Normal flow depth in pipe =    6.97(In.)
Flow top width inside pipe =    7.52(In.)
Critical Depth =    5.80(In.)
Pipe flow velocity =      3.01(Ft/s)
Travel time through pipe =    0.22 min.
Time of concentration (TC) =     7.55 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      460.000 to Point/Station      460.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.400(Ac.)
Runoff from this stream =      1.107(CFS)
Time of concentration =    7.55 min.
Rainfall intensity =     3.093(In/Hr)
Summary of stream data:

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


1        8.273     19.66                  1.935
2        1.107      7.55                  3.093
Largest stream flow has longer time of concentration
Qp =      8.273 + sum of
          Qb          Ia/Ib
           1.107 *    0.625 =      0.692
Qp =      8.965

Total of 2 streams to confluence:
Flow rates before confluence point:
       8.273       1.107
Area of streams before confluence:
       13.500        0.400
Results of confluence:
Total flow rate =      8.965(CFS)
Time of concentration =    19.663 min.
Effective stream area after confluence =     13.900(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      460.000 to Point/Station      465.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------------
Upstream point/station elevation =  1437.600(Ft.)
Downstream point/station elevation =  1436.900(Ft.)
Pipe length  =   240.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.965(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =     8.965(CFS)
Normal flow depth in pipe =   15.28(In.)
Flow top width inside pipe =   23.09(In.)
Critical Depth =   12.83(In.)
Pipe flow velocity =      4.25(Ft/s)
Travel time through pipe =    0.94 min.
Time of concentration (TC) =    20.60 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      465.000 to Point/Station      465.000
**** CONFLUENCE OF MINOR STREAMS ****
```

```
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     13.900(Ac.)
Runoff from this stream =      8.965(CFS)
Time of concentration =   20.60 min.
Rainfall intensity =     1.891(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      399.000 to Point/Station      399.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
----------------------------------------------------------------------
Rainfall intensity =      2.324(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.877
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.500
Decimal fraction soil group C = 0.500
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  62.50
Pervious area fraction =  0.100; Impervious fraction =  0.900
User specified values are as follows:
TC =  13.53 min.  Rain intensity =       2.32(In/Hr)
Total area =        18.90(Ac.)  Total runoff =     11.00(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      399.000 to Point/Station      465.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------
Upstream point/station elevation =  1438.000(Ft.)
Downstream point/station elevation =  1437.000(Ft.)
Pipe length  =   260.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.000(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    11.000(CFS)
Normal flow depth in pipe =   16.01(In.)
Flow top width inside pipe =   22.62(In.)
Critical Depth =   14.27(In.)
Pipe flow velocity =      4.94(Ft/s)
Travel time through pipe =    0.88 min.
Time of concentration (TC) =    14.40 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      465.000 to Point/Station      465.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     18.900(Ac.)
Runoff from this stream =     11.000(CFS)
Time of concentration =   14.40 min.
Rainfall intensity =     2.254(In/Hr)
Summary of stream data:

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


1        8.965     20.60                 1.891
2       11.000     14.40                 2.254
Largest stream flow has longer or shorter time of concentration
Qp =     11.000 + sum of
          Qa           Tb/Ta
           8.965 *    0.699 =      6.267
Qp =     17.267

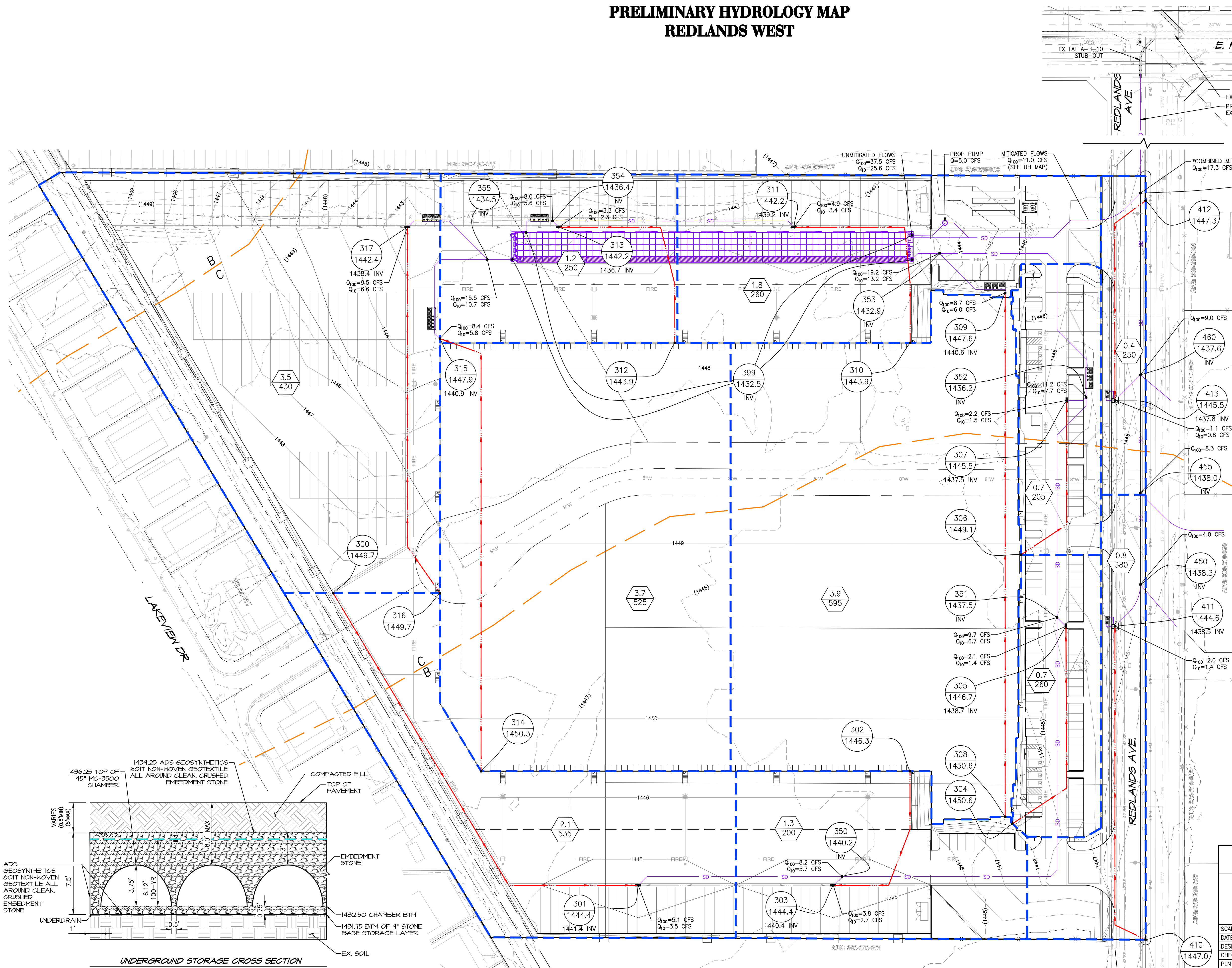
Total of 2 streams to confluence:
Flow rates before confluence point:
       8.965      11.000
Area of streams before confluence:
       13.900       18.900
Results of confluence:
Total flow rate =     17.267(CFS)
Time of concentration =    14.404 min.
```

Effective stream area after confluence = 32.800(Ac.)
End of computations, total study area = 32.80 (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 = 60.3

RATIONAL METHOD HYDROLOGY MAPS

PRELIMINARY HYDROLOGY MAP
REDLANDS WEST



***NOTE**

– COMBINED MITIGATED FLOW RATE INCLUDES REDLANDS EAST INDUSTRIAL DEVELOPMENT

– PEAK MITIGATED FLOW RATES HAVE BEEN CALCULATED ONLY FOR THE 100–YEAR STORM EVENT. PEAK MITIGATED FLOW RATES FOR THE 10–YEAR STORM EVENT WILL BE CONSIDERABLY LOWER THAN THE 100–YEAR PEAK MITIGATED FLOW RATES.

LEGEND

Symbol	Meaning
NODE / ELEV	– NODE NUMBER; – ELEVATION (FT)
AC / FT	– AREA (AC); – LENGTH (FT)
blue dashed line	– DRAINAGE AREA BOUNDARY (PROPOSED)
red line	– FLOWLINE (PROPOSED)
orange dashed line	– NRCS SOIL BOUNDARY

N / S / E / W — WEBB

1" = 50'
50 0 50 100 150

CITY OF PERRIS, CALIFORNIA
REDLANDS WEST

DEVELOPED CONDITION RATIONAL METHOD HYDROLOGY MAP

SCALE: 1"=50'	ALBERT A. WEBB ASSOCIATES	ENGINEERING CONSULTANTS 3788 McCRAY STREET RIVERSIDE CA. 92506 PH. (951) 686-1070 FAX (951) 788-1256	W.O. 20-0186
DATE: 11/9/2020			SHEET 1
DESIGNED: AYS			OF 1 SHEETS
CHECKED: JRG			
PLN CK REF:			DWG. NO.
F.B.			

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APPENDIX B – HYDRAULIC ANALYSIS

Hydraulic calculations to be provided in Final Engineering.

APPENDIX C – UNIT HYDROGRAPH / ROUTING ANALYSIS

PROPOSED CONDITION 100-YEAR, 1/3/6/24-HOUR UNIT HYDROGRAPHS

DEVELOPED CONDITION									
Cover Type	**Condition (Poor,Fair,Good)**	**Soil Type (A,B,C,D)**	**COVER TYPE**	**RI**	**Land Use**	**% Impervious**	**Area (SF)**	**Area (SF)**	**Impervious Area (SF)**
Urban	Good	B	RESIDENTIAL OR COMMERCIAL	56	Streets/Conc	0.9	183363	4.21	165027
Urban	Good	B	RESIDENTIAL OR COMMERCIAL	56	Roof	0.9	195276	4.48	175748
Urban	Good	B	RESIDENTIAL OR COMMERCIAL	56	Landscape	0	58454	1.34	0
Urban	Good	C	RESIDENTIAL OR COMMERCIAL	69	Streets/Conc	0.9	254007	5.83	228606
Urban	Good	C	RESIDENTIAL OR COMMERCIAL	69	Roof	0.9	135061	3.10	121555
Urban	Good	C	RESIDENTIAL OR COMMERCIAL	69	Landscape	0	51090	1.17	0
			AVERAGE WEIGHTED RI VALUE	**62.5**		**TOTAL**	877250	20.1	
						TOTAL % IMPERVIOUS		**78.8%**	
						LOW LOSS RATE		**0.270**	

DEVELOPED CONDITION								
	EAST			WEST			COMBINED	
RETURN PERIOD *(yr)*	**EVENT** *(hrs)*	**VOL** *(ac-ft)*	***PEAK*** *(cfs)*	**EVENT** *(hrs)*	**VOL** *(ac-ft)*	***PEAK*** *(cfs)*	**VOL** *(ac-ft)*	***PEAK*** *(cfs)*
100	1	1.1	*36.37*	1	1.8	*50.07*	2.9	*86.44*
	3	1.6	*20.47*	3	2.6	*31.52*	4.2	*51.99*
	6	2.1	*17.76*	6	3.3	*27.41*	5.4	*45.17*
	24	3.3	*5.81*	24	5.3	*9.47*	8.6	*15.28*

U n i t H y d r o g r a p h A n a l y s i s

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Study date 05/12/21 File: PROPWEST1001100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 4010

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

REDLANDS WEST- DEVELOPED CONDITION
100-YEAR STORM EVENT
20-0186 WEST INDUSTRIAL PROJECT
05/12/2020 AYS

Drainage Area = 20.10(Ac.) = 0.031 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 20.10(Ac.) = 0.031 Sq. Mi.
Length along longest watercourse = 1915.00(Ft.)
Length along longest watercourse measured to centroid = 500.00(Ft.)
Length along longest watercourse = 0.363 Mi.
Length along longest watercourse measured to centroid = 0.095 Mi.
Difference in elevation = 17.20(Ft.)
Slope along watercourse = 47.4235 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.048 Hr.
Lag time = 2.88 Min.
25% of lag time = 0.72 Min.
40% of lag time = 1.15 Min.
Unit time = 5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
20.10	0.45	9.05

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
20.10	1.20	24.12

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 0.450(In)
Area Averaged 100-Year Rainfall = 1.200(In)

Point rain (area averaged) = 1.200(In)
Areal adjustment factor = 99.98 %
Adjusted average point rain = 1.200(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
20.100	62.50	0.788

Total Area Entered = 20.10(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)

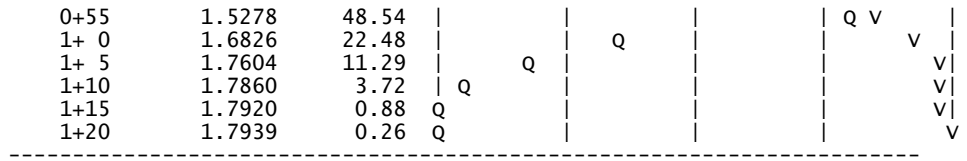
```
      62.5  62.5      0.443     0.788        0.129       1.000      0.129
                                                        Sum (F) =   0.129
      Area averaged mean soil loss (F) (In/Hr) =  0.129
      Minimum soil loss rate ((In/Hr)) =  0.064
      (for 24 hour storm duration)
      Soil low loss rate (decimal) =   0.270
      ------------------------------------------------------------------------
      Slope of intensity-duration curve for a 1 hour storm =0.5000
      ------------------------------------------------------------------------

                  U n i t  H y d r o g r a p h
                         VALLEY S-Curve
      ------------------------------------------------------------------------
                  Unit Hydrograph Data
      ------------------------------------------------------------------------
      Unit time period   Time % of lag   Distribution   Unit Hydrograph
          (hrs)                          Graph %           (CFS)
      ------------------------------------------------------------------------
          1   0.083        173.510         38.418             7.782
          2   0.167        347.020         45.257             9.168
          3   0.250        520.529          9.969             2.019
          4   0.333        694.039          4.152             0.841
          5   0.417        867.549          2.203             0.446
                                  Sum = 100.000    Sum=      20.257
-------------------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time   Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)  Percent   (In/Hr)         Max   |   Low        (In/Hr)
   1   0.08     4.20      0.605          0.129    (  0.163)        0.476
   2   0.17     4.30      0.619          0.129    (  0.167)        0.490
   3   0.25     5.00      0.720          0.129    (  0.194)        0.591
   4   0.33     5.00      0.720          0.129    (  0.194)        0.591
   5   0.42     5.80      0.835          0.129    (  0.225)        0.706
   6   0.50     6.50      0.936          0.129    (  0.253)        0.807
   7   0.58     7.40      1.065          0.129    (  0.288)        0.937
   8   0.67     8.60      1.238          0.129    (  0.334)        1.109
   9   0.75    12.30      1.771          0.129    (  0.478)        1.642
  10   0.83    29.10      4.190          0.129    (  1.131)        4.061
  11   0.92     6.80      0.979          0.129    (  0.264)        0.850
  12   1.00     5.00      0.720          0.129    (  0.194)        0.591
               (Loss Rate Not Used)
     Sum =     100.0                                  Sum =    12.9
        Flood volume = Effective rainfall      1.07(In)
         times area      20.1(Ac.)/[(In)/(Ft.)] =       1.8(Ac.Ft)
        Total soil loss =      0.13(In)
        Total soil loss =     0.216(Ac.Ft)
        Total rainfall =      1.20(In)
        Flood volume =       78140.2 Cubic Feet
        Total soil loss =        9399.4 Cubic Feet
        ------------------------------------------------------------------------
         Peak flow rate of this hydrograph =     50.071(CFS)
        ------------------------------------------------------------------------
        ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          1 - H O U R    S T O R M
                       R u n o f f      H y d r o g r a p h
        ------------------------------------------------------------------------
                    Hydrograph in   5   Minute intervals ((CFS))

        ------------------------------------------------------------------------
  Time(h+m) Volume Ac.Ft   Q(CFS)  0       15.0      30.0      45.0      60.0
  ------------------------------------------------------------------------
    0+ 5       0.0255      3.71  V Q       |         |         |         |
    0+10       0.0819      8.18  |V   Q    |         |         |         |
    0+15       0.1512     10.06  |  V  Q   |         |         |         |
    0+20       0.2298     11.41  |    V Q  |         |         |         |
    0+25       0.3175     12.74  |      VQ |         |         |         |
    0+30       0.4186     14.67  |        Q|         |         |         |
    0+35       0.5348     16.88  |         |Q        |         |         |
    0+40       0.6706     19.72  |         |  QV     |         |         |
    0+45       0.8486     25.85  |         |      QV |         |         |
    0+50       1.1935     50.07  |         |         |     V   |  Q      |
```


0+55 1.5278 48.54
1+ 0 1.6826 22.48
1+ 5 1.7604 11.29
1+10 1.7860 3.72
1+15 1.7920 0.88
1+20 1.7939 0.26

U n i t H y d r o g r a p h A n a l y s i s

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Study date 05/12/21 File: PROPWEST1003100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 4010

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

REDLANDS WEST- DEVELOPED CONDITION
100-YEAR STORM EVENT
20-0186 WEST INDUSTRIAL PROJECT
05/12/2020 AYS

Drainage Area = 20.10(Ac.) = 0.031 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 20.10(Ac.) = 0.031 Sq. Mi.
Length along longest watercourse = 1915.00(Ft.)
Length along longest watercourse measured to centroid = 500.00(Ft.)
Length along longest watercourse = 0.363 Mi.
Length along longest watercourse measured to centroid = 0.095 Mi.
Difference in elevation = 17.20(Ft.)
Slope along watercourse = 47.4235 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.048 Hr.
Lag time = 2.88 Min.
25% of lag time = 0.72 Min.
40% of lag time = 1.15 Min.
Unit time = 5.00 Min.
Duration of storm = 3 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
20.10	0.80	16.08

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
20.10	1.90	38.19

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 0.800(In)
Area Averaged 100-Year Rainfall = 1.900(In)

Point rain (area averaged) = 1.900(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 1.900(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
20.100	62.50	0.788

Total Area Entered = 20.10(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)

62.5	62.5	0.443	0.788	0.129	1.000	0.129
					Sum (F) =	0.129

Area averaged mean soil loss (F) (In/Hr) = 0.129
Minimum soil loss rate ((In/Hr)) = 0.064
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.270

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	173.510	38.418	7.782
2	0.167	347.020	45.257	9.168
3	0.250	520.529	9.969	2.019
4	0.333	694.039	4.152	0.841
5	0.417	867.549	2.203	0.446
			Sum = 100.000	Sum= 20.257

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit Time	(Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max		Low	Effective (In/Hr)
1	0.08	1.30	0.296	(0.129)		0.080	0.216
2	0.17	1.30	0.296	(0.129)		0.080	0.216
3	0.25	1.10	0.251	(0.129)		0.068	0.183
4	0.33	1.50	0.342	(0.129)		0.092	0.250
5	0.42	1.50	0.342	(0.129)		0.092	0.250
6	0.50	1.80	0.410	(0.129)		0.111	0.300
7	0.58	1.50	0.342	(0.129)		0.092	0.250
8	0.67	1.80	0.410	(0.129)		0.111	0.300
9	0.75	1.80	0.410	(0.129)		0.111	0.300
10	0.83	1.50	0.342	(0.129)		0.092	0.250
11	0.92	1.60	0.365	(0.129)		0.098	0.266
12	1.00	1.80	0.410	(0.129)		0.111	0.300
13	1.08	2.20	0.502	0.129	(	0.135)	0.373
14	1.17	2.20	0.502	0.129	(	0.135)	0.373
15	1.25	2.20	0.502	0.129	(	0.135)	0.373
16	1.33	2.00	0.456	(0.129)		0.123	0.333
17	1.42	2.60	0.593	0.129	(	0.160)	0.464
18	1.50	2.70	0.616	0.129	(	0.166)	0.487
19	1.58	2.40	0.547	0.129	(	0.148)	0.418
20	1.67	2.70	0.616	0.129	(	0.166)	0.487
21	1.75	3.30	0.752	0.129	(	0.203)	0.624
22	1.83	3.10	0.707	0.129	(	0.191)	0.578
23	1.92	2.90	0.661	0.129	(	0.179)	0.532
24	2.00	3.00	0.684	0.129	(	0.185)	0.555
25	2.08	3.10	0.707	0.129	(	0.191)	0.578
26	2.17	4.20	0.958	0.129	(	0.259)	0.829
27	2.25	5.00	1.140	0.129	(	0.308)	1.011
28	2.33	3.50	0.798	0.129	(	0.215)	0.669
29	2.42	6.80	1.550	0.129	(	0.419)	1.421
30	2.50	7.30	1.664	0.129	(	0.449)	1.535
31	2.58	8.20	1.869	0.129	(	0.505)	1.741
32	2.67	5.90	1.345	0.129	(	0.363)	1.216
33	2.75	2.00	0.456	(0.129)		0.123	0.333
34	2.83	1.80	0.410	(0.129)		0.111	0.300
35	2.92	1.80	0.410	(0.129)		0.111	0.300
36	3.00	0.60	0.137	(0.129)		0.037	0.100
		(Loss Rate Not Used)					
Sum =		100.0				Sum =	18.7

Flood volume = Effective rainfall 1.56(In)
times area 20.1(Ac.)/[(In)/(Ft.)] = 2.6(Ac.Ft)
Total soil loss = 0.34(In)
Total soil loss = 0.571(Ac.Ft)
Total rainfall = 1.90(In)
Flood volume = 113742.2 Cubic Feet
Total soil loss = 24875.3 Cubic Feet

Peak flow rate of this hydrograph = 31.523(CFS)

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3 - H O U R S T O R M

R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	10.0	20.0	30.0	40.0
0+ 5	0.0116	1.68	VQ				
0+10	0.0369	3.67	V Q				
0+15	0.0634	3.85	V Q				
0+20	0.0926	4.24	V Q				
0+25	0.1262	4.88	V Q				
0+30	0.1632	5.38	V Q				
0+35	0.2010	5.49	V Q				
0+40	0.2393	5.55	V Q				
0+45	0.2802	5.95	VQ				
0+50	0.3191	5.64	VQ				
0+55	0.3558	5.33	Q				
1+ 0	0.3948	5.67	QV				
1+ 5	0.4398	6.53	Q				
1+10	0.4898	7.26	Q				
1+15	0.5411	7.45	QV				
1+20	0.5907	7.21	Q V				
1+25	0.6451	7.90	Q V				
1+30	0.7085	9.20	QV				
1+35	0.7712	9.11	Q V				
1+40	0.8342	9.15	Q V				
1+45	0.9085	10.78	Q V				
1+50	0.9895	11.77	Q V				
1+55	1.0674	11.30	Q V				
2+ 0	1.1439	11.11	Q V				
2+ 5	1.2227	11.43	Q V				
2+10	1.3162	13.58	Q V				
2+15	1.4357	17.35	Q V				
2+20	1.5520	16.89	Q V				
2+25	1.6911	20.20	Q V				
2+30	1.8810	27.57	Q V				
2+35	2.0981	31.52	QV				
2+40	2.3049	30.03	Q V				
2+45	2.4371	19.19	Q V				
2+50	2.5059	9.99	Q V				
2+55	2.5580	7.55	Q V				
3+ 0	2.5921	4.95	Q V				
3+ 5	2.6053	1.92	Q V				
3+10	2.6094	0.59	Q V				
3+15	2.6109	0.22	Q V				
3+20	2.6112	0.04	Q V				

U n i t H y d r o g r a p h A n a l y s i s

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Study date 05/12/21 File: PROPWEST1006100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 4010

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

REDLANDS WEST- DEVELOPED CONDITION
100-YEAR STORM EVENT
20-0186 WEST INDUSTRIAL PROJECT
05/12/2020 AYS

Drainage Area = 20.10(Ac.) = 0.031 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 20.10(Ac.) = 0.031 Sq. Mi.
Length along longest watercourse = 1915.00(Ft.)
Length along longest watercourse measured to centroid = 500.00(Ft.)
Length along longest watercourse = 0.363 Mi.
Length along longest watercourse measured to centroid = 0.095 Mi.
Difference in elevation = 17.20(Ft.)
Slope along watercourse = 47.4235 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.048 Hr.
Lag time = 2.88 Min.
25% of lag time = 0.72 Min.
40% of lag time = 1.15 Min.
Unit time = 5.00 Min.
Duration of storm = 6 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
20.10	1.00	20.10

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
20.10	2.50	50.25

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 1.000(In)
Area Averaged 100-Year Rainfall = 2.500(In)

Point rain (area averaged) = 2.500(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 2.500(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
20.100	62.50	0.788

Total Area Entered = 20.10(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)

62.5 62.5 0.443 0.788 0.129 1.000 0.129
Sum (F) = 0.129

Area averaged mean soil loss (F) (In/Hr) = 0.129
Minimum soil loss rate ((In/Hr)) = 0.064
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.270

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	173.510	38.418	7.782
2	0.167	347.020	45.257	9.168
3	0.250	520.529	9.969	2.019
4	0.333	694.039	4.152	0.841
5	0.417	867.549	2.203	0.446
			Sum = 100.000	Sum= 20.257

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit Time	(Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.50	0.150	(0.129)	0.040	0.109
2	0.17	0.60	0.180	(0.129)	0.049	0.131
3	0.25	0.60	0.180	(0.129)	0.049	0.131
4	0.33	0.60	0.180	(0.129)	0.049	0.131
5	0.42	0.60	0.180	(0.129)	0.049	0.131
6	0.50	0.70	0.210	(0.129)	0.057	0.153
7	0.58	0.70	0.210	(0.129)	0.057	0.153
8	0.67	0.70	0.210	(0.129)	0.057	0.153
9	0.75	0.70	0.210	(0.129)	0.057	0.153
10	0.83	0.70	0.210	(0.129)	0.057	0.153
11	0.92	0.70	0.210	(0.129)	0.057	0.153
12	1.00	0.80	0.240	(0.129)	0.065	0.175
13	1.08	0.80	0.240	(0.129)	0.065	0.175
14	1.17	0.80	0.240	(0.129)	0.065	0.175
15	1.25	0.80	0.240	(0.129)	0.065	0.175
16	1.33	0.80	0.240	(0.129)	0.065	0.175
17	1.42	0.80	0.240	(0.129)	0.065	0.175
18	1.50	0.80	0.240	(0.129)	0.065	0.175
19	1.58	0.80	0.240	(0.129)	0.065	0.175
20	1.67	0.80	0.240	(0.129)	0.065	0.175
21	1.75	0.80	0.240	(0.129)	0.065	0.175
22	1.83	0.80	0.240	(0.129)	0.065	0.175
23	1.92	0.80	0.240	(0.129)	0.065	0.175
24	2.00	0.90	0.270	(0.129)	0.073	0.197
25	2.08	0.80	0.240	(0.129)	0.065	0.175
26	2.17	0.90	0.270	(0.129)	0.073	0.197
27	2.25	0.90	0.270	(0.129)	0.073	0.197
28	2.33	0.90	0.270	(0.129)	0.073	0.197
29	2.42	0.90	0.270	(0.129)	0.073	0.197
30	2.50	0.90	0.270	(0.129)	0.073	0.197
31	2.58	0.90	0.270	(0.129)	0.073	0.197
32	2.67	0.90	0.270	(0.129)	0.073	0.197
33	2.75	1.00	0.300	(0.129)	0.081	0.219
34	2.83	1.00	0.300	(0.129)	0.081	0.219
35	2.92	1.00	0.300	(0.129)	0.081	0.219
36	3.00	1.00	0.300	(0.129)	0.081	0.219
37	3.08	1.00	0.300	(0.129)	0.081	0.219
38	3.17	1.10	0.330	(0.129)	0.089	0.241
39	3.25	1.10	0.330	(0.129)	0.089	0.241
40	3.33	1.10	0.330	(0.129)	0.089	0.241
41	3.42	1.20	0.360	(0.129)	0.097	0.263
42	3.50	1.30	0.390	(0.129)	0.105	0.285
43	3.58	1.40	0.420	(0.129)	0.113	0.307
44	3.67	1.40	0.420	(0.129)	0.113	0.307
45	3.75	1.50	0.450	(0.129)	0.121	0.328

46	3.83	1.50	0.450	(0.129)	0.121		0.328
47	3.92	1.60	0.480	0.129	(0.130)		0.351
48	4.00	1.60	0.480	0.129	(0.130)		0.351
49	4.08	1.70	0.510	0.129	(0.138)		0.381
50	4.17	1.80	0.540	0.129	(0.146)		0.411
51	4.25	1.90	0.570	0.129	(0.154)		0.441
52	4.33	2.00	0.600	0.129	(0.162)		0.471
53	4.42	2.10	0.630	0.129	(0.170)		0.501
54	4.50	2.10	0.630	0.129	(0.170)		0.501
55	4.58	2.20	0.660	0.129	(0.178)		0.531
56	4.67	2.30	0.690	0.129	(0.186)		0.561
57	4.75	2.40	0.720	0.129	(0.194)		0.591
58	4.83	2.40	0.720	0.129	(0.194)		0.591
59	4.92	2.50	0.750	0.129	(0.202)		0.621
60	5.00	2.60	0.780	0.129	(0.211)		0.651
61	5.08	3.10	0.930	0.129	(0.251)		0.801
62	5.17	3.60	1.080	0.129	(0.292)		0.951
63	5.25	3.90	1.170	0.129	(0.316)		1.041
64	5.33	4.20	1.260	0.129	(0.340)		1.131
65	5.42	4.70	1.410	0.129	(0.381)		1.281
66	5.50	5.60	1.680	0.129	(0.454)		1.551
67	5.58	1.90	0.570	0.129	(0.154)		0.441
68	5.67	0.90	0.270	(0.129)	0.073		0.197
69	5.75	0.60	0.180	(0.129)	0.049		0.131
70	5.83	0.50	0.150	(0.129)	0.040		0.109
71	5.92	0.30	0.090	(0.129)	0.024		0.066
72	6.00	0.20	0.060	(0.129)	0.016		0.044

(Loss Rate Not Used)

Sum = 100.0 Sum = 23.7

Flood volume = Effective rainfall 1.98(In)
times area 20.1(Ac.)/[(In)/(Ft.)] = 3.3(Ac.Ft)
Total soil loss = 0.52(In)
Total soil loss = 0.873(Ac.Ft)
Total rainfall = 2.50(In)
Flood volume = 144375.9 Cubic Feet
Total soil loss = 38019.0 Cubic Feet

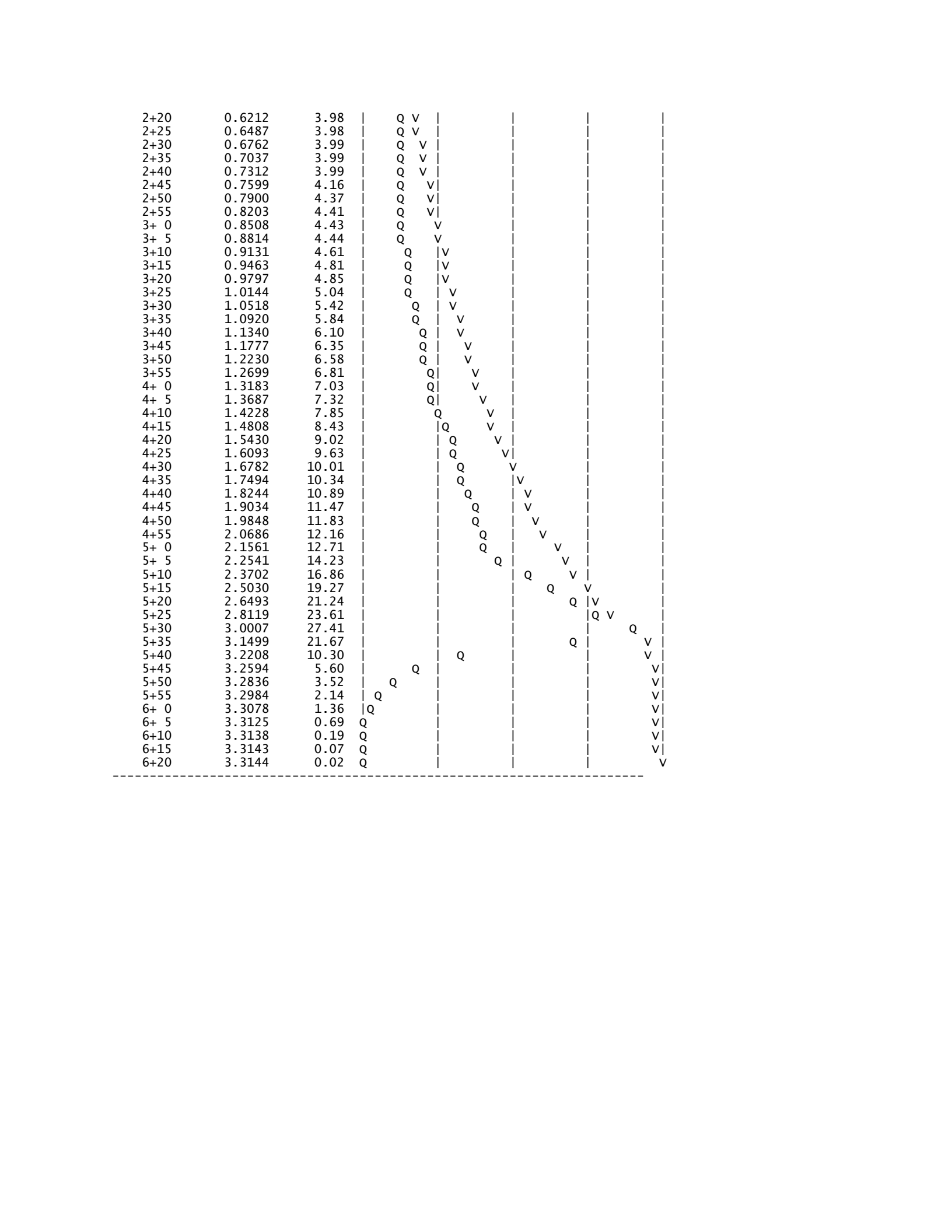
Peak flow rate of this hydrograph = 27.414(CFS)

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6 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	7.5	15.0	22.5	30.0
0+ 5	0.0059	0.85	VQ				
0+10	0.0198	2.03	V Q				
0+15	0.0367	2.45	V Q				
0+20	0.0545	2.59	V Q				
0+25	0.0728	2.65	V Q				
0+30	0.0923	2.83	V Q				
0+35	0.1132	3.03	V Q				
0+40	0.1344	3.08	V Q				
0+45	0.1557	3.10	V Q				
0+50	0.1771	3.11	V Q				
0+55	0.1985	3.11	V Q				
1+ 0	0.2211	3.28	V Q				
1+ 5	0.2450	3.48	V Q				
1+10	0.2693	3.52	VQ				
1+15	0.2937	3.54	VQ				
1+20	0.3181	3.55	VQ				
1+25	0.3426	3.55	Q				
1+30	0.3671	3.55	Q				
1+35	0.3915	3.55	Q				
1+40	0.4160	3.55	QV				
1+45	0.4404	3.55	QV				
1+50	0.4649	3.55	QV				
1+55	0.4893	3.55	QV				
2+ 0	0.5149	3.72	Q V				
2+ 5	0.5408	3.75	QV				
2+10	0.5667	3.77	QV				
2+15	0.5939	3.94	Q V				



U n i t H y d r o g r a p h A n a l y s i s

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Study date 05/12/21 File: PROPWEST10024100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 4010

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

REDLANDS WEST- DEVELOPED CONDITION
100-YEAR STORM EVENT
20-0186 WEST INDUSTRIAL PROJECT
05/12/2020 AYS

Drainage Area = 20.10(Ac.) = 0.031 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 20.10(Ac.) = 0.031 Sq. Mi.
Length along longest watercourse = 1915.00(Ft.)
Length along longest watercourse measured to centroid = 500.00(Ft.)
Length along longest watercourse = 0.363 Mi.
Length along longest watercourse measured to centroid = 0.095 Mi.
Difference in elevation = 17.20(Ft.)
Slope along watercourse = 47.4235 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.048 Hr.
Lag time = 2.88 Min.
25% of lag time = 0.72 Min.
40% of lag time = 1.15 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
20.10	1.70	34.17

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
20.10	4.25	85.43

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 1.700(In)
Area Averaged 100-Year Rainfall = 4.250(In)

Point rain (area averaged) = 4.250(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 4.250(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
20.100	62.50	0.788

Total Area Entered = 20.10(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)

62.5 62.5 0.443 0.788 0.129 1.000 0.129
Sum (F) = 0.129

Area averaged mean soil loss (F) (In/Hr) = 0.129
Minimum soil loss rate ((In/Hr)) = 0.064
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.270

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	173.510	38.418	7.782
2	0.167	347.020	45.257	9.168
3	0.250	520.529	9.969	2.019
4	0.333	694.039	4.152	0.841
5	0.417	867.549	2.203	0.446
			Sum = 100.000	Sum= 20.257

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit Time	(Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.034	(0.228)	0.009	0.025
2	0.17	0.07	0.034	(0.227)	0.009	0.025
3	0.25	0.07	0.034	(0.227)	0.009	0.025
4	0.33	0.10	0.051	(0.226)	0.014	0.037
5	0.42	0.10	0.051	(0.225)	0.014	0.037
6	0.50	0.10	0.051	(0.224)	0.014	0.037
7	0.58	0.10	0.051	(0.223)	0.014	0.037
8	0.67	0.10	0.051	(0.222)	0.014	0.037
9	0.75	0.10	0.051	(0.221)	0.014	0.037
10	0.83	0.13	0.068	(0.220)	0.018	0.050
11	0.92	0.13	0.068	(0.220)	0.018	0.050
12	1.00	0.13	0.068	(0.219)	0.018	0.050
13	1.08	0.10	0.051	(0.218)	0.014	0.037
14	1.17	0.10	0.051	(0.217)	0.014	0.037
15	1.25	0.10	0.051	(0.216)	0.014	0.037
16	1.33	0.10	0.051	(0.215)	0.014	0.037
17	1.42	0.10	0.051	(0.214)	0.014	0.037
18	1.50	0.10	0.051	(0.214)	0.014	0.037
19	1.58	0.10	0.051	(0.213)	0.014	0.037
20	1.67	0.10	0.051	(0.212)	0.014	0.037
21	1.75	0.10	0.051	(0.211)	0.014	0.037
22	1.83	0.13	0.068	(0.210)	0.018	0.050
23	1.92	0.13	0.068	(0.209)	0.018	0.050
24	2.00	0.13	0.068	(0.208)	0.018	0.050
25	2.08	0.13	0.068	(0.208)	0.018	0.050
26	2.17	0.13	0.068	(0.207)	0.018	0.050
27	2.25	0.13	0.068	(0.206)	0.018	0.050
28	2.33	0.13	0.068	(0.205)	0.018	0.050
29	2.42	0.13	0.068	(0.204)	0.018	0.050
30	2.50	0.13	0.068	(0.203)	0.018	0.050
31	2.58	0.17	0.085	(0.203)	0.023	0.062
32	2.67	0.17	0.085	(0.202)	0.023	0.062
33	2.75	0.17	0.085	(0.201)	0.023	0.062
34	2.83	0.17	0.085	(0.200)	0.023	0.062
35	2.92	0.17	0.085	(0.199)	0.023	0.062
36	3.00	0.17	0.085	(0.198)	0.023	0.062
37	3.08	0.17	0.085	(0.198)	0.023	0.062
38	3.17	0.17	0.085	(0.197)	0.023	0.062
39	3.25	0.17	0.085	(0.196)	0.023	0.062
40	3.33	0.17	0.085	(0.195)	0.023	0.062
41	3.42	0.17	0.085	(0.194)	0.023	0.062
42	3.50	0.17	0.085	(0.194)	0.023	0.062
43	3.58	0.17	0.085	(0.193)	0.023	0.062
44	3.67	0.17	0.085	(0.192)	0.023	0.062
45	3.75	0.17	0.085	(0.191)	0.023	0.062

46	3.83	0.20	0.102	(0.190)	0.028	0.074
47	3.92	0.20	0.102	(0.190)	0.028	0.074
48	4.00	0.20	0.102	(0.189)	0.028	0.074
49	4.08	0.20	0.102	(0.188)	0.028	0.074
50	4.17	0.20	0.102	(0.187)	0.028	0.074
51	4.25	0.20	0.102	(0.186)	0.028	0.074
52	4.33	0.23	0.119	(0.186)	0.032	0.087
53	4.42	0.23	0.119	(0.185)	0.032	0.087
54	4.50	0.23	0.119	(0.184)	0.032	0.087
55	4.58	0.23	0.119	(0.183)	0.032	0.087
56	4.67	0.23	0.119	(0.182)	0.032	0.087
57	4.75	0.23	0.119	(0.182)	0.032	0.087
58	4.83	0.27	0.136	(0.181)	0.037	0.099
59	4.92	0.27	0.136	(0.180)	0.037	0.099
60	5.00	0.27	0.136	(0.179)	0.037	0.099
61	5.08	0.20	0.102	(0.178)	0.028	0.074
62	5.17	0.20	0.102	(0.178)	0.028	0.074
63	5.25	0.20	0.102	(0.177)	0.028	0.074
64	5.33	0.23	0.119	(0.176)	0.032	0.087
65	5.42	0.23	0.119	(0.175)	0.032	0.087
66	5.50	0.23	0.119	(0.175)	0.032	0.087
67	5.58	0.27	0.136	(0.174)	0.037	0.099
68	5.67	0.27	0.136	(0.173)	0.037	0.099
69	5.75	0.27	0.136	(0.172)	0.037	0.099
70	5.83	0.27	0.136	(0.172)	0.037	0.099
71	5.92	0.27	0.136	(0.171)	0.037	0.099
72	6.00	0.27	0.136	(0.170)	0.037	0.099
73	6.08	0.30	0.153	(0.169)	0.041	0.112
74	6.17	0.30	0.153	(0.169)	0.041	0.112
75	6.25	0.30	0.153	(0.168)	0.041	0.112
76	6.33	0.30	0.153	(0.167)	0.041	0.112
77	6.42	0.30	0.153	(0.166)	0.041	0.112
78	6.50	0.30	0.153	(0.166)	0.041	0.112
79	6.58	0.33	0.170	(0.165)	0.046	0.124
80	6.67	0.33	0.170	(0.164)	0.046	0.124
81	6.75	0.33	0.170	(0.163)	0.046	0.124
82	6.83	0.33	0.170	(0.163)	0.046	0.124
83	6.92	0.33	0.170	(0.162)	0.046	0.124
84	7.00	0.33	0.170	(0.161)	0.046	0.124
85	7.08	0.33	0.170	(0.160)	0.046	0.124
86	7.17	0.33	0.170	(0.160)	0.046	0.124
87	7.25	0.33	0.170	(0.159)	0.046	0.124
88	7.33	0.37	0.187	(0.158)	0.050	0.137
89	7.42	0.37	0.187	(0.157)	0.050	0.137
90	7.50	0.37	0.187	(0.157)	0.050	0.137
91	7.58	0.40	0.204	(0.156)	0.055	0.149
92	7.67	0.40	0.204	(0.155)	0.055	0.149
93	7.75	0.40	0.204	(0.155)	0.055	0.149
94	7.83	0.43	0.221	(0.154)	0.060	0.161
95	7.92	0.43	0.221	(0.153)	0.060	0.161
96	8.00	0.43	0.221	(0.152)	0.060	0.161
97	8.08	0.50	0.255	(0.152)	0.069	0.186
98	8.17	0.50	0.255	(0.151)	0.069	0.186
99	8.25	0.50	0.255	(0.150)	0.069	0.186
100	8.33	0.50	0.255	(0.150)	0.069	0.186
101	8.42	0.50	0.255	(0.149)	0.069	0.186
102	8.50	0.50	0.255	(0.148)	0.069	0.186
103	8.58	0.53	0.272	(0.148)	0.073	0.199
104	8.67	0.53	0.272	(0.147)	0.073	0.199
105	8.75	0.53	0.272	(0.146)	0.073	0.199
106	8.83	0.57	0.289	(0.145)	0.078	0.211
107	8.92	0.57	0.289	(0.145)	0.078	0.211
108	9.00	0.57	0.289	(0.144)	0.078	0.211
109	9.08	0.63	0.323	(0.143)	0.087	0.236
110	9.17	0.63	0.323	(0.143)	0.087	0.236
111	9.25	0.63	0.323	(0.142)	0.087	0.236
112	9.33	0.67	0.340	(0.141)	0.092	0.248
113	9.42	0.67	0.340	(0.141)	0.092	0.248
114	9.50	0.67	0.340	(0.140)	0.092	0.248
115	9.58	0.70	0.357	(0.139)	0.096	0.261
116	9.67	0.70	0.357	(0.139)	0.096	0.261
117	9.75	0.70	0.357	(0.138)	0.096	0.261
118	9.83	0.73	0.374	(0.137)	0.101	0.273
119	9.92	0.73	0.374	(0.137)	0.101	0.273
120	10.00	0.73	0.374	(0.136)	0.101	0.273

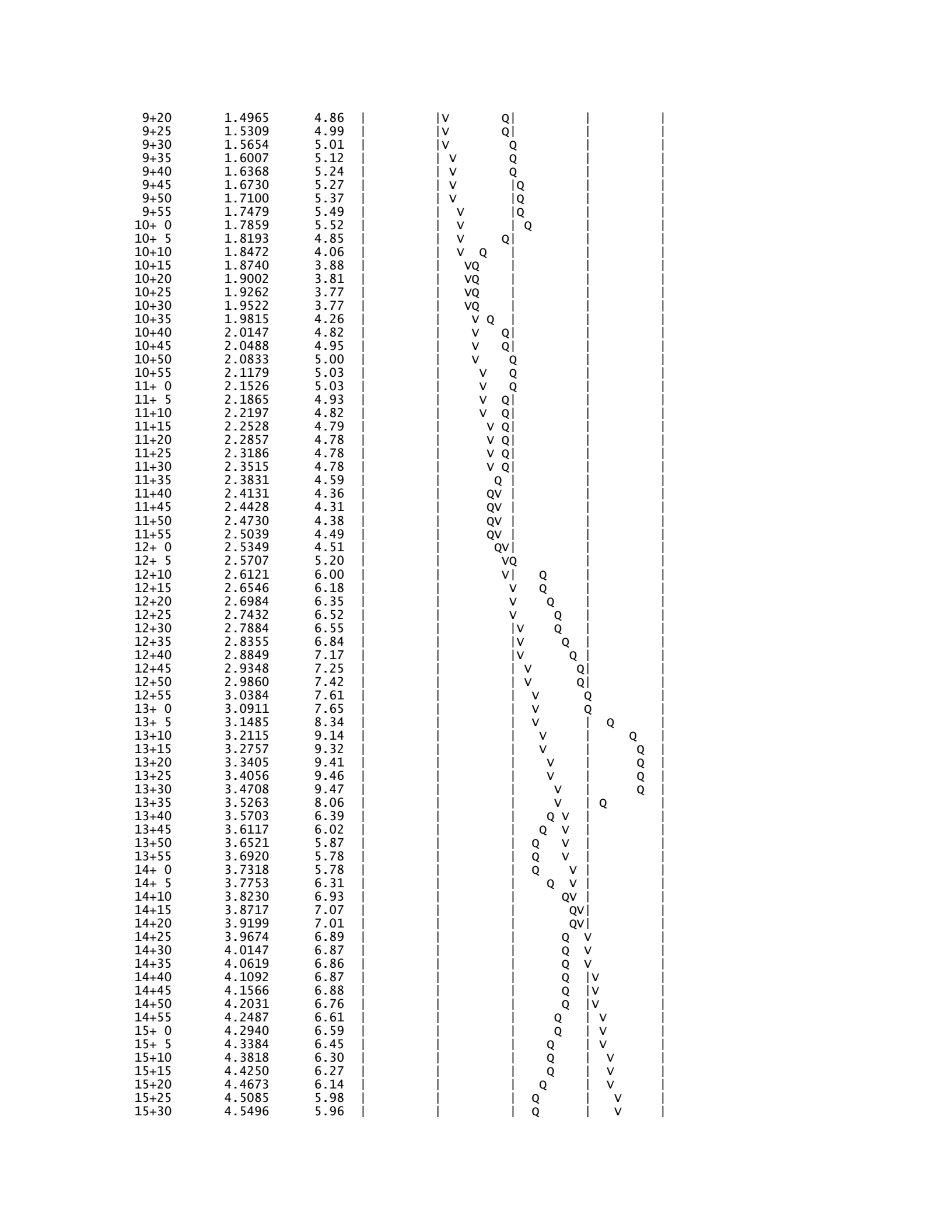
121	10.08	0.50	0.255	(0.135)	0.069	0.186
122	10.17	0.50	0.255	(0.135)	0.069	0.186
123	10.25	0.50	0.255	(0.134)	0.069	0.186
124	10.33	0.50	0.255	(0.133)	0.069	0.186
125	10.42	0.50	0.255	(0.133)	0.069	0.186
126	10.50	0.50	0.255	(0.132)	0.069	0.186
127	10.58	0.67	0.340	(0.131)	0.092	0.248
128	10.67	0.67	0.340	(0.131)	0.092	0.248
129	10.75	0.67	0.340	(0.130)	0.092	0.248
130	10.83	0.67	0.340	(0.130)	0.092	0.248
131	10.92	0.67	0.340	(0.129)	0.092	0.248
132	11.00	0.67	0.340	(0.128)	0.092	0.248
133	11.08	0.63	0.323	(0.128)	0.087	0.236
134	11.17	0.63	0.323	(0.127)	0.087	0.236
135	11.25	0.63	0.323	(0.126)	0.087	0.236
136	11.33	0.63	0.323	(0.126)	0.087	0.236
137	11.42	0.63	0.323	(0.125)	0.087	0.236
138	11.50	0.63	0.323	(0.125)	0.087	0.236
139	11.58	0.57	0.289	(0.124)	0.078	0.211
140	11.67	0.57	0.289	(0.123)	0.078	0.211
141	11.75	0.57	0.289	(0.123)	0.078	0.211
142	11.83	0.60	0.306	(0.122)	0.083	0.223
143	11.92	0.60	0.306	(0.121)	0.083	0.223
144	12.00	0.60	0.306	(0.121)	0.083	0.223
145	12.08	0.83	0.425	(0.120)	0.115	0.310
146	12.17	0.83	0.425	(0.120)	0.115	0.310
147	12.25	0.83	0.425	(0.119)	0.115	0.310
148	12.33	0.87	0.442	0.118	(0.119)	0.324
149	12.42	0.87	0.442	0.118	(0.119)	0.324
150	12.50	0.87	0.442	0.117	(0.119)	0.325
151	12.58	0.93	0.476	0.117	(0.129)	0.359
152	12.67	0.93	0.476	0.116	(0.129)	0.360
153	12.75	0.93	0.476	0.116	(0.129)	0.360
154	12.83	0.97	0.493	0.115	(0.133)	0.378
155	12.92	0.97	0.493	0.114	(0.133)	0.379
156	13.00	0.97	0.493	0.114	(0.133)	0.379
157	13.08	1.13	0.578	0.113	(0.156)	0.465
158	13.17	1.13	0.578	0.113	(0.156)	0.465
159	13.25	1.13	0.578	0.112	(0.156)	0.466
160	13.33	1.13	0.578	0.111	(0.156)	0.467
161	13.42	1.13	0.578	0.111	(0.156)	0.467
162	13.50	1.13	0.578	0.110	(0.156)	0.468
163	13.58	0.77	0.391	(0.110)	0.106	0.285
164	13.67	0.77	0.391	(0.109)	0.106	0.285
165	13.75	0.77	0.391	(0.109)	0.106	0.285
166	13.83	0.77	0.391	(0.108)	0.106	0.285
167	13.92	0.77	0.391	(0.108)	0.106	0.285
168	14.00	0.77	0.391	(0.107)	0.106	0.285
169	14.08	0.90	0.459	0.106	(0.124)	0.353
170	14.17	0.90	0.459	0.106	(0.124)	0.353
171	14.25	0.90	0.459	0.105	(0.124)	0.354
172	14.33	0.87	0.442	0.105	(0.119)	0.337
173	14.42	0.87	0.442	0.104	(0.119)	0.338
174	14.50	0.87	0.442	0.104	(0.119)	0.338
175	14.58	0.87	0.442	0.103	(0.119)	0.339
176	14.67	0.87	0.442	0.103	(0.119)	0.339
177	14.75	0.87	0.442	0.102	(0.119)	0.340
178	14.83	0.83	0.425	0.102	(0.115)	0.323
179	14.92	0.83	0.425	0.101	(0.115)	0.324
180	15.00	0.83	0.425	0.101	(0.115)	0.324
181	15.08	0.80	0.408	0.100	(0.110)	0.308
182	15.17	0.80	0.408	0.100	(0.110)	0.308
183	15.25	0.80	0.408	0.099	(0.110)	0.309
184	15.33	0.77	0.391	0.099	(0.106)	0.292
185	15.42	0.77	0.391	0.098	(0.106)	0.293
186	15.50	0.77	0.391	0.098	(0.106)	0.293
187	15.58	0.63	0.323	(0.097)	0.087	0.236
188	15.67	0.63	0.323	(0.097)	0.087	0.236
189	15.75	0.63	0.323	(0.096)	0.087	0.236
190	15.83	0.63	0.323	(0.096)	0.087	0.236
191	15.92	0.63	0.323	(0.095)	0.087	0.236
192	16.00	0.63	0.323	(0.095)	0.087	0.236
193	16.08	0.13	0.068	(0.094)	0.018	0.050
194	16.17	0.13	0.068	(0.094)	0.018	0.050
195	16.25	0.13	0.068	(0.093)	0.018	0.050

196	16.33	0.13	0.068	(0.093)	0.018	0.050
197	16.42	0.13	0.068	(0.092)	0.018	0.050
198	16.50	0.13	0.068	(0.092)	0.018	0.050
199	16.58	0.10	0.051	(0.091)	0.014	0.037
200	16.67	0.10	0.051	(0.091)	0.014	0.037
201	16.75	0.10	0.051	(0.090)	0.014	0.037
202	16.83	0.10	0.051	(0.090)	0.014	0.037
203	16.92	0.10	0.051	(0.089)	0.014	0.037
204	17.00	0.10	0.051	(0.089)	0.014	0.037
205	17.08	0.17	0.085	(0.089)	0.023	0.062
206	17.17	0.17	0.085	(0.088)	0.023	0.062
207	17.25	0.17	0.085	(0.088)	0.023	0.062
208	17.33	0.17	0.085	(0.087)	0.023	0.062
209	17.42	0.17	0.085	(0.087)	0.023	0.062
210	17.50	0.17	0.085	(0.086)	0.023	0.062
211	17.58	0.17	0.085	(0.086)	0.023	0.062
212	17.67	0.17	0.085	(0.085)	0.023	0.062
213	17.75	0.17	0.085	(0.085)	0.023	0.062
214	17.83	0.13	0.068	(0.085)	0.018	0.050
215	17.92	0.13	0.068	(0.084)	0.018	0.050
216	18.00	0.13	0.068	(0.084)	0.018	0.050
217	18.08	0.13	0.068	(0.083)	0.018	0.050
218	18.17	0.13	0.068	(0.083)	0.018	0.050
219	18.25	0.13	0.068	(0.083)	0.018	0.050
220	18.33	0.13	0.068	(0.082)	0.018	0.050
221	18.42	0.13	0.068	(0.082)	0.018	0.050
222	18.50	0.13	0.068	(0.081)	0.018	0.050
223	18.58	0.10	0.051	(0.081)	0.014	0.037
224	18.67	0.10	0.051	(0.081)	0.014	0.037
225	18.75	0.10	0.051	(0.080)	0.014	0.037
226	18.83	0.07	0.034	(0.080)	0.009	0.025
227	18.92	0.07	0.034	(0.079)	0.009	0.025
228	19.00	0.07	0.034	(0.079)	0.009	0.025
229	19.08	0.10	0.051	(0.079)	0.014	0.037
230	19.17	0.10	0.051	(0.078)	0.014	0.037
231	19.25	0.10	0.051	(0.078)	0.014	0.037
232	19.33	0.13	0.068	(0.078)	0.018	0.050
233	19.42	0.13	0.068	(0.077)	0.018	0.050
234	19.50	0.13	0.068	(0.077)	0.018	0.050
235	19.58	0.10	0.051	(0.077)	0.014	0.037
236	19.67	0.10	0.051	(0.076)	0.014	0.037
237	19.75	0.10	0.051	(0.076)	0.014	0.037
238	19.83	0.07	0.034	(0.075)	0.009	0.025
239	19.92	0.07	0.034	(0.075)	0.009	0.025
240	20.00	0.07	0.034	(0.075)	0.009	0.025
241	20.08	0.10	0.051	(0.074)	0.014	0.037
242	20.17	0.10	0.051	(0.074)	0.014	0.037
243	20.25	0.10	0.051	(0.074)	0.014	0.037
244	20.33	0.10	0.051	(0.074)	0.014	0.037
245	20.42	0.10	0.051	(0.073)	0.014	0.037
246	20.50	0.10	0.051	(0.073)	0.014	0.037
247	20.58	0.10	0.051	(0.073)	0.014	0.037
248	20.67	0.10	0.051	(0.072)	0.014	0.037
249	20.75	0.10	0.051	(0.072)	0.014	0.037
250	20.83	0.07	0.034	(0.072)	0.009	0.025
251	20.92	0.07	0.034	(0.071)	0.009	0.025
252	21.00	0.07	0.034	(0.071)	0.009	0.025
253	21.08	0.10	0.051	(0.071)	0.014	0.037
254	21.17	0.10	0.051	(0.071)	0.014	0.037
255	21.25	0.10	0.051	(0.070)	0.014	0.037
256	21.33	0.07	0.034	(0.070)	0.009	0.025
257	21.42	0.07	0.034	(0.070)	0.009	0.025
258	21.50	0.07	0.034	(0.069)	0.009	0.025
259	21.58	0.10	0.051	(0.069)	0.014	0.037
260	21.67	0.10	0.051	(0.069)	0.014	0.037
261	21.75	0.10	0.051	(0.069)	0.014	0.037
262	21.83	0.07	0.034	(0.068)	0.009	0.025
263	21.92	0.07	0.034	(0.068)	0.009	0.025
264	22.00	0.07	0.034	(0.068)	0.009	0.025
265	22.08	0.10	0.051	(0.068)	0.014	0.037
266	22.17	0.10	0.051	(0.068)	0.014	0.037
267	22.25	0.10	0.051	(0.067)	0.014	0.037
268	22.33	0.07	0.034	(0.067)	0.009	0.025
269	22.42	0.07	0.034	(0.067)	0.009	0.025
270	22.50	0.07	0.034	(0.067)	0.009	0.025

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271  22.58     0.07      0.034       (  0.067)       0.009        0.025
272  22.67     0.07      0.034       (  0.066)       0.009        0.025
273  22.75     0.07      0.034       (  0.066)       0.009        0.025
274  22.83     0.07      0.034       (  0.066)       0.009        0.025
275  22.92     0.07      0.034       (  0.066)       0.009        0.025
276  23.00     0.07      0.034       (  0.066)       0.009        0.025
277  23.08     0.07      0.034       (  0.066)       0.009        0.025
278  23.17     0.07      0.034       (  0.065)       0.009        0.025
279  23.25     0.07      0.034       (  0.065)       0.009        0.025
280  23.33     0.07      0.034       (  0.065)       0.009        0.025
281  23.42     0.07      0.034       (  0.065)       0.009        0.025
282  23.50     0.07      0.034       (  0.065)       0.009        0.025
283  23.58     0.07      0.034       (  0.065)       0.009        0.025
284  23.67     0.07      0.034       (  0.065)       0.009        0.025
285  23.75     0.07      0.034       (  0.065)       0.009        0.025
286  23.83     0.07      0.034       (  0.065)       0.009        0.025
287  23.92     0.07      0.034       (  0.064)       0.009        0.025
288  24.00     0.07      0.034       (  0.064)       0.009        0.025
               (Loss Rate Not Used)
    Sum =     100.0                                    Sum =    37.8
      Flood volume = Effective rainfall      3.15(In)
       times area      20.1(Ac.)/[(In)/(Ft.)] =       5.3(Ac.Ft)
      Total soil loss =      1.10(In)
      Total soil loss =     1.837(Ac.Ft)
      Total rainfall =      4.25(In)
      Flood volume =      230054.4 Cubic Feet
      Total soil loss =       80026.2 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =      9.468(CFS)
      ---------------------------------------------------------------------
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      ---------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      ---------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
 ------------------------------------------------------------------------
   0+ 5       0.0013      0.19  Q         |         |         |         |
   0+10       0.0042      0.42  VQ        |         |         |         |
   0+15       0.0075      0.47  VQ        |         |         |         |
   0+20       0.0115      0.59  V Q       |         |         |         |
   0+25       0.0164      0.71  V Q       |         |         |         |
   0+30       0.0215      0.74  V Q       |         |         |         |
   0+35       0.0267      0.75  V Q       |         |         |         |
   0+40       0.0319      0.75  V  Q      |         |         |         |
   0+45       0.0371      0.75  V  Q      |         |         |         |
   0+50       0.0429      0.85  V  Q      |         |         |         |
   0+55       0.0496      0.96  V  Q      |         |         |         |
   1+ 0       0.0564      0.99  V  Q      |         |         |         |
   1+ 5       0.0626      0.90  V  Q      |         |         |         |
   1+10       0.0681      0.80  V  Q      |         |         |         |
   1+15       0.0734      0.77  V  Q      |         |         |         |
   1+20       0.0787      0.76  V  Q      |         |         |         |
   1+25       0.0838      0.75  V  Q      |         |         |         |
   1+30       0.0890      0.75  V  Q      |         |         |         |
   1+35       0.0942      0.75  V  Q      |         |         |         |
   1+40       0.0994      0.75  V  Q      |         |         |         |
   1+45       0.1046      0.75  V  Q      |         |         |         |
   1+50       0.1105      0.85  V  Q      |         |         |         |
   1+55       0.1171      0.96  V  Q      |         |         |         |
   2+ 0       0.1240      0.99  V  Q      |         |         |         |
   2+ 5       0.1308      1.00  V   Q     |         |         |         |
   2+10       0.1378      1.01  |V  Q     |         |         |         |
   2+15       0.1447      1.01  |V  Q     |         |         |         |
   2+20       0.1516      1.01  |V  Q     |         |         |         |
   2+25       0.1586      1.01  |V  Q     |         |         |         |
   2+30       0.1655      1.01  |V  Q     |         |         |         |
   2+35       0.1731      1.10  |V  Q     |         |         |         |
   2+40       0.1815      1.22  |V  Q     |         |         |         |
   2+45       0.1900      1.24  |V  Q     |         |         |         |
   2+50       0.1986      1.25  |V   Q    |         |         |         |
   2+55       0.2073      1.26  |V   Q    |         |         |         |
   3+ 0       0.2160      1.26  |V   Q    |         |         |         |
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3+ 5       0.2246      1.26  |V   Q    |          |          |          |
3+10       0.2333      1.26  |V   Q    |          |          |          |
3+15       0.2419      1.26  |V   Q    |          |          |          |
3+20       0.2506      1.26  |V   Q    |          |          |          |
3+25       0.2593      1.26  |V   Q    |          |          |          |
3+30       0.2679      1.26  | V  Q    |          |          |          |
3+35       0.2766      1.26  | V  Q    |          |          |          |
3+40       0.2852      1.26  | V  Q    |          |          |          |
3+45       0.2939      1.26  | V  Q    |          |          |          |
3+50       0.3032      1.35  | V  Q    |          |          |          |
3+55       0.3133      1.47  | V  Q    |          |          |          |
4+ 0       0.3236      1.49  | V  Q    |          |          |          |
4+ 5       0.3340      1.50  | V   Q   |          |          |          |
4+10       0.3444      1.51  | V   Q   |          |          |          |
4+15       0.3548      1.51  | V   Q   |          |          |          |
4+20       0.3658      1.61  | V   Q   |          |          |          |
4+25       0.3777      1.72  | V   Q   |          |          |          |
4+30       0.3897      1.74  | V   Q   |          |          |          |
4+35       0.4018      1.76  |  V   Q  |          |          |          |
4+40       0.4139      1.76  |  V   Q  |          |          |          |
4+45       0.4260      1.76  |  V   Q  |          |          |          |
4+50       0.4388      1.86  |  V   Q  |          |          |          |
4+55       0.4524      1.97  |  V   Q  |          |          |          |
5+ 0       0.4661      2.00  |  V   Q  |          |          |          |
5+ 5       0.4786      1.81  |  V   Q  |          |          |          |
5+10       0.4896      1.59  |  V  Q   |          |          |          |
5+15       0.5002      1.54  |  V  Q   |          |          |          |
5+20       0.5113      1.62  |  V  Q   |          |          |          |
5+25       0.5232      1.72  |  V  Q   |          |          |          |
5+30       0.5352      1.74  |   V Q   |          |          |          |
5+35       0.5479      1.85  |   V  Q  |          |          |          |
5+40       0.5615      1.97  |   V  Q  |          |          |          |
5+45       0.5753      2.00  |   V  Q  |          |          |          |
5+50       0.5891      2.01  |   V   Q |          |          |          |
5+55       0.6029      2.01  |   V   Q |          |          |          |
6+ 0       0.6168      2.01  |   V   Q |          |          |          |
6+ 5       0.6313      2.11  |   V   Q |          |          |          |
6+10       0.6466      2.22  |   V   Q |          |          |          |
6+15       0.6621      2.25  |    V  Q |          |          |          |
6+20       0.6777      2.26  |    V   Q|          |          |          |
6+25       0.6932      2.26  |    V   Q|          |          |          |
6+30       0.7088      2.26  |    V   Q|          |          |          |
6+35       0.7251      2.36  |    V   Q|          |          |          |
6+40       0.7421      2.47  |    V   Q|          |          |          |
6+45       0.7593      2.50  |    V   Q|          |          |          |
6+50       0.7766      2.51  |    V    Q          |          |          |
6+55       0.7939      2.52  |     V   Q          |          |          |
7+ 0       0.8113      2.52  |     V   Q          |          |          |
7+ 5       0.8286      2.52  |     V   Q          |          |          |
7+10       0.8459      2.52  |     V   Q          |          |          |
7+15       0.8632      2.52  |     V   Q          |          |          |
7+20       0.8812      2.61  |     V   Q          |          |          |
7+25       0.9000      2.73  |     V   Q          |          |          |
7+30       0.9189      2.75  |     V   |Q         |          |          |
7+35       0.9386      2.86  |      V  |Q         |          |          |
7+40       0.9591      2.98  |      V  |Q         |          |          |
7+45       0.9798      3.00  |      V  | Q        |          |          |
7+50       1.0012      3.11  |      V  | Q        |          |          |
7+55       1.0234      3.23  |      V  | Q        |          |          |
8+ 0       1.0458      3.25  |      V  |  Q       |          |          |
8+ 5       1.0697      3.46  |       V |  Q       |          |          |
8+10       1.0951      3.69  |       V |   Q      |          |          |
8+15       1.1208      3.74  |       V |   Q      |          |          |
8+20       1.1467      3.76  |       V |    Q     |          |          |
8+25       1.1727      3.77  |       V |    Q     |          |          |
8+30       1.1987      3.77  |        V|    Q     |          |          |
8+35       1.2254      3.87  |        V|    Q     |          |          |
8+40       1.2528      3.98  |        V|    Q     |          |          |
8+45       1.2804      4.01  |        V|     Q    |          |          |
8+50       1.3087      4.12  |        V|     Q    |          |          |
8+55       1.3379      4.23  |         V     Q    |          |          |
9+ 0       1.3672      4.26  |         V      Q   |          |          |
9+ 5       1.3980      4.46  |         V      Q   |          |          |
9+10       1.4303      4.70  |         V       Q  |          |          |
9+15       1.4630      4.75  |          |V      Q  |          |          |
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15+35	4.5875	5.50	|	|	Q |	|	V |
15+40	4.6217	4.97	|	|	Q|	|	V |
15+45	4.6551	4.85	|	|	Q|	|	V |
15+50	4.6882	4.80	|	|	Q|	|	V |
15+55	4.7211	4.78	|	|	Q|	|	V |
16+ 0	4.7540	4.78	|	|	Q|	|	V |
16+ 5	4.7769	3.33	|	Q |	|	|	V |
16+10	4.7881	1.62	|	Q |	|	|	V |
16+15	4.7967	1.25	|	Q |	|	|	V |
16+20	4.8042	1.09	|	Q |	|	|	V |
16+25	4.8111	1.01	|	Q |	|	|	V |
16+30	4.8180	1.01	|	Q |	|	|	V |
16+35	4.8243	0.91	|	Q |	|	|	V |
16+40	4.8298	0.80	|	Q |	|	|	V |
16+45	4.8351	0.77	|	Q |	|	|	V |
16+50	4.8403	0.76	|	Q |	|	|	V |
16+55	4.8455	0.75	|	Q |	|	|	V |
17+ 0	4.8507	0.75	|	Q |	|	|	V |
17+ 5	4.8572	0.95	|	Q |	|	|	V |
17+10	4.8653	1.18	|	Q |	|	|	V |
17+15	4.8738	1.23	|	Q |	|	|	V |
17+20	4.8824	1.25	|	Q |	|	|	V |
17+25	4.8910	1.26	|	Q |	|	|	V |
17+30	4.8997	1.26	|	Q |	|	|	V |
17+35	4.9083	1.26	|	Q |	|	|	V |
17+40	4.9170	1.26	|	Q |	|	|	V |
17+45	4.9257	1.26	|	Q |	|	|	V |
17+50	4.9337	1.16	|	Q |	|	|	V |
17+55	4.9409	1.05	|	Q |	|	|	V |
18+ 0	4.9479	1.02	|	Q |	|	|	V |
18+ 5	4.9549	1.01	|	Q |	|	|	V |
18+10	4.9618	1.01	|	Q |	|	|	V |
18+15	4.9687	1.01	|	Q |	|	|	V |
18+20	4.9757	1.01	|	Q |	|	|	V |
18+25	4.9826	1.01	|	Q |	|	|	V |
18+30	4.9895	1.01	|	Q |	|	|	V |
18+35	4.9958	0.91	|	Q |	|	|	V |
18+40	5.0013	0.80	|	Q |	|	|	V |
18+45	5.0066	0.77	|	Q |	|	|	V |
18+50	5.0111	0.66	|	Q |	|	|	V |
18+55	5.0149	0.54	|	Q |	|	|	V |
19+ 0	5.0185	0.52	|	Q |	|	|	V |
19+ 5	5.0226	0.61	|	Q |	|	|	V |
19+10	5.0275	0.71	|	Q |	|	|	V |
19+15	5.0326	0.74	|	Q |	|	|	V |
19+20	5.0385	0.85	|	Q |	|	|	V |
19+25	5.0451	0.96	|	Q |	|	|	V |
19+30	5.0519	0.99	|	Q |	|	|	V |
19+35	5.0581	0.90	|	Q |	|	|	V |
19+40	5.0636	0.80	|	Q |	|	|	V |
19+45	5.0689	0.77	|	Q |	|	|	V |
19+50	5.0735	0.66	|	Q |	|	|	V |
19+55	5.0772	0.54	|	Q |	|	|	V |
20+ 0	5.0808	0.52	|	Q |	|	|	V |
20+ 5	5.0850	0.61	|	Q |	|	|	V |
20+10	5.0899	0.71	|	Q |	|	|	V |
20+15	5.0950	0.74	|	Q |	|	|	V |
20+20	5.1001	0.75	|	Q |	|	|	V |
20+25	5.1053	0.75	|	Q |	|	|	V |
20+30	5.1105	0.75	|	Q |	|	|	V |
20+35	5.1157	0.75	|	Q |	|	|	V |
20+40	5.1209	0.75	|	Q |	|	|	V |
20+45	5.1261	0.75	|	Q |	|	|	V |
20+50	5.1307	0.66	|	Q |	|	|	V |
20+55	5.1344	0.54	|	Q |	|	|	V |
21+ 0	5.1380	0.52	|	Q |	|	|	V |
21+ 5	5.1422	0.61	|	Q |	|	|	V |
21+10	5.1471	0.71	|	Q |	|	|	V |
21+15	5.1522	0.74	|	Q |	|	|	V|
21+20	5.1566	0.65	|	Q |	|	|	V|
21+25	5.1604	0.54	|	Q |	|	|	V|
21+30	5.1640	0.52	|	Q |	|	|	V|
21+35	5.1681	0.61	|	Q |	|	|	V|
21+40	5.1730	0.71	|	Q |	|	|	V|
21+45	5.1781	0.74	|	Q |	|	|	V|

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   21+50       5.1826      0.65  | Q       |         |         |         v|
   21+55       5.1864      0.54  | Q       |         |         |         v|
   22+ 0       5.1899      0.52  | Q       |         |         |         v|
   22+ 5       5.1941      0.61  | Q       |         |         |         v|
   22+10       5.1990      0.71  | Q       |         |         |         v|
   22+15       5.2041      0.74  | Q       |         |         |         v|
   22+20       5.2086      0.65  | Q       |         |         |         v|
   22+25       5.2124      0.54  | Q       |         |         |         v|
   22+30       5.2159      0.52  | Q       |         |         |         v|
   22+35       5.2194      0.51  | Q       |         |         |         v|
   22+40       5.2229      0.50  | Q       |         |         |         v|
   22+45       5.2264      0.50  | Q       |         |         |         v|
   22+50       5.2298      0.50  | Q       |         |         |         v|
   22+55       5.2333      0.50  | Q       |         |         |         v|
   23+ 0       5.2368      0.50  | Q       |         |         |         v|
   23+ 5       5.2402      0.50  | Q       |         |         |         v|
   23+10       5.2437      0.50  | Q       |         |         |         v|
   23+15       5.2471      0.50  | Q       |         |         |         v|
   23+20       5.2506      0.50  | Q       |         |         |         v|
   23+25       5.2541      0.50  | Q       |         |         |         v|
   23+30       5.2575      0.50  | Q       |         |         |         v|
   23+35       5.2610      0.50  | Q       |         |         |         v|
   23+40       5.2645      0.50  | Q       |         |         |         v|
   23+45       5.2679      0.50  | Q       |         |         |         v|
   23+50       5.2714      0.50  | Q       |         |         |         v|
   23+55       5.2749      0.50  | Q       |         |         |         v|
   24+ 0       5.2783      0.50  | Q       |         |         |         v|
   24+ 5       5.2805      0.31  |Q        |         |         |         v|
   24+10       5.2810      0.08  Q         |         |         |         v|
   24+15       5.2812      0.03  Q         |         |         |         v|
   24+20       5.2813      0.01  Q         |         |         |          v
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STAGE-STORAGE/OUTFLOW TABLE

Basin 1 - Stage/Storage/Outflow Table
W.O.# 20-0186 - Redlands West

UG Chamber Storage		100-Year	WEIR
Tributary Area:	20.1 AC	Q ALLOWABLE	20
DCV=	N/A		
Bottom Chamber Elevation:	1432.50	L(ft)	4
Bottom Stone Elevation:	1431.75	C	3
		Invert H (ft)	5.5

100 YEAR
WEIR +PUMP (Q=5.0 CFS)

$Q_{ORIFICE}$= Cd*Area*$(2*G*H)^{0.5}$

Q_{WEIR}= C*L*$H^{3/2}$

#	Elevation (ft)	Depth (ft)	Storage (cf)	Storage (ac-ft)	H (ft)	Q (cfs)	Total Q (cfs)	Comments
1	1432.5	0	0.00	0.000			5.00	Bottom of Chamber
2	1433	0.5	12235.72	0.281		0.00	5.00	
3	1433.5	1	19286.43	0.443		0.00	5.00	
4	1434	1.5	26119.75	0.600		0.00	5.00	
5	1434.5	2	32657.67	0.750		0.00	5.00	
6	1435	2.5	38792.55	0.891		0.00	5.00	
7	1435.5	3	44355.79	1.018		0.00	5.00	
8	1436	3.5	48890.35	1.122		0.00	5.00	
9	1436.5	4	52339.64	1.202		0.00	5.00	
10	1437	4.5	55686.98	1.278		0.00	5.00	
11	1437.5	5	59034.32	1.355		0.00	5.00	
12	1438	5.5	62381.66	1.432	0	0.00	5.00	Weir Opening
13	1438.5	6	65729.00	1.509	0.5	4.24	9.24	
14	1439	6.5	69076.34	1.586	1	12.00	17.00	Top of Storage

Project: **Redlands West Industrial**

Chamber Model -	MC-3500	
Units -	**Imperial**	Click Here for Metric
Number of Chambers -	310	
Number of End Caps -	10	
Voids in the stone (porosity) -	40	%
Base of STONE Elevation -	1431.75	ft
Amount of Stone Above Chambers -	36	in
Amount of Stone Below Chambers -	9	in
Area of system -	16737	sf Min. Area - 16090 sf min. area

StormTech® Detention • Retention • Water Quality
A division of ADS

☑ Include Perimeter Stone in Calculations

Height of System *(inches)*	Incremental Single Chamber *(cubic feet)*	Incremental Single End Cap *(cubic feet)*	Incremental Chambers *(cubic feet)*	Incremental End Cap *(cubic feet)*	Incremental Stone *(cubic feet)*	Incremental Ch, EC and Stone *(cubic feet)*	Cumulative System (cubic feet)	Elevation (feet)
90	0.00	0.00	0.00	0.00	557.89	557.89	70750.01	1439.25
89	0.00	0.00	0.00	0.00	557.89	557.89	70192.12	1439.17
88	0.00	0.00	0.00	0.00	557.89	557.89	69634.23	1439.08
87	0.00	0.00	0.00	0.00	557.89	557.89	69076.34	1439.00
86	0.00	0.00	0.00	0.00	557.89	557.89	68518.45	1438.92
85	0.00	0.00	0.00	0.00	557.89	557.89	67960.56	1438.83
84	0.00	0.00	0.00	0.00	557.89	557.89	67402.67	1438.75
83	0.00	0.00	0.00	0.00	557.89	557.89	66844.78	1438.67
82	0.00	0.00	0.00	0.00	557.89	557.89	66286.89	1438.58
81	0.00	0.00	0.00	0.00	557.89	557.89	65729.00	1438.50
80	0.00	0.00	0.00	0.00	557.89	557.89	65171.11	1438.42
79	0.00	0.00	0.00	0.00	557.89	557.89	64613.22	1438.33
78	0.00	0.00	0.00	0.00	557.89	557.89	64055.33	1438.25
77	0.00	0.00	0.00	0.00	557.89	557.89	63497.44	1438.17
76	0.00	0.00	0.00	0.00	557.89	557.89	62939.55	1438.08
75	0.00	0.00	0.00	0.00	557.89	557.89	62381.66	1438.00
74	0.00	0.00	0.00	0.00	557.89	557.89	61823.77	1437.92
73	0.00	0.00	0.00	0.00	557.89	557.89	61265.88	1437.83
72	0.00	0.00	0.00	0.00	557.89	557.89	60707.99	1437.75
71	0.00	0.00	0.00	0.00	557.89	557.89	60150.10	1437.67
70	0.00	0.00	0.00	0.00	557.89	557.89	59592.21	1437.58
69	0.00	0.00	0.00	0.00	557.89	557.89	59034.32	1437.50
68	0.00	0.00	0.00	0.00	557.89	557.89	58476.43	1437.42
67	0.00	0.00	0.00	0.00	557.89	557.89	57918.54	1437.33
66	0.00	0.00	0.00	0.00	557.89	557.89	57360.65	1437.25
65	0.00	0.00	0.00	0.00	557.89	557.89	56802.76	1437.17
64	0.00	0.00	0.00	0.00	557.89	557.89	56244.87	1437.08
63	0.00	0.00	0.00	0.00	557.89	557.89	55686.98	1437.00
62	0.00	0.00	0.00	0.00	557.89	557.89	55129.09	1436.92
61	0.00	0.00	0.00	0.00	557.89	557.89	54571.20	1436.83
60	0.00	0.00	0.00	0.00	557.89	557.89	54013.31	1436.75
59	0.00	0.00	0.00	0.00	557.89	557.89	53455.42	1436.67
58	0.00	0.00	0.00	0.00	557.89	557.89	52897.53	1436.58
57	0.00	0.00	0.00	0.00	557.89	557.89	52339.64	1436.50
56	0.00	0.00	0.00	0.00	557.89	557.89	51781.75	1436.42
55	0.00	0.00	0.00	0.00	557.89	557.89	51223.86	1436.33
54	0.06	0.00	18.01	0.00	550.69	568.69	50665.97	1436.25
53	0.19	0.02	60.17	0.24	533.73	594.14	50097.28	1436.17
52	0.29	0.04	91.13	0.38	521.29	612.79	49503.14	1436.08
51	0.40	0.05	125.13	0.52	507.63	633.28	48890.35	1436.00
50	0.69	0.07	213.03	0.68	472.41	686.11	48257.07	1435.92
49	1.03	0.09	318.77	0.88	430.03	749.68	47570.96	1435.83
48	1.25	0.11	387.35	1.07	402.52	790.94	46821.28	1435.75
47	1.42	0.13	440.89	1.26	381.03	823.18	46030.33	1435.67
46	1.57	0.14	487.67	1.44	362.24	851.36	45207.15	1435.58
45	1.71	0.16	529.22	1.63	345.55	876.40	44355.79	1435.50
44	1.83	0.18	566.83	1.82	330.43	899.08	43479.39	1435.42
43	1.94	0.20	600.71	2.01	316.80	919.52	42580.31	1435.33
42	2.04	0.22	632.66	2.18	303.95	938.79	41660.79	1435.25
41	2.13	0.23	661.75	2.35	292.25	956.35	40722.00	1435.17
40	2.22	0.25	689.51	2.51	281.08	973.10	39765.65	1435.08
39	2.31	0.27	715.11	2.66	270.79	988.55	38792.55	1435.00
38	2.38	0.28	739.28	2.80	261.06	1003.14	37804.00	1434.92
37	2.46	0.29	762.32	2.94	251.79	1017.05	36800.87	1434.83
36	2.53	0.31	783.73	3.08	243.17	1029.98	35783.82	1434.75
35	2.59	0.32	804.06	3.21	234.98	1042.25	34753.84	1434.67
34	2.66	0.33	823.38	3.34	227.20	1053.92	33711.59	1434.58
33	2.72	0.35	841.68	3.47	219.83	1064.98	32657.67	1434.50
32	2.77	0.36	859.10	3.60	212.81	1075.51	31592.69	1434.42
31	2.82	0.37	875.64	3.72	206.14	1085.51	30517.18	1434.33
30	2.88	0.38	891.39	3.84	199.80	1095.03	29431.67	1434.25
29	2.92	0.40	906.48	3.96	193.71	1104.16	28336.64	1434.17
28	2.97	0.41	920.67	4.08	187.99	1112.73	27232.48	1434.08
27	3.01	0.42	933.86	4.19	182.67	1120.72	26119.75	1434.00
26	3.05	0.43	946.51	4.30	177.57	1128.37	24999.03	1433.92
25	3.09	0.44	959.23	4.40	172.44	1136.07	23870.65	1433.83
24	3.13	0.45	970.47	4.51	167.90	1142.88	22734.59	1433.75
23	3.17	0.46	981.36	4.61	163.50	1149.47	21591.71	1433.67
22	3.20	0.47	991.83	4.71	159.28	1155.81	20442.24	1433.58
21	3.23	0.48	1001.65	4.80	155.31	1161.76	19286.43	1433.50
20	3.26	0.49	1011.04	4.89	151.52	1167.45	18124.67	1433.42
19	3.29	0.50	1019.98	4.98	147.91	1172.87	16957.22	1433.33
18	3.32	0.51	1028.57	5.06	144.44	1178.07	15784.36	1433.25
17	3.34	0.51	1036.68	5.14	141.16	1182.98	14606.29	1433.17
16	3.37	0.52	1044.27	5.22	138.09	1187.59	13423.30	1433.08
15	3.39	0.53	1051.68	5.30	135.10	1192.07	12235.72	1433.00
14	3.41	0.54	1058.51	5.37	132.34	1196.21	11043.64	1432.92
13	3.44	0.54	1065.48	5.43	129.53	1200.43	9847.43	1432.83
12	3.46	0.55	1071.89	5.49	126.94	1204.32	8647.00	1432.75
11	3.48	0.56	1078.40	5.55	124.31	1208.26	7442.68	1432.67
10	3.51	0.59	1086.58	5.95	120.88	1213.41	6234.42	1432.58
9	0.00	0.00	0.00	0.00	557.89	557.89	5021.01	1432.50
8	0.00	0.00	0.00	0.00	557.89	557.89	4463.12	1432.42
7	0.00	0.00	0.00	0.00	557.89	557.89	3905.23	1432.33
6	0.00	0.00	0.00	0.00	557.89	557.89	3347.34	1432.25
5	0.00	0.00	0.00	0.00	557.89	557.89	2789.45	1432.17
4	0.00	0.00	0.00	0.00	557.89	557.89	2231.56	1432.08
3	0.00	0.00	0.00	0.00	557.89	557.89	1673.67	1432.00
2	0.00	0.00	0.00	0.00	557.89	557.89	1115.78	1431.92
1	0.00	0.00	0.00	0.00	557.89	557.89	557.89	1431.83

	Developed Condition		Basin Routing Results		
Storm Event	Volume (Ac-ft)	Peak Flow (cfs)	Peak Flow (cfs)	Max Basin Depth (feet)	Water Surface Elevation (cfs)
EAST 100-Year, 1-Hour	1.1	36.4	5.0	3.98	1434.98
WEST 100-Year, 1-Hour	1.8	50.1	5.0	5.38	1437.88
COMBINED 100-Year, 1-Hour	**2.9**	**86.5**	**10.0**	-	-
EAST 100-Year, 3-Hour	1.6	20.5	5.0	3.59	1434.59
WEST 100-Year, 3-Hour	2.6	31.5	11.0	6.12	1438.62
COMBINED 100-Year, 3-Hour	**4.2**	**52.0**	**16.0**	-	-
EAST 100-Year, 6-Hour	2.1	17.8	5.0	3.05	1434.05
WEST 100-Year, 6-Hour	3.3	27.4	8.6	5.93	1438.43
COMBINED 100-Year, 24-Hour	**5.4**	**45.2**	**13.6**	-	-
EAST 100-Year, 24-Hour	3.3	5.8	5.0	0.55	1431.55
WEST 100-Year, 24-Hour	5.3	9.5	5.0	2.30	1434.80
COMBINED 100-Year, 24-Hour	**8.6**	**15.3**	**10.0**	-	-

H:\2020\20-0186\Drainage\PHYD\Hydrology\Unit Hydrograph\[20-0186 West StormTech_Cumulative_Storages_Spreadsheet_.xls]Cun

100-YEAR, 1-HOUR ROUTING ANALYSIS

FLOOD HYDROGRAPH ROUTING PROGRAM
Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005
Study date: 05/12/21

PROPOSED 100-YR, 1-HOUR STORM EVENT
REDLANDS WEST - ROUTING
20-0186 UG CHAMBER STORAGE PUMP
05/12/2021 AYS 5.0 CFS

Program License Serial Number 4010

********** HYDROGRAPH INFORMATION **********

From study/file name: PROPWEST1001100.rte
**********HYDROGRAPH DATA**********
Number of intervals = 16
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 50.071 (CFS)
Total volume = 1.794 (Ac.Ft)
Status of hydrographs being held in storage
Stream 1 Stream 2 Stream 3 Stream 4 Stream 5
Peak (CFS) 0.000 0.000 0.000 0.000 0.000
Vol (Ac.Ft) 0.000 0.000 0.000 0.000 0.000
****

++++++++++
Process from Point/Station 200.000 to Point/Station 201.000
**** RETARDING BASIN ROUTING ****
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User entry of depth-outflow-storage data

Total number of inflow hydrograph intervals = 16
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.500	0.281	5.000	0.264	0.298
1.000	0.443	5.000	0.426	0.460
1.500	0.600	5.000	0.583	0.617
2.000	0.750	5.000	0.733	0.767
2.500	0.891	5.000	0.874	0.908
3.000	1.018	5.000	1.001	1.035
3.500	1.122	5.000	1.105	1.139
4.000	1.202	5.000	1.185	1.219
4.500	1.278	5.000	1.261	1.295
5.000	1.355	5.000	1.338	1.372
5.500	1.432	5.000	1.415	1.449
6.000	1.509	9.240	1.477	1.541
6.500	1.586	17.000	1.527	1.645

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	12.5	25.04	37.55	50.07	Depth (Ft.)
0.083	3.71	0.21	0.012	O I	|	|	|	|	0.02
0.167	8.18	0.88	0.049	O I	|	|	|	|	0.09
0.250	10.06	1.83	0.103	|O I	|	|	|	|	0.18
0.333	11.41	2.86	0.161	|O I	|	|	|	|	0.29
0.417	12.74	3.92	0.220	| O I	|	|	|	|	0.39
0.500	14.67	5.00	0.284	| O |I	|	|	|	|	0.51
0.583	16.88	5.00	0.358	| O | I	|	|	|	|	0.74
0.667	19.72	5.00	0.450	| O | I	|	|	|	|	1.02
0.750	25.85	5.00	0.572	| O | | I	|	|	|	|	1.41
0.833	50.07	5.00	0.799	| O | |	|	|	|	I	2.17
0.917	48.54	5.00	1.104	| O | |	|	|	I|	|	3.42
1.000	22.48	5.00	1.315	| O | | I	|	|	|	|	4.74
1.083	11.29	5.00	1.396	| O I|	|	|	|	|	5.27
1.167	3.72	5.00	1.414	| IO	|	|	|	|	5.38
1.250	0.88	5.00	1.395	I O	|	|	|	|	5.26
1.333	0.26	5.00	1.365	I O	|	|	|	|	5.06
1.417	0.00	5.00	1.331	I O	|	|	|	|	4.84
1.500	0.00	5.00	1.297	I O	|	|	|	|	4.62
1.583	0.00	5.00	1.262	I O	|	|	|	|	4.40
1.667	0.00	5.00	1.228	I O	|	|	|	|	4.17
1.750	0.00	5.00	1.193	I O	|	|	|	|	3.95
1.833	0.00	5.00	1.159	I O	|	|	|	|	3.73
1.917	0.00	5.00	1.124	I O	|	|	|	|	3.52
2.000	0.00	5.00	1.090	I O	|	|	|	|	3.35
2.083	0.00	5.00	1.056	I O	|	|	|	|	3.18
2.167	0.00	5.00	1.021	I O	|	|	|	|	3.02
2.250	0.00	5.00	0.987	I O	|	|	|	|	2.88
2.333	0.00	5.00	0.952	I O	|	|	|	|	2.74
2.417	0.00	5.00	0.918	I O	|	|	|	|	2.61
2.500	0.00	5.00	0.883	I O	|	|	|	|	2.47
2.583	0.00	5.00	0.849	I O	|	|	|	|	2.35
2.667	0.00	5.00	0.815	I O	|	|	|	|	2.23
2.750	0.00	5.00	0.780	I O	|	|	|	|	2.11
2.833	0.00	5.00	0.746	I O	|	|	|	|	1.99
2.917	0.00	5.00	0.711	I O	|	|	|	|	1.87
3.000	0.00	5.00	0.677	I O	|	|	|	|	1.76
3.083	0.00	5.00	0.642	I O	|	|	|	|	1.64
3.167	0.00	5.00	0.608	I O	|	|	|	|	1.53
3.250	0.00	5.00	0.574	I O	|	|	|	|	1.42
3.333	0.00	5.00	0.539	I O	|	|	|	|	1.31
3.417	0.00	5.00	0.505	I O	|	|	|	|	1.20
3.500	0.00	5.00	0.470	I O	|	|	|	|	1.09
3.583	0.00	5.00	0.436	I O	|	|	|	|	0.98
3.667	0.00	5.00	0.401	I O	|	|	|	|	0.87
3.750	0.00	5.00	0.367	I O	|	|	|	|	0.77
3.833	0.00	5.00	0.332	I O	|	|	|	|	0.66
3.917	0.00	5.00	0.298	I O	|	|	|	|	0.55
4.000	0.00	4.71	0.265	I O	|	|	|	|	0.47
4.083	0.00	4.16	0.234	I O	|	|	|	|	0.42
4.167	0.00	3.68	0.207	I O	|	|	|	|	0.37
4.250	0.00	3.26	0.183	I O	|	|	|	|	0.33
4.333	0.00	2.88	0.162	IO	|	|	|	|	0.29
4.417	0.00	2.55	0.143	IO	|	|	|	|	0.25
4.500	0.00	2.25	0.127	IO	|	|	|	|	0.23
4.583	0.00	1.99	0.112	IO	|	|	|	|	0.20
4.667	0.00	1.76	0.099	IO	|	|	|	|	0.18
4.750	0.00	1.56	0.088	O	|	|	|	|	0.16
4.833	0.00	1.38	0.078	O	|	|	|	|	0.14
4.917	0.00	1.22	0.069	O	|	|	|	|	0.12
5.000	0.00	1.08	0.061	O	|	|	|	|	0.11
5.083	0.00	0.96	0.054	O	|	|	|	|	0.10
5.167	0.00	0.84	0.047	O	|	|	|	|	0.08
5.250	0.00	0.75	0.042	O	|	|	|	|	0.07
5.333	0.00	0.66	0.037	O	|	|	|	|	0.07
5.417	0.00	0.58	0.033	O	|	|	|	|	0.06
5.500	0.00	0.52	0.029	O	|	|	|	|	0.05
5.583	0.00	0.46	0.026	O	|	|	|	|	0.05
5.667	0.00	0.40	0.023	O	|	|	|	|	0.04
5.750	0.00	0.36	0.020	O	|	|	|	|	0.04
5.833	0.00	0.32	0.018	O	|	|	|	|	0.03
5.917	0.00	0.28	0.016	O	|	|	|	|	0.03
6.000	0.00	0.25	0.014	O	|	|	|	|	0.02

6.083	0.00	0.22	0.012	o	|	|	|	0.02
6.167	0.00	0.19	0.011	o	|	|	|	0.02
6.250	0.00	0.17	0.010	o	|	|	|	0.02
6.333	0.00	0.15	0.009	o	|	|	|	0.02
6.417	0.00	0.13	0.008	o	|	|	|	0.01
6.500	0.00	0.12	0.007	o	|	|	|	0.01
6.583	0.00	0.10	0.006	o	|	|	|	0.01
6.667	0.00	0.09	0.005	o	|	|	|	0.01
6.750	0.00	0.08	0.005	o	|	|	|	0.01
6.833	0.00	0.07	0.004	o	|	|	|	0.01
6.917	0.00	0.06	0.004	o	|	|	|	0.01
7.000	0.00	0.06	0.003	o	|	|	|	0.01
7.083	0.00	0.05	0.003	o	|	|	|	0.01
7.167	0.00	0.04	0.002	o	|	|	|	0.00
7.250	0.00	0.04	0.002	o	|	|	|	0.00
7.333	0.00	0.03	0.002	o	|	|	|	0.00
7.417	0.00	0.03	0.002	o	|	|	|	0.00
7.500	0.00	0.03	0.002	o	|	|	|	0.00
7.583	0.00	0.02	0.001	o	|	|	|	0.00
7.667	0.00	0.02	0.001	o	|	|	|	0.00
7.750	0.00	0.02	0.001	o	|	|	|	0.00
7.833	0.00	0.02	0.001	o	|	|	|	0.00
7.917	0.00	0.01	0.001	o	|	|	|	0.00
8.000	0.00	0.01	0.001	o	|	|	|	0.00
8.083	0.00	0.01	0.001	o	|	|	|	0.00
8.167	0.00	0.01	0.001	o	|	|	|	0.00
8.250	0.00	0.01	0.001	o	|	|	|	0.00

**********HYDROGRAPH DATA**********

Number of intervals = 99
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 5.000 (CFS)
Total volume = 1.793 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

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100-YEAR, 3-HOUR ROUTING ANALYSIS

FLOOD HYDROGRAPH ROUTING PROGRAM
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Study date: 05/12/21

PROPOSED 100-YR, 3-HOUR STORM EVENT
REDLANDS WEST - ROUTING
20-0186 UG CHAMBER STORAGE PUMP
05/12/2021 AYS 5.0 CFS

Program License Serial Number 4010

********** HYDROGRAPH INFORMATION **********

From study/file name: PROPWEST1003100.rte
**********HYDROGRAPH DATA**********
Number of intervals = 40
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 31.523 (CFS)
Total volume = 2.611 (Ac.Ft)
Status of hydrographs being held in storage
Stream 1 Stream 2 Stream 3 Stream 4 Stream 5
Peak (CFS) 0.000 0.000 0.000 0.000 0.000
Vol (Ac.Ft) 0.000 0.000 0.000 0.000 0.000
****

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Process from Point/Station 200.000 to Point/Station 201.000
**** RETARDING BASIN ROUTING ****
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User entry of depth-outflow-storage data

Total number of inflow hydrograph intervals = 40
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.500	0.281	5.000	0.264	0.298
1.000	0.443	5.000	0.426	0.460
1.500	0.600	5.000	0.583	0.617
2.000	0.750	5.000	0.733	0.767
2.500	0.891	5.000	0.874	0.908
3.000	1.018	5.000	1.001	1.035
3.500	1.122	5.000	1.105	1.139
4.000	1.202	5.000	1.185	1.219
4.500	1.278	5.000	1.261	1.295
5.000	1.355	5.000	1.338	1.372
5.500	1.432	5.000	1.415	1.449
6.000	1.509	9.240	1.477	1.541
6.500	1.586	17.000	1.527	1.645

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0 7.9 15.76 23.64 31.52	Depth (Ft.)
0.083	1.68	0.10	0.005	OI | | | |	0.01
0.167	3.67	0.40	0.022	O I | | | |	0.04
0.250	3.85	0.78	0.044	O I | | | |	0.08
0.333	4.24	1.16	0.065	|O I | | | |	0.12
0.417	4.88	1.55	0.087	|O I | | | |	0.16
0.500	5.38	1.97	0.110	|O I | | | |	0.20
0.583	5.49	2.37	0.133	| O I | | | |	0.24
0.667	5.55	2.73	0.153	| O I | | | |	0.27
0.750	5.95	3.08	0.173	| O I | | | |	0.31
0.833	5.64	3.39	0.191	| O I | | | |	0.34
0.917	5.33	3.63	0.204	| O I | | | |	0.36
1.000	5.67	3.85	0.216	| O I | | | |	0.38
1.083	6.53	4.11	0.231	| O I | | | |	0.41
1.167	7.26	4.43	0.249	| O I| | | |	0.44
1.250	7.45	4.77	0.268	| O I| | | |	0.48
1.333	7.21	5.00	0.285	| O I| | | |	0.51
1.417	7.90	5.00	0.302	| O I | | |	0.57
1.500	9.20	5.00	0.327	| O |I | | |	0.64
1.583	9.11	5.00	0.355	| O |I | | |	0.73
1.667	9.15	5.00	0.384	| O |I | | |	0.82
1.750	10.78	5.00	0.418	| O | I | | |	0.92
1.833	11.77	5.00	0.461	| O | I | | |	1.06
1.917	11.30	5.00	0.506	| O | I | | |	1.20
2.000	11.11	5.00	0.549	| O | I | | |	1.34
2.083	11.43	5.00	0.592	| O | I | | |	1.48
2.167	13.58	5.00	0.644	| O | I | | |	1.65
2.250	17.35	5.00	0.716	| O | |I | |	1.89
2.333	16.89	5.00	0.800	| O | |I | |	2.18
2.417	20.20	5.00	0.893	| O | | I | |	2.51
2.500	27.57	5.00	1.023	| O | | | I |	3.02
2.583	31.52	5.00	1.192	| O | | | | I	3.94
2.667	30.03	5.00	1.369	| O | | | I |	5.09
2.750	19.19	8.36	1.493	| O | I | |	5.90
2.833	9.99	11.03	1.527	| | IO | | |	6.12
2.917	7.55	9.87	1.515	| I| O | | |	6.04
3.000	4.95	8.48	1.495	| I O | | |	5.91
3.083	1.92	6.87	1.466	|I O | | |	5.72
3.167	0.59	5.08	1.433	I O | | |	5.51
3.250	0.22	5.00	1.402	I O | | |	5.30
3.333	0.04	5.00	1.368	I O | | |	5.08
3.417	0.00	5.00	1.334	I O | | |	4.86
3.500	0.00	5.00	1.299	I O | | |	4.64
3.583	0.00	5.00	1.265	I O | | |	4.41
3.667	0.00	5.00	1.230	I O | | |	4.19
3.750	0.00	5.00	1.196	I O | | |	3.96
3.833	0.00	5.00	1.162	I O | | |	3.75
3.917	0.00	5.00	1.127	I O | | |	3.53
4.000	0.00	5.00	1.093	I O | | |	3.36
4.083	0.00	5.00	1.058	I O | | |	3.19
4.167	0.00	5.00	1.024	I O | | |	3.03
4.250	0.00	5.00	0.989	I O | | |	2.89
4.333	0.00	5.00	0.955	I O | | |	2.75
4.417	0.00	5.00	0.920	I O | | |	2.62
4.500	0.00	5.00	0.886	I O | | |	2.48
4.583	0.00	5.00	0.852	I O | | |	2.36
4.667	0.00	5.00	0.817	I O | | |	2.24
4.750	0.00	5.00	0.783	I O | | |	2.12
4.833	0.00	5.00	0.748	I O | | |	1.99
4.917	0.00	5.00	0.714	I O | | |	1.88
5.000	0.00	5.00	0.679	I O | | |	1.76
5.083	0.00	5.00	0.645	I O | | |	1.65
5.167	0.00	5.00	0.611	I O | | |	1.54
5.250	0.00	5.00	0.576	I O | | |	1.42
5.333	0.00	5.00	0.542	I O | | |	1.31
5.417	0.00	5.00	0.507	I O | | |	1.20
5.500	0.00	5.00	0.473	I O | | |	1.09
5.583	0.00	5.00	0.438	I O | | |	0.99
5.667	0.00	5.00	0.404	I O | | |	0.88
5.750	0.00	5.00	0.370	I O | | |	0.77
5.833	0.00	5.00	0.335	I O | | |	0.67
5.917	0.00	5.00	0.301	I O | | |	0.56
6.000	0.00	4.75	0.267	I O | | |	0.48

6.083	0.00	4.20	0.236	I O	|	|	|	0.42
6.167	0.00	3.72	0.209	I O	|	|	|	0.37
6.250	0.00	3.29	0.185	I O	|	|	|	0.33
6.333	0.00	2.91	0.163	I O	|	|	|	0.29
6.417	0.00	2.57	0.145	I O	|	|	|	0.26
6.500	0.00	2.28	0.128	I O	|	|	|	0.23
6.583	0.00	2.01	0.113	I O	|	|	|	0.20
6.667	0.00	1.78	0.100	IO	|	|	|	0.18
6.750	0.00	1.58	0.089	IO	|	|	|	0.16
6.833	0.00	1.39	0.078	IO	|	|	|	0.14
6.917	0.00	1.23	0.069	IO	|	|	|	0.12
7.000	0.00	1.09	0.061	IO	|	|	|	0.11
7.083	0.00	0.96	0.054	O	|	|	|	0.10
7.167	0.00	0.85	0.048	O	|	|	|	0.09
7.250	0.00	0.75	0.042	O	|	|	|	0.08
7.333	0.00	0.67	0.037	O	|	|	|	0.07
7.417	0.00	0.59	0.033	O	|	|	|	0.06
7.500	0.00	0.52	0.029	O	|	|	|	0.05
7.583	0.00	0.46	0.026	O	|	|	|	0.05
7.667	0.00	0.41	0.023	O	|	|	|	0.04
7.750	0.00	0.36	0.020	O	|	|	|	0.04
7.833	0.00	0.32	0.018	O	|	|	|	0.03
7.917	0.00	0.28	0.016	O	|	|	|	0.03
8.000	0.00	0.25	0.014	O	|	|	|	0.03
8.083	0.00	0.22	0.012	O	|	|	|	0.02
8.167	0.00	0.20	0.011	O	|	|	|	0.02
8.250	0.00	0.17	0.010	O	|	|	|	0.02
8.333	0.00	0.15	0.009	O	|	|	|	0.02
8.417	0.00	0.14	0.008	O	|	|	|	0.01
8.500	0.00	0.12	0.007	O	|	|	|	0.01
8.583	0.00	0.11	0.006	O	|	|	|	0.01
8.667	0.00	0.09	0.005	O	|	|	|	0.01
8.750	0.00	0.08	0.005	O	|	|	|	0.01
8.833	0.00	0.07	0.004	O	|	|	|	0.01
8.917	0.00	0.06	0.004	O	|	|	|	0.01
9.000	0.00	0.06	0.003	O	|	|	|	0.01
9.083	0.00	0.05	0.003	O	|	|	|	0.01
9.167	0.00	0.04	0.003	O	|	|	|	0.00
9.250	0.00	0.04	0.002	O	|	|	|	0.00
9.333	0.00	0.04	0.002	O	|	|	|	0.00
9.417	0.00	0.03	0.002	O	|	|	|	0.00
9.500	0.00	0.03	0.002	O	|	|	|	0.00
9.583	0.00	0.02	0.001	O	|	|	|	0.00
9.667	0.00	0.02	0.001	O	|	|	|	0.00
9.750	0.00	0.02	0.001	O	|	|	|	0.00
9.833	0.00	0.02	0.001	O	|	|	|	0.00
9.917	0.00	0.01	0.001	O	|	|	|	0.00
10.000	0.00	0.01	0.001	O	|	|	|	0.00
10.083	0.00	0.01	0.001	O	|	|	|	0.00
10.167	0.00	0.01	0.001	O	|	|	|	0.00
10.250	0.00	0.01	0.001	O	|	|	|	0.00

**********HYDROGRAPH DATA**********

Number of intervals = 123
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 11.026 (CFS)
Total volume = 2.611 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

****

100-YEAR, 6-HOUR ROUTING ANALYSIS

FLOOD HYDROGRAPH ROUTING PROGRAM
Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005
Study date: 05/12/21

PROPOSED 100-YR, 6-HOUR STORM EVENT
REDLANDS WEST - ROUTING
20-0186 UG CHAMBER STORAGE PUMP
05/12/2021 AYS 5.0 CFS

Program License Serial Number 4010

********** HYDROGRAPH INFORMATION **********

From study/file name: PROPWEST1006100.rte
**********HYDROGRAPH DATA**********
Number of intervals = 76
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 27.414 (CFS)
Total volume = 3.314 (Ac.Ft)
Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

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Process from Point/Station 200.000 to Point/Station 201.000
**** RETARDING BASIN ROUTING ****
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User entry of depth-outflow-storage data

Total number of inflow hydrograph intervals = 76
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.500	0.281	5.000	0.264	0.298
1.000	0.443	5.000	0.426	0.460
1.500	0.600	5.000	0.583	0.617
2.000	0.750	5.000	0.733	0.767
2.500	0.891	5.000	0.874	0.908
3.000	1.018	5.000	1.001	1.035
3.500	1.122	5.000	1.105	1.139
4.000	1.202	5.000	1.185	1.219
4.500	1.278	5.000	1.261	1.295
5.000	1.355	5.000	1.338	1.372
5.500	1.432	5.000	1.415	1.449
6.000	1.509	9.240	1.477	1.541
6.500	1.586	17.000	1.527	1.645

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	6.9	13.71	20.56	27.41	Depth (Ft.)
0.083	0.85	0.05	0.003	O	|	|	|	|	0.00
0.167	2.03	0.21	0.012	O I	|	|	|	|	0.02
0.250	2.45	0.44	0.025	O I	|	|	|	|	0.04
0.333	2.59	0.68	0.038	O I	|	|	|	|	0.07
0.417	2.65	0.91	0.051	|O I	|	|	|	|	0.09
0.500	2.83	1.12	0.063	|O I	|	|	|	|	0.11
0.583	3.03	1.33	0.075	|O I	|	|	|	|	0.13
0.667	3.08	1.53	0.086	|O I	|	|	|	|	0.15
0.750	3.10	1.71	0.096	|O I	|	|	|	|	0.17
0.833	3.11	1.87	0.105	| OI	|	|	|	|	0.19
0.917	3.11	2.01	0.113	| OI	|	|	|	|	0.20
1.000	3.28	2.15	0.121	| OI	|	|	|	|	0.21
1.083	3.48	2.29	0.129	| O I	|	|	|	|	0.23
1.167	3.52	2.43	0.137	| O I	|	|	|	|	0.24
1.250	3.54	2.56	0.144	| O I	|	|	|	|	0.26
1.333	3.55	2.67	0.150	| OI	|	|	|	|	0.27
1.417	3.55	2.77	0.156	| OI	|	|	|	|	0.28
1.500	3.55	2.86	0.161	| OI	|	|	|	|	0.29
1.583	3.55	2.94	0.165	| OI	|	|	|	|	0.29
1.667	3.55	3.01	0.169	| OI	|	|	|	|	0.30
1.750	3.55	3.07	0.173	| OI	|	|	|	|	0.31
1.833	3.55	3.13	0.176	| OI	|	|	|	|	0.31
1.917	3.55	3.18	0.179	| OI	|	|	|	|	0.32
2.000	3.72	3.23	0.182	| OI	|	|	|	|	0.32
2.083	3.75	3.29	0.185	| OI	|	|	|	|	0.33
2.167	3.77	3.34	0.188	| OI	|	|	|	|	0.33
2.250	3.94	3.40	0.191	| OI	|	|	|	|	0.34
2.333	3.98	3.47	0.195	| O	|	|	|	|	0.35
2.417	3.98	3.53	0.198	| O	|	|	|	|	0.35
2.500	3.99	3.58	0.201	| O	|	|	|	|	0.36
2.583	3.99	3.63	0.204	| O	|	|	|	|	0.36
2.667	3.99	3.67	0.206	| O	|	|	|	|	0.37
2.750	4.16	3.72	0.209	| O	|	|	|	|	0.37
2.833	4.37	3.78	0.212	| OI	|	|	|	|	0.38
2.917	4.41	3.85	0.216	| OI	|	|	|	|	0.39
3.000	4.43	3.92	0.220	| OI	|	|	|	|	0.39
3.083	4.44	3.98	0.223	| OI	|	|	|	|	0.40
3.167	4.61	4.04	0.227	| OI	|	|	|	|	0.40
3.250	4.81	4.12	0.231	| OI	|	|	|	|	0.41
3.333	4.85	4.20	0.236	| OI	|	|	|	|	0.42
3.417	5.04	4.29	0.241	| O	|	|	|	|	0.43
3.500	5.42	4.40	0.247	| OI	|	|	|	|	0.44
3.583	5.84	4.54	0.255	| OI	|	|	|	|	0.45
3.667	6.10	4.70	0.264	| O I	|	|	|	|	0.47
3.750	6.35	4.88	0.274	| O I	|	|	|	|	0.49
3.833	6.58	5.00	0.285	| O I	|	|	|	|	0.51
3.917	6.81	5.00	0.296	| O I	|	|	|	|	0.55
4.000	7.03	5.00	0.310	| O I	|	|	|	|	0.59
4.083	7.32	5.00	0.325	| O I	|	|	|	|	0.63
4.167	7.85	5.00	0.342	| O |I	|	|	|	|	0.69
4.250	8.43	5.00	0.364	| O |I	|	|	|	|	0.76
4.333	9.02	5.00	0.390	| O | I	|	|	|	|	0.84
4.417	9.63	5.00	0.419	| O | I	|	|	|	|	0.93
4.500	10.01	5.00	0.453	| O | I	|	|	|	|	1.03
4.583	10.34	5.00	0.488	| O | I	|	|	|	|	1.14
4.667	10.89	5.00	0.527	| O | I	|	|	|	|	1.27
4.750	11.47	5.00	0.569	| O | I	|	|	|	|	1.40
4.833	11.83	5.00	0.615	| O | I	|	|	|	|	1.55
4.917	12.16	5.00	0.663	| O | I	|	|	|	|	1.71
5.000	12.71	5.00	0.715	| O | I	|	|	|	|	1.88
5.083	14.23	5.00	0.773	| O | I	|	|	|	|	2.08
5.167	16.86	5.00	0.846	| O | I	|	|	|	|	2.34
5.250	19.27	5.00	0.935	| O | I	|	|	|	|	2.68
5.333	21.24	5.00	1.041	| O | I	|	|	|	|	3.11
5.417	23.61	5.00	1.161	| O | I	|	|	|	|	3.74
5.500	27.41	5.00	1.302	| O | I	|	|	|	|	4.65
5.583	21.67	5.21	1.436	| O |	|	|	|	|	5.52
5.667	10.30	8.64	1.498	| O I |	|	|	|	|	5.93
5.750	5.60	8.42	1.494	| O |I |	|	|	|	|	5.90
5.833	3.52	7.19	1.472	| I O |	|	|	|	|	5.76
5.917	2.14	5.80	1.447	| I O |	|	|	|	|	5.59
6.000	1.36	5.00	1.421	|I O |	|	|	|	|	5.43

6.083	0.69	5.00	1.394	I	o	|	|	|	5.25
6.167	0.19	5.00	1.363	I	o	|	|	|	5.05
6.250	0.07	5.00	1.329	I	o	|	|	|	4.83
6.333	0.02	5.00	1.295	I	o	|	|	|	4.61
6.417	0.00	5.00	1.261	I	o	|	|	|	4.39
6.500	0.00	5.00	1.226	I	o	|	|	|	4.16
6.583	0.00	5.00	1.192	I	o	|	|	|	3.94
6.667	0.00	5.00	1.157	I	o	|	|	|	3.72
6.750	0.00	5.00	1.123	I	o	|	|	|	3.51
6.833	0.00	5.00	1.088	I	o	|	|	|	3.34
6.917	0.00	5.00	1.054	I	o	|	|	|	3.17
7.000	0.00	5.00	1.020	I	o	|	|	|	3.01
7.083	0.00	5.00	0.985	I	o	|	|	|	2.87
7.167	0.00	5.00	0.951	I	o	|	|	|	2.73
7.250	0.00	5.00	0.916	I	o	|	|	|	2.60
7.333	0.00	5.00	0.882	I	o	|	|	|	2.47
7.417	0.00	5.00	0.847	I	o	|	|	|	2.35
7.500	0.00	5.00	0.813	I	o	|	|	|	2.22
7.583	0.00	5.00	0.778	I	o	|	|	|	2.10
7.667	0.00	5.00	0.744	I	o	|	|	|	1.98
7.750	0.00	5.00	0.710	I	o	|	|	|	1.87
7.833	0.00	5.00	0.675	I	o	|	|	|	1.75
7.917	0.00	5.00	0.641	I	o	|	|	|	1.64
8.000	0.00	5.00	0.606	I	o	|	|	|	1.52
8.083	0.00	5.00	0.572	I	o	|	|	|	1.41
8.167	0.00	5.00	0.537	I	o	|	|	|	1.30
8.250	0.00	5.00	0.503	I	o	|	|	|	1.19
8.333	0.00	5.00	0.469	I	o	|	|	|	1.08
8.417	0.00	5.00	0.434	I	o	|	|	|	0.97
8.500	0.00	5.00	0.400	I	o	|	|	|	0.87
8.583	0.00	5.00	0.365	I	o	|	|	|	0.76
8.667	0.00	5.00	0.331	I	o	|	|	|	0.65
8.750	0.00	5.00	0.296	I	o	|	|	|	0.55
8.833	0.00	4.68	0.263	I	o	|	|	|	0.47
8.917	0.00	4.14	0.233	I	o	|	|	|	0.41
9.000	0.00	3.66	0.206	I	o	|	|	|	0.37
9.083	0.00	3.24	0.182	I	o	|	|	|	0.32
9.167	0.00	2.87	0.161	I	o	|	|	|	0.29
9.250	0.00	2.53	0.142	I	o	|	|	|	0.25
9.333	0.00	2.24	0.126	I	o	|	|	|	0.22
9.417	0.00	1.98	0.111	I	o	|	|	|	0.20
9.500	0.00	1.75	0.099	I	o	|	|	|	0.18
9.583	0.00	1.55	0.087	I	o	|	|	|	0.16
9.667	0.00	1.37	0.077	I	o	|	|	|	0.14
9.750	0.00	1.21	0.068	I	o	|	|	|	0.12
9.833	0.00	1.07	0.060	I	o	|	|	|	0.11
9.917	0.00	0.95	0.053	I	o	|	|	|	0.09
10.000	0.00	0.84	0.047	o		|	|	|	0.08
10.083	0.00	0.74	0.042	o		|	|	|	0.07
10.167	0.00	0.66	0.037	o		|	|	|	0.07
10.250	0.00	0.58	0.033	o		|	|	|	0.06
10.333	0.00	0.51	0.029	o		|	|	|	0.05
10.417	0.00	0.45	0.026	o		|	|	|	0.05
10.500	0.00	0.40	0.023	o		|	|	|	0.04
10.583	0.00	0.36	0.020	o		|	|	|	0.04
10.667	0.00	0.31	0.018	o		|	|	|	0.03
10.750	0.00	0.28	0.016	o		|	|	|	0.03
10.833	0.00	0.25	0.014	o		|	|	|	0.02
10.917	0.00	0.22	0.012	o		|	|	|	0.02
11.000	0.00	0.19	0.011	o		|	|	|	0.02
11.083	0.00	0.17	0.010	o		|	|	|	0.02
11.167	0.00	0.15	0.008	o		|	|	|	0.02
11.250	0.00	0.13	0.007	o		|	|	|	0.01
11.333	0.00	0.12	0.007	o		|	|	|	0.01
11.417	0.00	0.10	0.006	o		|	|	|	0.01
11.500	0.00	0.09	0.005	o		|	|	|	0.01
11.583	0.00	0.08	0.005	o		|	|	|	0.01
11.667	0.00	0.07	0.004	o		|	|	|	0.01
11.750	0.00	0.06	0.004	o		|	|	|	0.01
11.833	0.00	0.06	0.003	o		|	|	|	0.01
11.917	0.00	0.05	0.003	o		|	|	|	0.00
12.000	0.00	0.04	0.002	o		|	|	|	0.00
12.083	0.00	0.04	0.002	o		|	|	|	0.00
12.167	0.00	0.03	0.002	o		|	|	|	0.00
12.250	0.00	0.03	0.002	o		|	|	|	0.00

12.333	0.00	0.03	0.002	o	|	|	|	0.00
12.417	0.00	0.02	0.001	o	|	|	|	0.00
12.500	0.00	0.02	0.001	o	|	|	|	0.00
12.583	0.00	0.02	0.001	o	|	|	|	0.00
12.667	0.00	0.02	0.001	o	|	|	|	0.00
12.750	0.00	0.01	0.001	o	|	|	|	0.00
12.833	0.00	0.01	0.001	o	|	|	|	0.00
12.917	0.00	0.01	0.001	o	|	|	|	0.00
13.000	0.00	0.01	0.001	o	|	|	|	0.00
13.083	0.00	0.01	0.001	o	|	|	|	0.00

**********HYDROGRAPH DATA**********

Number of intervals = 157
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 8.641 (CFS)
Total volume = 3.314 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

****

100-YEAR, 24-HOUR ROUTING ANALYSIS

FLOOD HYDROGRAPH ROUTING PROGRAM
Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005
Study date: 05/12/21

PROPOSED 100-YR, 24-HOUR STORM EVENT
REDLANDS WEST - ROUTING
20-0186 UG CHAMBER STORAGE PUMP
05/12/2021 AYS 5.0 CFS

Program License Serial Number 4010

********** HYDROGRAPH INFORMATION **********

From study/file name: PROPWEST10024100.rte
**********HYDROGRAPH DATA**********
Number of intervals = 292
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 9.468 (CFS)
Total volume = 5.281 (Ac.Ft)
Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

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Process from Point/Station 200.000 to Point/Station 201.000
**** RETARDING BASIN ROUTING ****
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User entry of depth-outflow-storage data

Total number of inflow hydrograph intervals = 292
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

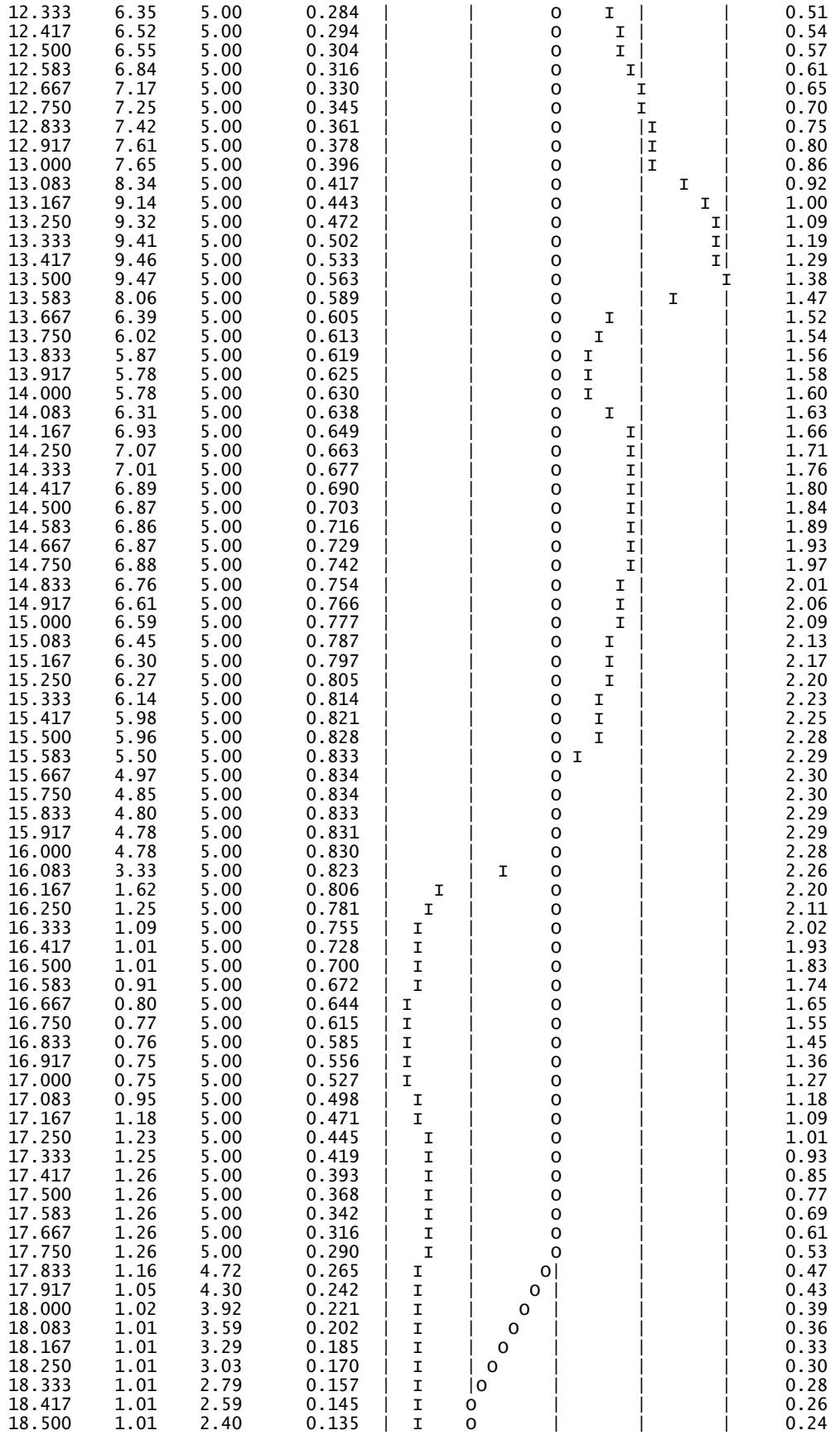
Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.500	0.281	5.000	0.264	0.298
1.000	0.443	5.000	0.426	0.460
1.500	0.600	5.000	0.583	0.617
2.000	0.750	5.000	0.733	0.767
2.500	0.891	5.000	0.874	0.908
3.000	1.018	5.000	1.001	1.035
3.500	1.122	5.000	1.105	1.139
4.000	1.202	5.000	1.185	1.219
4.500	1.278	5.000	1.261	1.295
5.000	1.355	5.000	1.338	1.372
5.500	1.432	5.000	1.415	1.449
6.000	1.509	9.240	1.477	1.541
6.500	1.586	17.000	1.527	1.645

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	2.4	4.73	7.10	9.47	Depth (Ft.)
0.083	0.19	0.01	0.001	O	|	|	|	|	0.00
0.167	0.42	0.05	0.003	OI	|	|	|	|	0.00
0.250	0.47	0.09	0.005	OI	|	|	|	|	0.01
0.333	0.59	0.14	0.008	OI	|	|	|	|	0.01
0.417	0.71	0.20	0.011	O I	|	|	|	|	0.02
0.500	0.74	0.26	0.015	O I	|	|	|	|	0.03
0.583	0.75	0.32	0.018	|OI	|	|	|	|	0.03
0.667	0.75	0.37	0.021	|OI	|	|	|	|	0.04
0.750	0.75	0.41	0.023	|OI	|	|	|	|	0.04
0.833	0.85	0.46	0.026	|OI	|	|	|	|	0.05
0.917	0.96	0.51	0.029	|O I	|	|	|	|	0.05
1.000	0.99	0.56	0.032	|O I	|	|	|	|	0.06
1.083	0.90	0.61	0.034	| OI	|	|	|	|	0.06
1.167	0.80	0.64	0.036	| O	|	|	|	|	0.06
1.250	0.77	0.65	0.037	| O	|	|	|	|	0.07
1.333	0.76	0.67	0.037	| O	|	|	|	|	0.07
1.417	0.75	0.68	0.038	| O	|	|	|	|	0.07
1.500	0.75	0.69	0.039	| O	|	|	|	|	0.07
1.583	0.75	0.69	0.039	| O	|	|	|	|	0.07
1.667	0.75	0.70	0.039	| O	|	|	|	|	0.07
1.750	0.75	0.71	0.040	| O	|	|	|	|	0.07
1.833	0.85	0.72	0.040	| O	|	|	|	|	0.07
1.917	0.96	0.74	0.042	| OI	|	|	|	|	0.07
2.000	0.99	0.77	0.043	| OI	|	|	|	|	0.08
2.083	1.00	0.79	0.045	| OI	|	|	|	|	0.08
2.167	1.01	0.82	0.046	| OI	|	|	|	|	0.08
2.250	1.01	0.84	0.047	| OI	|	|	|	|	0.08
2.333	1.01	0.86	0.048	| OI	|	|	|	|	0.09
2.417	1.01	0.88	0.049	| OI	|	|	|	|	0.09
2.500	1.01	0.89	0.050	| O	|	|	|	|	0.09
2.583	1.10	0.91	0.051	| O	|	|	|	|	0.09
2.667	1.22	0.94	0.053	| OI	|	|	|	|	0.09
2.750	1.24	0.97	0.055	| OI	|	|	|	|	0.10
2.833	1.25	1.00	0.056	| OI	|	|	|	|	0.10
2.917	1.26	1.03	0.058	| OI	|	|	|	|	0.10
3.000	1.26	1.06	0.059	| OI	|	|	|	|	0.11
3.083	1.26	1.08	0.061	| OI	|	|	|	|	0.11
3.167	1.26	1.10	0.062	| OI	|	|	|	|	0.11
3.250	1.26	1.12	0.063	| OI	|	|	|	|	0.11
3.333	1.26	1.14	0.064	| OI	|	|	|	|	0.11
3.417	1.26	1.15	0.065	| OI	|	|	|	|	0.11
3.500	1.26	1.16	0.065	| OI	|	|	|	|	0.12
3.583	1.26	1.17	0.066	| OI	|	|	|	|	0.12
3.667	1.26	1.18	0.066	| OI	|	|	|	|	0.12
3.750	1.26	1.19	0.067	| O	|	|	|	|	0.12
3.833	1.35	1.20	0.068	| O	|	|	|	|	0.12
3.917	1.47	1.23	0.069	| O	|	|	|	|	0.12
4.000	1.49	1.26	0.071	| OI	|	|	|	|	0.13
4.083	1.50	1.29	0.072	| OI	|	|	|	|	0.13
4.167	1.51	1.31	0.074	| OI	|	|	|	|	0.13
4.250	1.51	1.33	0.075	| OI	|	|	|	|	0.13
4.333	1.61	1.36	0.076	| OI	|	|	|	|	0.14
4.417	1.72	1.39	0.078	| OI	|	|	|	|	0.14
4.500	1.74	1.43	0.081	| OI	|	|	|	|	0.14
4.583	1.76	1.47	0.083	| OI	|	|	|	|	0.15
4.667	1.76	1.50	0.084	| O	|	|	|	|	0.15
4.750	1.76	1.53	0.086	| O	|	|	|	|	0.15
4.833	1.86	1.56	0.088	| OI	|	|	|	|	0.16
4.917	1.97	1.61	0.090	| OI	|	|	|	|	0.16
5.000	2.00	1.65	0.093	| OI	|	|	|	|	0.16
5.083	1.81	1.68	0.094	| OI	|	|	|	|	0.17
5.167	1.59	1.68	0.094	| O	|	|	|	|	0.17
5.250	1.54	1.67	0.094	| O	|	|	|	|	0.17
5.333	1.62	1.66	0.093	| O	|	|	|	|	0.17
5.417	1.72	1.66	0.093	| O	|	|	|	|	0.17
5.500	1.74	1.67	0.094	| O	|	|	|	|	0.17
5.583	1.85	1.68	0.095	| OI	|	|	|	|	0.17
5.667	1.97	1.71	0.096	| OI	|	|	|	|	0.17
5.750	2.00	1.74	0.098	| OI	|	|	|	|	0.17
5.833	2.01	1.77	0.100	| OI	|	|	|	|	0.18
5.917	2.01	1.80	0.101	| O	|	|	|	|	0.18
6.000	2.01	1.82	0.102	| O	|	|	|	|	0.18

6.083	2.11	1.85	0.104	OI|				0.19
6.167	2.22	1.89	0.106	OI|				0.19
6.250	2.25	1.93	0.108	OI|				0.19
6.333	2.26	1.96	0.110	OI|				0.20
6.417	2.26	2.00	0.112	OI|				0.20
6.500	2.26	2.03	0.114	OI|				0.20
6.583	2.36	2.06	0.116	OI|				0.21
6.667	2.47	2.10	0.118	OI				0.21
6.750	2.50	2.15	0.121	OI				0.21
6.833	2.51	2.19	0.123	OI				0.22
6.917	2.52	2.23	0.125	OI				0.22
7.000	2.52	2.26	0.127	OI				0.23
7.083	2.52	2.29	0.129	OI				0.23
7.167	2.52	2.31	0.130	OI				0.23
7.250	2.52	2.34	0.131	OI				0.23
7.333	2.61	2.36	0.133	OI				0.24
7.417	2.73	2.40	0.135	OI				0.24
7.500	2.75	2.44	0.137	OI				0.24
7.583	2.86	2.48	0.139	OI				0.25
7.667	2.98	2.53	0.142	O I				0.25
7.750	3.00	2.58	0.145	O I				0.26
7.833	3.11	2.64	0.148	O I				0.26
7.917	3.23	2.70	0.152	|OI				0.27
8.000	3.25	2.76	0.155	|OI				0.28
8.083	3.46	2.83	0.159	|O I				0.28
8.167	3.69	2.92	0.164	|O I				0.29
8.250	3.74	3.01	0.169	| O I				0.30
8.333	3.76	3.09	0.174	| O I				0.31
8.417	3.77	3.17	0.178	| O I				0.32
8.500	3.77	3.24	0.182	| O I				0.32
8.583	3.87	3.31	0.186	| O I				0.33
8.667	3.98	3.38	0.190	| O I				0.34
8.750	4.01	3.45	0.194	| O I				0.35
8.833	4.12	3.52	0.198	| O I				0.35
8.917	4.23	3.60	0.202	| O I |				0.36
9.000	4.26	3.67	0.206	| O I |				0.37
9.083	4.46	3.75	0.211	| O I|				0.38
9.167	4.70	3.85	0.216	| O I|				0.38
9.250	4.75	3.95	0.222	| O I				0.39
9.333	4.86	4.05	0.227	| O I				0.40
9.417	4.99	4.15	0.233	| O I				0.41
9.500	5.01	4.25	0.239	| O I				0.42
9.583	5.12	4.34	0.244	| O |I				0.43
9.667	5.24	4.44	0.249	| O|I				0.44
9.750	5.27	4.53	0.255	| O|I				0.45
9.833	5.37	4.62	0.260	| O| I				0.46
9.917	5.49	4.72	0.265	| O| I				0.47
10.000	5.52	4.81	0.270	| O I				0.48
10.083	4.85	4.85	0.273	| O				0.49
10.167	4.06	4.81	0.270	| I O				0.48
10.250	3.88	4.71	0.265	| I O|				0.47
10.333	3.81	4.61	0.259	| I O|				0.46
10.417	3.77	4.52	0.254	| I O|				0.45
10.500	3.77	4.43	0.249	| I O |				0.44
10.583	4.26	4.38	0.246	| O |				0.44
10.667	4.82	4.40	0.247	| O I				0.44
10.750	4.95	4.46	0.250	| OI				0.45
10.833	5.00	4.52	0.254	| OI				0.45
10.917	5.03	4.57	0.257	| O|I				0.46
11.000	5.03	4.63	0.260	| O|I				0.46
11.083	4.93	4.67	0.262	| OI				0.47
11.167	4.82	4.69	0.264	| OI				0.47
11.250	4.79	4.71	0.264	| OI				0.47
11.333	4.78	4.71	0.265	| OI				0.47
11.417	4.78	4.72	0.265	| OI				0.47
11.500	4.78	4.73	0.266	| OI				0.47
11.583	4.59	4.72	0.265	| O|				0.47
11.667	4.36	4.69	0.264	| IO|				0.47
11.750	4.31	4.65	0.261	| IO|				0.47
11.833	4.38	4.62	0.259	| IO|				0.46
11.917	4.49	4.60	0.258	| O|				0.46
12.000	4.51	4.58	0.258	| O|				0.46
12.083	5.20	4.62	0.259	| O|I				0.46
12.167	6.00	4.73	0.266	| O| I				0.47
12.250	6.18	4.89	0.275	| O I				0.49



18.583	0.91	2.24	0.126	| I O|	|	|	|	0.22
18.667	0.80	2.08	0.117	| I O|	|	|	|	0.21
18.750	0.77	1.93	0.108	| I O |	|	|	|	0.19
18.833	0.66	1.79	0.100	| I O |	|	|	|	0.18
18.917	0.54	1.65	0.093	|I O |	|	|	|	0.17
19.000	0.52	1.52	0.086	|I O |	|	|	|	0.15
19.083	0.61	1.41	0.079	| I O |	|	|	|	0.14
19.167	0.71	1.32	0.074	| I O |	|	|	|	0.13
19.250	0.74	1.26	0.071	| I O |	|	|	|	0.13
19.333	0.85	1.20	0.068	| I O |	|	|	|	0.12
19.417	0.96	1.17	0.066	| O |	|	|	|	0.12
19.500	0.99	1.15	0.064	| O |	|	|	|	0.11
19.583	0.90	1.12	0.063	| O |	|	|	|	0.11
19.667	0.80	1.09	0.061	| IO |	|	|	|	0.11
19.750	0.77	1.06	0.059	| IO |	|	|	|	0.11
19.833	0.66	1.02	0.057	| IO |	|	|	|	0.10
19.917	0.54	0.97	0.054	|I O |	|	|	|	0.10
20.000	0.52	0.92	0.052	|I O |	|	|	|	0.09
20.083	0.61	0.88	0.049	| O |	|	|	|	0.09
20.167	0.71	0.85	0.048	| O |	|	|	|	0.09
20.250	0.74	0.84	0.047	| O |	|	|	|	0.08
20.333	0.75	0.83	0.046	| O |	|	|	|	0.08
20.417	0.75	0.82	0.046	| O |	|	|	|	0.08
20.500	0.75	0.81	0.046	| O |	|	|	|	0.08
20.583	0.75	0.80	0.045	| O |	|	|	|	0.08
20.667	0.75	0.80	0.045	| O |	|	|	|	0.08
20.750	0.75	0.79	0.045	| O |	|	|	|	0.08
20.833	0.66	0.78	0.044	| O |	|	|	|	0.08
20.917	0.54	0.76	0.043	|IO |	|	|	|	0.08
21.000	0.52	0.74	0.041	|IO |	|	|	|	0.07
21.083	0.61	0.72	0.040	| O |	|	|	|	0.07
21.167	0.71	0.71	0.040	| O |	|	|	|	0.07
21.250	0.74	0.71	0.040	| O |	|	|	|	0.07
21.333	0.65	0.71	0.040	| O |	|	|	|	0.07
21.417	0.54	0.70	0.039	|IO |	|	|	|	0.07
21.500	0.52	0.68	0.038	|IO |	|	|	|	0.07
21.583	0.61	0.66	0.037	| O |	|	|	|	0.07
21.667	0.71	0.66	0.037	| O |	|	|	|	0.07
21.750	0.74	0.67	0.038	| O |	|	|	|	0.07
21.833	0.65	0.67	0.038	| O |	|	|	|	0.07
21.917	0.54	0.66	0.037	|IO |	|	|	|	0.07
22.000	0.52	0.65	0.037	|IO |	|	|	|	0.06
22.083	0.61	0.64	0.036	| O |	|	|	|	0.06
22.167	0.71	0.64	0.036	| O |	|	|	|	0.06
22.250	0.74	0.65	0.037	| O |	|	|	|	0.07
22.333	0.65	0.66	0.037	| O |	|	|	|	0.07
22.417	0.54	0.65	0.037	|IO |	|	|	|	0.06
22.500	0.52	0.64	0.036	|IO |	|	|	|	0.06
22.583	0.51	0.62	0.035	|IO |	|	|	|	0.06
22.667	0.50	0.61	0.034	|IO |	|	|	|	0.06
22.750	0.50	0.60	0.034	|IO |	|	|	|	0.06
22.833	0.50	0.59	0.033	|O |	|	|	|	0.06
22.917	0.50	0.58	0.032	|O |	|	|	|	0.06
23.000	0.50	0.57	0.032	|O |	|	|	|	0.06
23.083	0.50	0.56	0.031	|O |	|	|	|	0.06
23.167	0.50	0.55	0.031	|O |	|	|	|	0.06
23.250	0.50	0.55	0.031	|O |	|	|	|	0.05
23.333	0.50	0.54	0.030	|O |	|	|	|	0.05
23.417	0.50	0.54	0.030	|O |	|	|	|	0.05
23.500	0.50	0.53	0.030	|O |	|	|	|	0.05
23.583	0.50	0.53	0.030	|O |	|	|	|	0.05
23.667	0.50	0.53	0.030	|O |	|	|	|	0.05
23.750	0.50	0.52	0.029	|O |	|	|	|	0.05
23.833	0.50	0.52	0.029	|O |	|	|	|	0.05
23.917	0.50	0.52	0.029	|O |	|	|	|	0.05
24.000	0.50	0.52	0.029	|O |	|	|	|	0.05
24.083	0.31	0.50	0.028	|O |	|	|	|	0.05
24.167	0.08	0.47	0.026	IO |	|	|	|	0.05
24.250	0.03	0.42	0.024	IO |	|	|	|	0.04
24.333	0.01	0.38	0.021	IO |	|	|	|	0.04
24.417	0.00	0.33	0.019	IO |	|	|	|	0.03
24.500	0.00	0.29	0.017	O |	|	|	|	0.03
24.583	0.00	0.26	0.015	O |	|	|	|	0.03
24.667	0.00	0.23	0.013	O |	|	|	|	0.02
24.750	0.00	0.20	0.011	O |	|	|	|	0.02

24.833	0.00	0.18	0.010	o	|	|	|	0.02
24.917	0.00	0.16	0.009	o	|	|	|	0.02
25.000	0.00	0.14	0.008	o	|	|	|	0.01
25.083	0.00	0.12	0.007	o	|	|	|	0.01
25.167	0.00	0.11	0.006	o	|	|	|	0.01
25.250	0.00	0.10	0.005	o	|	|	|	0.01
25.333	0.00	0.09	0.005	o	|	|	|	0.01
25.417	0.00	0.08	0.004	o	|	|	|	0.01
25.500	0.00	0.07	0.004	o	|	|	|	0.01
25.583	0.00	0.06	0.003	o	|	|	|	0.01
25.667	0.00	0.05	0.003	o	|	|	|	0.01
25.750	0.00	0.05	0.003	o	|	|	|	0.00
25.833	0.00	0.04	0.002	o	|	|	|	0.00
25.917	0.00	0.04	0.002	o	|	|	|	0.00
26.000	0.00	0.03	0.002	o	|	|	|	0.00
26.083	0.00	0.03	0.002	o	|	|	|	0.00
26.167	0.00	0.03	0.001	o	|	|	|	0.00
26.250	0.00	0.02	0.001	o	|	|	|	0.00
26.333	0.00	0.02	0.001	o	|	|	|	0.00
26.417	0.00	0.02	0.001	o	|	|	|	0.00
26.500	0.00	0.02	0.001	o	|	|	|	0.00
26.583	0.00	0.01	0.001	o	|	|	|	0.00
26.667	0.00	0.01	0.001	o	|	|	|	0.00
26.750	0.00	0.01	0.001	o	|	|	|	0.00
26.833	0.00	0.01	0.001	o	|	|	|	0.00

**********HYDROGRAPH DATA**********

Number of intervals = 322
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 5.000 (CFS)
Total volume = 5.281 (Ac.Ft)

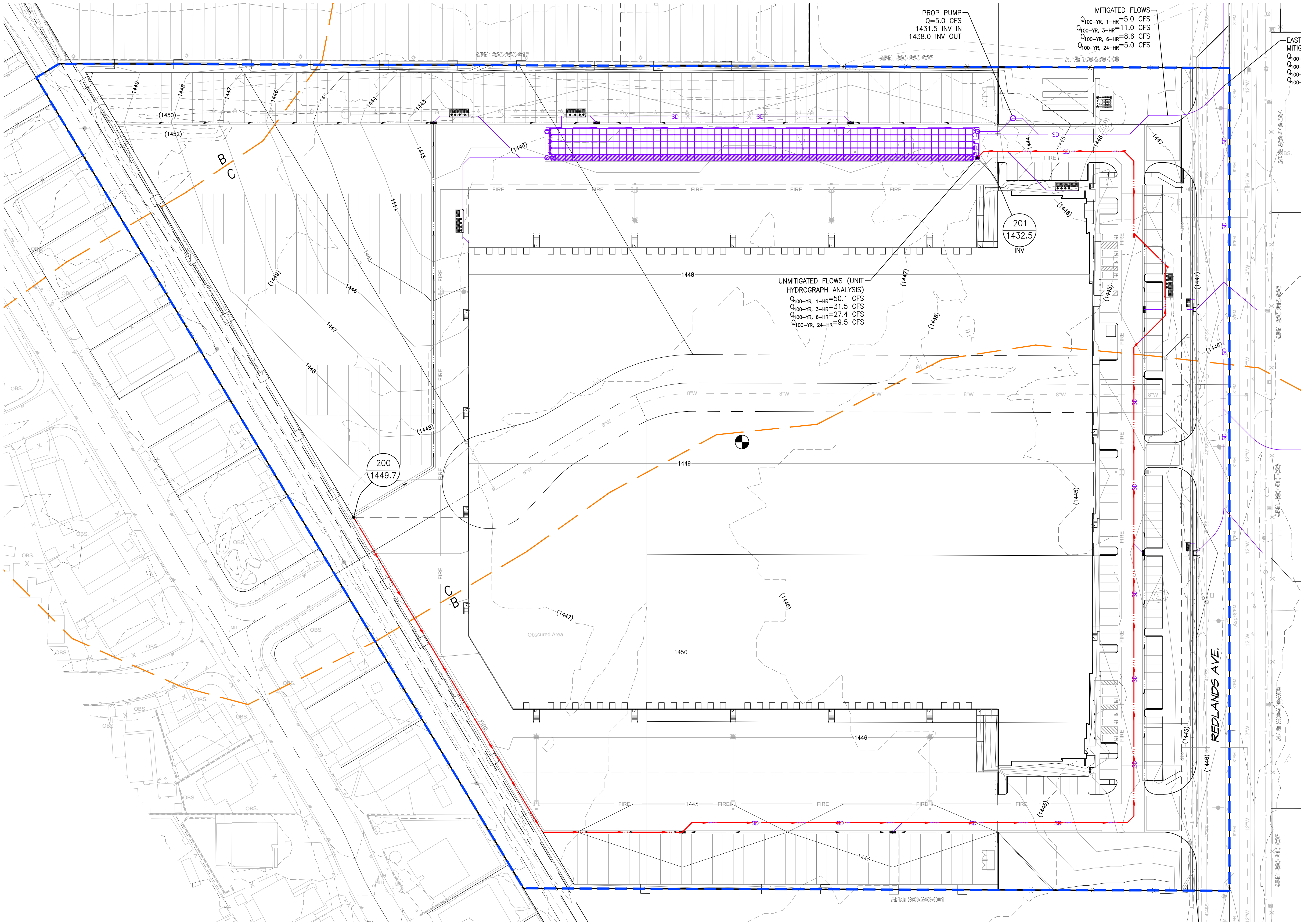
Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

****

UNIT HYDROGRAPH HYDROLOGY MAPS

PRELIMINARY UNIT HYDROGRAPH MAP
REDLANDS WEST



PROPOSED	
TOTAL AREA	20.1 AC
L_T	1915 Ft
L_{CA}	500 Ft
ΔH	17.2 Ft

LEGEND

- NODE / ELEV – NODE NUMBER – ELEVATION (FT)
- – DRAINAGE AREA BOUNDARY (PROPOSED)
- – FLOWLINE (PROPOSED)
- – NRCS SOIL BOUNDARY

N W E S

1" = 50'

50 0 50 100 150

CITY OF PERRIS, CALIFORNIA

REDLANDS WEST

DEVELOPED CONDITION
UNIT HYDROGRAPH EXHIBIT

SCALE: 1"=50'	ALBERT A. WEBB ASSOCIATES	ENGINEERING CONSULTANTS 3788 McCRAY STREET RIVERSIDE CA. 92506 PH. (951) 686-1070 FAX (951) 788-1256	W.O. 20-0186
DATE: 11/16/2020			SHEET 1
DESIGNED: AYS			
CHECKED: JRG			OF 1 SHEETS
PLN CK REF:			DWG. NO.
F.B.			

H:\2020\20-0186\DRAINAGE\PHYD\DWG FOLDER\20-0186-C-UH MAPS.DWG 5/13/2021 10:50:29 AM

APPENDIX D – REFERENCES

TECHNICAL MEMORANDUM – PERRIS VALLEY MDP: LINE A-B AND LINE A-C TRIBUTARY WATERSHED MODIFICATION

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

SEE SHEET NO. 2

SINCLAIR STREET

EXISTING N'LY 1/2 OF SINCLAIR

FLOW IN STREET

FLOW IN STREET

EXISTING RIBBON GUTTER

FLOW

EXISTING VEGETATED SWALE

FLOW

SPILLOVER FROM CHANNEL (TO NORTH)

FLOW

FLOW

PERRIS BLVD.

SINCLAIR STREET

COMMERCE DRIVE

LAKEVIEW DRIVE

BUSINESS PARK DRIVE

RIDER STREET

REDLANDS AVENUE

100

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.

5.00 AC.

6.20 AC.

5.80 AC.

3.90 AC.

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.

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.

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.

130 140 1.1 CFS FLOWBY

124 Q100=225.6 CFS Tc=21.3 MIN.

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

132 Q100=227.2 CFS Tc=22.6 MIN.

142 Q100=234.1 CFS Tc=22.7 MIN.

154 Q100=277.4 CFS Tc=22.8 MIN. 1.8 CFS FLOWBY

172 Q100=282.1 CFS Tc=23.3 MIN.

LAT. "A-20"

LAT. "A-18"

LAT. "A-16"

LAT. "A-14"

LAT. "A-11"

LAT. "A-9"

LAT. "A-17" 11.5 CFS FLOWBY

LAT. "A-15"

LAT. "A-13" 6.5 CFS FLOWBY

LAT. "A-12"

LAT. "A-10"

0.70 AC.

0.70 AC.

LAT. "A-19"

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.

1.00 AC.

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

9.70 AC.

153 Q100=49.4 CFS Tc=28.4 MIN.

160 162 Q100=278.5 CFS Tc=23.3 MIN.

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

181 Q100=15.4 CFS Tc=15.4 MIN.

201 Q100=355 Tc=23.7

Q100=294 Tc=23.6

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.

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

92 Q100=22.5 CFS Tc=23.5 MIN.

0.10 AC.

Q100=22.7 CFS Tc=24.4 MIN.

93

44 58 2009

SEE SHEET NO. 1

OFFSITE RUNOFF SHEET FLOWS EAST

OFFSITE RUNOFF SHEET FLOWS EAST

SINCLAIR STREET

EXISTING BERM

EXISTING BERM

FROM CHANNEL (TO NORTH)

FLOW

FLOW

220

240

250

3.90 AC.

10.0 AC.

6.70 AC.

4.70 AC.

241 Q100=13.4 CFS Tc=14.6 MIN.

251 Q100=8.9 CFS Tc=16.3 MIN.

221 Q100=19.6 CFS Tc=15.1 MIN.

5.90 AC.

10.9 AC.

6.40 AC.

.0 CFS MIN.

8 CFS

Q100=24.8 CFS Q100(conf)=445.6 CFS Tc=25.7 MIN. 242

Q100)=482.9 CFS Tc=26.4 MIN. 262

222 Q100=40.1 CFS Tc=16.8 MIN.

Q100=282.1 CFS Tc=23.3 MIN. 172

202 Q100=367.1 CFS Tc=24.3 MIN.

212 Q100=377.9 CFS Tc=25.0 MIN.

232 Q100)=424.0 CFS Tc=25.7 MIN.

252 Q100=18.7 CFS Q100(conf)=462.7 CFS Tc=26.4 MIN.

LAT. "A-9"

LAT. "A-6"

LAT. "A-3"

LAT. "A-2"

LAT. "A-12"

LAT. "A-8"

LAT. "A-7"

LAT. "A-5"

LAT. "A-4"

LAT. "A-1"

RIDER STREET

201 Q100=14.8 CFS Tc=13.7 MIN.

211 Q100=13.8 CFS Tc=14.6 MIN.

Q100=411.4 CFS Tc=25.0 MIN. 223

Q100=15.7 CFS Tc=15.6 MIN. 231

261 Q100=24.9 CFS Tc=16.6 MIN.

LAT. "A-10"

Q100=355.6 CFS Tc=23.7 MIN. 195

6.90 AC.

PERRIS VALLEY CHANNEL

5.4 CFS 4 MIN.

Q100=294.8 CFS Tc=23.6 MIN. 182

7.20 AC.

8.10 AC.

13.2 AC.

AC.

REDLANDS AVENUE

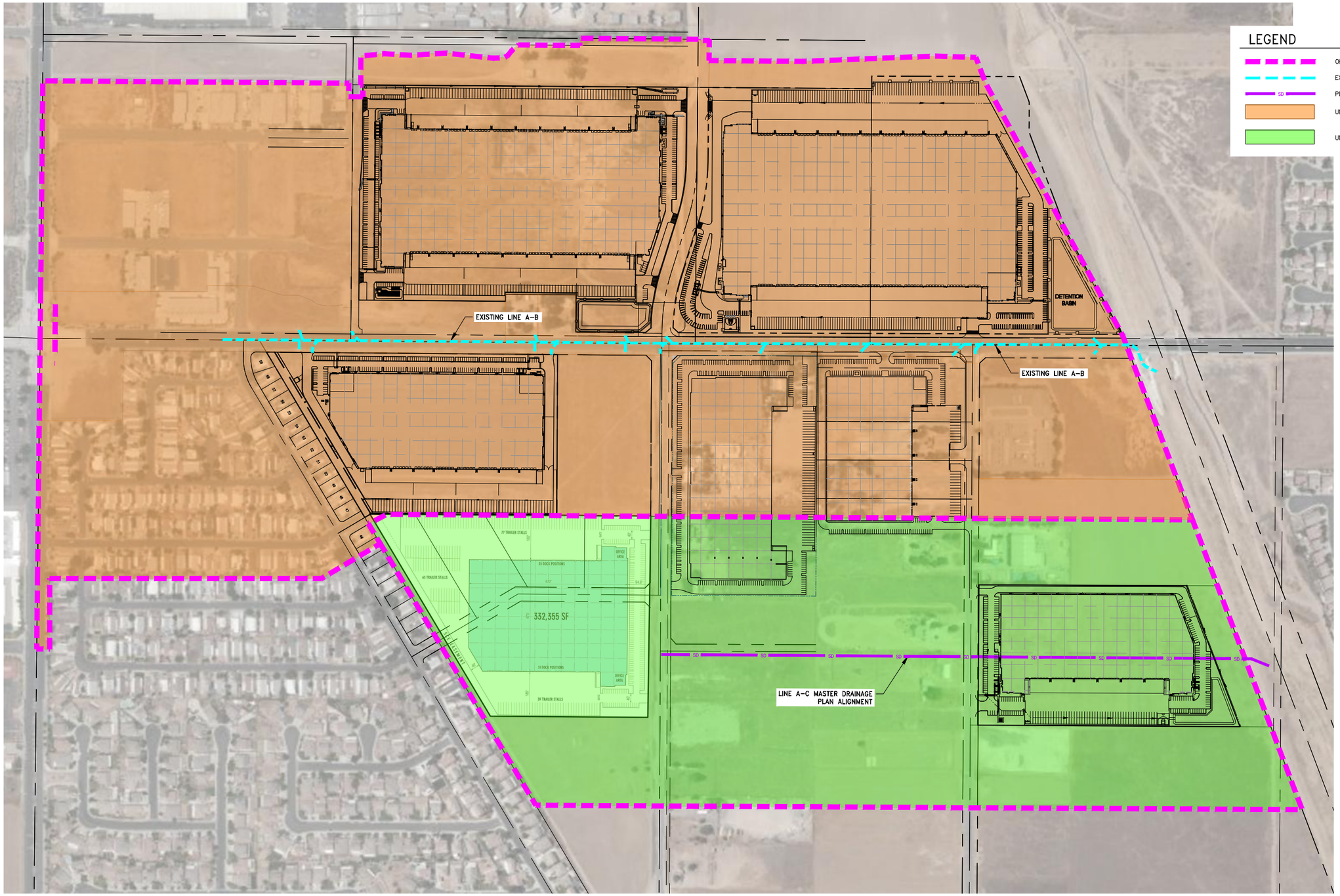
200

210

230

260

51 52 2009



N
W WEBB E
S

1" = 200'

100 0 200 400 600

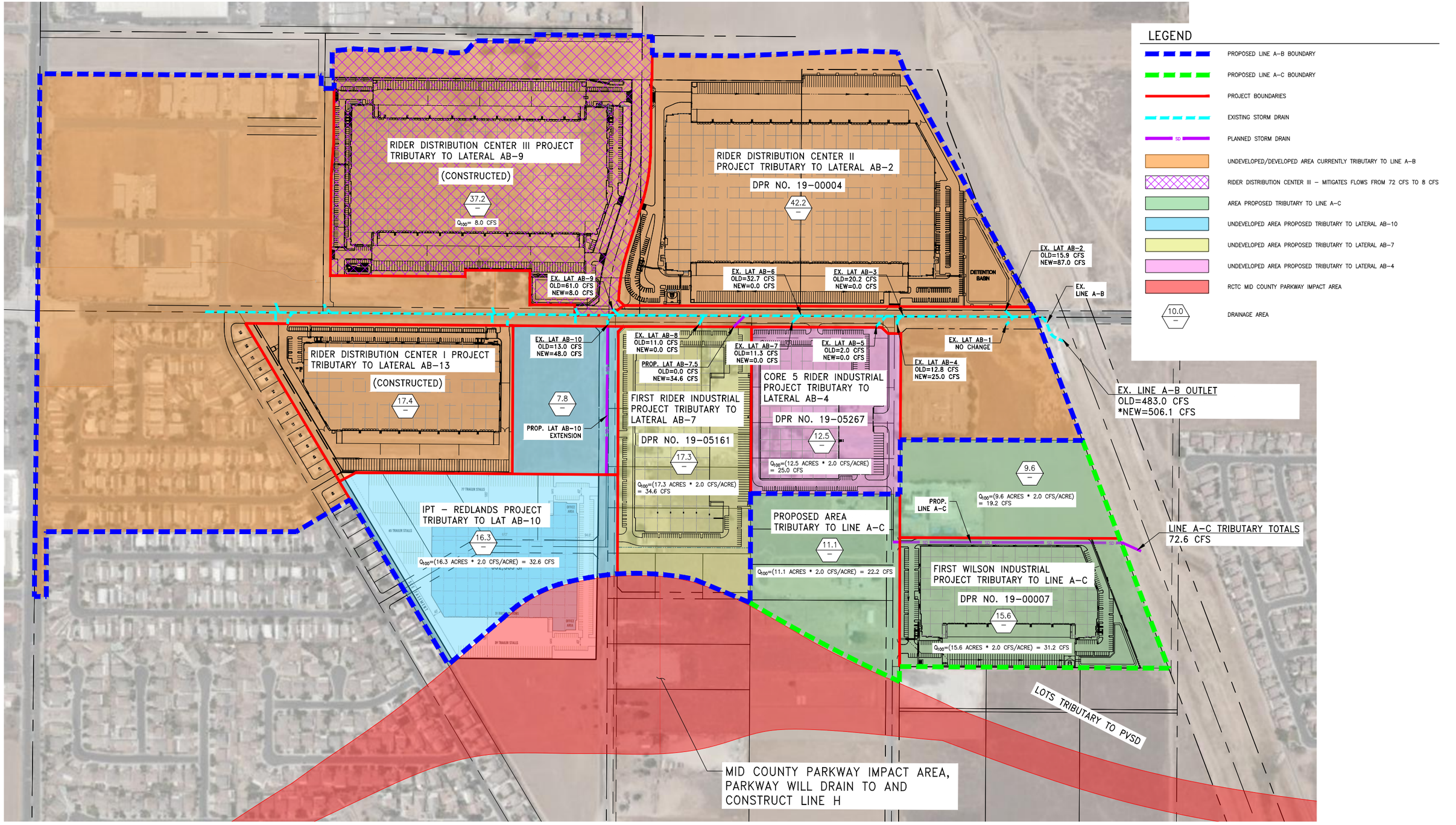
CITY OF PERRIS

LINE A–B, LINE A–C ORIGINAL TRIBUTARIES

SCALE: AS SHOWN	ALBERT A. WEBB ASSOCIATES	ENGINEERING CONSULTANTS 3788 McCRAY STREET RIVERSIDE CA. 92506 PH. (951) 686-1070 FAX (951) 788-1256	W.O. 18-0305
DATE: 1/30/20			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

MAP EXH



***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

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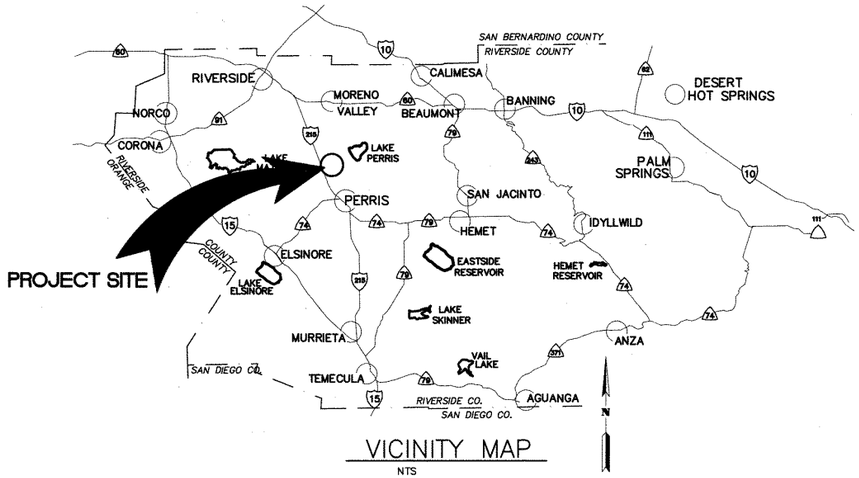
MAY 14

MDP LINE A-B AS-BUILT PLANS

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

INDEX

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TITLE SHEET	1
PLAN & PROFILES	2–13
LATERAL PROFILES	14–17
OETAILS	18



VICINITY MAP
NTS

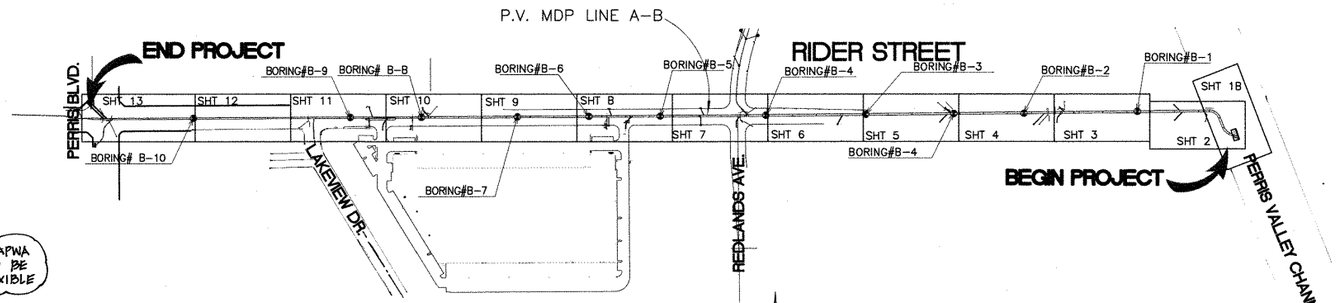
THE ULTIMATE H.C.L. IS BASEO ON THE AOOPTEO MOP WATER SURFACE ELEVATION OF 1433 IN THE PERRIS VALLEY STORM CHANNEL (PVSC) AT RIDER STREET, ANO ASSUMES THAT FULL CHANNEL IMPROVEMENTS HAVE BEEN CONSTRUCTEO PER THE AOOPTEO MOP. FOR ALL WATER SURFACE ELEVATIONS BETWEEN 1433 AND THE 100-YEAR FLOOD ELEVATION FOR PVSC (1437.5), LINE "A-B" WILL NOT HAVE CAPACITY FOR LOCAL 100-YEAR FLOWS.

LEGEND:

ℙ	—PROPERTY LINE
R/W	—RIGHT OF WAY
℄	—CENTERLINE
T.C.	—TOP OF CURB
F.L.	—FLOW LINE
F.S.	—FINISH SURFACE
H.P.	—HIGH POINT
F.F.	—FINISH FLOOR
R.C.P.	—REINFORCED CONCRETE PIPE
INV.	—INVERT
S =	—SLOPE
F.G.	—FINISH CRAOE
S.D.	—STORM DRAIN
ST.LT.	—STREET LICHT
G.B.	—CRADE BREAK
H.P.	—HICH POINT
E.C.	—EDCE OF CONCRETE
C.A.	—GUY ANCHOR
A.B.	—ACCRECATE BASE
F.H.	—FIRE HYORANT
P.P.	—POWER POLE
C.B.	—CATCH BASIN
R=	—RATE OF CRADE
B.C.R.	—BECIN OF CURB RETURN
E.C.R.	—END OF CURB RETURN
L.P.	—LOW POINT
T.O.P.	—TOP OF PIPE
B.O.P.	—BOTTOM OF PIPE
R	—RATE OF GRADE
T.F.	—TOP OF FOOTING
T.W.	—TOP OF WALL
S.F.	—SQUARE FEET
C.F.	—CURB FACE
F.P.	—FINISHEO PAVEMENT
S.F.O.W	—SOUTH FACE OF WALL
N.F.O.W	—NORTH FACE OF WALL
E.F.O.W	—EAST FACE OF WALL
W.F.O.W	—WEST FACE OF WALL
T.P.	—TOP OF PIPE
(0.00)	—EXISTING ELEVATION
B.O.W.	—BOTTOM OF WALL
T.C.	—TOP OF CRATE
N.C.	—NATURAL CRAOE
TOP	—TOP OF SLOPE
TOE	—TOE OF SLOPE
E.P.	—EDCE OF PAVEMENT
A.C.	—ASPHALT CONCRETE
C.L.F.	—CHAIN LINK FENCE
CONC.	—CONCRETE
PKWY DRAIN	—PARKWAY ORAIN
EXIST.	—EXISTING
EMH	—EOISON MANHOLE
M.H.	—MANHOLE
T.B.	—TOP OF BERM
E.T.W.	—EDCE OF TRAVELWAY
B.W.	—BACK OF WALK
TC-TX	—TOP OF CURB@DRIVEWAY
TC-BX	—BOT. OF CURB@DRIVEWAY
⊕	—BORINC LOCATION
1	—REVISION SYMBOL ANO NUMBER PER EMWD REQUIREMENT
1	—RCFD & WCD REVISION

GENERAL NOTES

1. THE CONTRACTOR SHALL CONSTRUCT THE FLOOO CONTROL IMPROVEMENTS SHOWN ON THE ORAWINCS IN CONFORMANCE WITH THE REQUIREMENTS OF THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT'S M.O.U. STANOARD SPECIFICATIONS OATED JUNE 24, 2008, AND RCFC&WCD STANDARD MANUAL. FOR THE LATEST DRAWINGS OF THE STANDARO MANUAL, PLEASE REFER TO THE "PUBLICATIONS AND RECOROS" PAGE FOUNO ON THE OISTRICT'S WEBSITE.
2. CONTACT THE ENCROACHMENT PERMIT ENCINEER AT 951.955.1266 IF AN ENCROACHMENT PERMIT IS REQUIREO FROM RIVERSIDE COUNTY FLOOD CONTROL. AFTER THE PERMIT IS ISSUED THE DISTRICT MUST BE NOTIFIED ONE WEEK PRIOR TO CONSTRUCTION.
3. CONTACT CONTRACT AOMINISTRATION AT 951.955.1288 IF CONSTRUCTION INSPECTION WILL BE PERFORMEO BY RIVERSIOE COUNTY FLOOO CONTROL. THE DISTRICT MUST BE NOTIFIED TWENTY DAYS (2D) PRIOR TO CONSTRUCTION.
4. ALL STATIONINC REFERS TO CENTERLINE OF CONSTRUCTION UNLESS OTHERWISE NOTED.
5. STATIONINC FOR LATERALS ANO CONNECTOR PIPE REFER TO THE CENTERLINE INTERSECTION STATIONS.
6. FORTY-EICHT HOURS BEFORE EXCAVATION, CALL UNDERGROUND SERVICE ALERT 1.800.227.2600.
7. ALL ELEVATIONS SHOWN ARE IN FEET ANO OECIMALS THEREOF BASEO ON THE NORTH AMERICAN VERTICAL DATUM (NAVO 1929).
8. ALL COORDINATES ARE SHOWN IN FEET AND DECIMALS THEREOF BASED ON THE NORTH AMERICAN DATUM (NAD 83), CALIFORNIA COOROINATE SYSTEM (CCS), ZONE 6 AND EPOCH 2011.00.
9. ALL CROSS SECTIONS ARE TAKEN LOOKING DOWNSTREAM.
10. ELEVATIONS OF UTILITIES ARE APPROXIMATE UNLESS OTHERWISE NOTED.
11. UNLESS OTHERWISE SPECIFIED, MINIMUM STREET RECONSTRUCTION SHALL BE 4" TYPE "B" HOT MIX ASPHALT OVER 6" CLASS 2 AGCRECATE BASE OR AS SPECIFIED BY THE ENCINEER
12. OPENINGS RESULTINC FROM THE CUTTINC OR PARTIAL REMOVAL OF EXISTING CULVERTS, PIPES OR SIMILAR STRUCTURES TO BE ABANDONED SHALL BE SEALED WITH 6" OF CLASS "B" CONCRETE.
13. PIPE CONNECTEO TO THE MAINLINE PIPE SHALL CONFORM TO JUNCTION STRUCTURE NO. 4 (JS 229) UNLESS OTHERWISE NOTED.
14. PIPE BEOOINC SHALL CONFORM TO RCFC&WCO STO. OWC. NO. M815 EXCEPT FOR COVER <2 FEET. FOR COVER <2 FEET, CONCRETE SLURRY (2000 PSI - 2 SACK) SHALL BE USED. THE ENTIRE TRENCH SHALL BE SLURRY EXTENOINC 4 INCHES MINIMUM ANO 12 INCHES MAXIMUM ABOVE THE TOP OF THE PIPE.
15. BH-1 INOICATES SOIL BORINC LOCATIONS BASEO ON THE SOILS REPORT DATED 11-19-2009. LOCATIONS SHOWN ARE APPROXIMATE.
16. "V" IS THE DEPTH OF CATCH BASINS MEASURED FROM THE TOP OF CURB TO INVERT OF CONNECTOR PIPE.
17. CATCH BASINS SHALL BE LOCATEO SO THAT LOCAL DEPRESSION SHALL BECIN AT EXISTING CURB RETURN JOINT, UNLESS OTHERWISE SPECIFIED.
18. ALL CURBS, GUTTERS, SIOEWALKS, DRIVEWAYS AND OTHER EXISTING IMPROVEMENTS TO BE RECONSTRUCTED IN KIND AND AT THE SAME ELEVATION ANO LOCATION AS THE EXISTING IMPROVEMENTS UNLESS OTHERWISE NOTED.
19. STANDARD DRAWINCS CALLED FOR ON THE PLAN AND PROFILE SHALL CONFORM TO DISTRICT STANDARD DRAWINCS UNLESS NOTEO OTHERWISE.
20. THE CONTRACTOR IS REQUIRED TO CALL ALL UTILITY ACENCIES RECAROING TEMPORARY SHORINC AND SUPPORT REQUIREMENTS FOR THE VARIOUS UTILITY LINES SHOWN ON THESE PLANS.
21. OURINC ROUCH CRADINC OPERATIONS ANO PRIOR TO CONSTRUCTION OF PERMANENT DRAINAGE STRUCTURES, TEMPORARY DRAINACE CONTROL SHOULD BE PROVIDEO TO PREVENT PONDING WATER ANO OAMACE TO AOJACENT PROPERTIES.
22. APPROVAL OF THESE PLANS BY THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT OOES NOT RELIEVE THE DEVELOPER'S ENCINEER OF RESPONSIBILITY FOR THE ENCINEERINC DESICN. IF FIELD CHANCES ARE REQUIRED, IT WILL BE THE RESPONSIBILITY OF THE DESICN ENCINEER TO MAKE THE NECESSARY CORRECTIONS.
23. THE CONTRACTOR OR DEVELOPER SHALL SECURE ALL REQUIRED ENCROACHMENT AND/OR STATE AND FEDERAL REGULATORY PERMITS PRIOR TO THE COMMENCEMENT OF ANY WORK.
24. THE CONCRETE COATINC ON THE INSIOE OF ALL REINFORCEO CONCRETE PIPES MUST BE INCREASED TO PROVIOE A MINIMUM OF 1-1/2 INCHES OVER THE REINFORCING AND INCREASED TO A MINIMUM OF 3-1/2 INCHES OVER REINFORCING FOR BOX CULVERT, WHEN OESICN VELOCITIES EXCEEO 20 FEET PER SECOND. THE CONCRETE OESICN STRENCTH IN THESE REACHES SHALL BE F'C=5,000 PSI FOR VELOCITIES EXCEEDING 20 FEET PER SECONO ANO F'C=6,000 PSI FOR VELOCITIES EXCEEOINC 30 FEET PER SECONO.
25. CONSTRUCTION JOINTS FOR CALTRANS STANDARD REINFORCED CONCRETE BOX SHALL BE PLACEO ACCORDING TO RCFC&WCD STANDARD ORAWING NO. BOX 401.



INDEX MAP
1"=300'

1 NOTE:
FOR PRE-CAST RCB, USE JOINT SEALANT PER APWA STD PLAN 330.0 ALL PRE-CAST RCB JOINTS TO BE SEALED WITH RUBBER BASED PRE-FORMED FLEXIBLE JOINT SEALANT AND CEMENT MORTAR.

SURVEY MONUMENT NOTES:
EXISTING C/L INTERSECTION MONUMENTS SHALL BE TIED WITH PRE-CONSTRUCTION TIE NOTES FILED WITH THE COUNTY OF RIVERSIDE. POST CONSTRUCTION MONUMENTS TO BE SET, AND POST CONSTRUCTION TIE NOTES TO BE FILED WITH THE COUNTY OF RIVERSIOE

AEL 4/16/14

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

MS 94

CITY OF PERRIS
FILE NO. P8-1013

BENCH MARK
COUNTY OF RIVERSIDE BENCHMARK NO. "M-31"
COUNTY OF RIVERSIDE BENCHMARK - 3 1/4" ALUMINUM DISK MARKED M-31, LOCATED FLUSH AT THE SOUTH WEST CORNER OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB LOCATED AT THE CROSSING OF PERRIS BLVD. AND RIV. CO. FLOOD CONTROL CHANNEL (PERRIS LATERAL 7) 43 FT. WEST OF CENTERLINE OF PERRIS BLVD. AND 4.5 FT. EAST OF CONCRETE BRIDGE BARRIER. (EDGE OF BRIDGE) MARKED R-103 D.W.R. IN TOP OF CONC. POST FLUSH W/ GROUND
ELEVATION = 1474.674' (NAVD 1929)

REF.	REVISIONS	ENGINEER APPR.	ENGINEER DATE	RCFC/ APPR	RCFC/ DATE
	CHANGED SLOPE TO 0.0018, ADDED MH, ADDED				
2	NEW 10"S, CHANGED 42" LAT TO 24" LAT, ADDED				
	BX. UTILITIES, RELOCATE UTILITIES, REV. S.D.	H.I.A.	1/8/16		2/23/16
1	CHANGED C.I.P. RCB TO PRE-CAST RCB PER APWA 330.0	H.I.A.	2/9/16		2/23/16

DESIGNED BY: BW
DRAWN BY: ET
DATE DRAWN:

APPROVED BY:
Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173
HAIDOOK I. AGHAIAN Date: 11/18/14
RCE NO. 43293

REGISTERED PROFESSIONAL ENGINEER HAIDOOK I. AGHAIAN R.C.E. NO. 43293 Exp. 3-31-16 CIVIL STATE OF CALIFORNIA

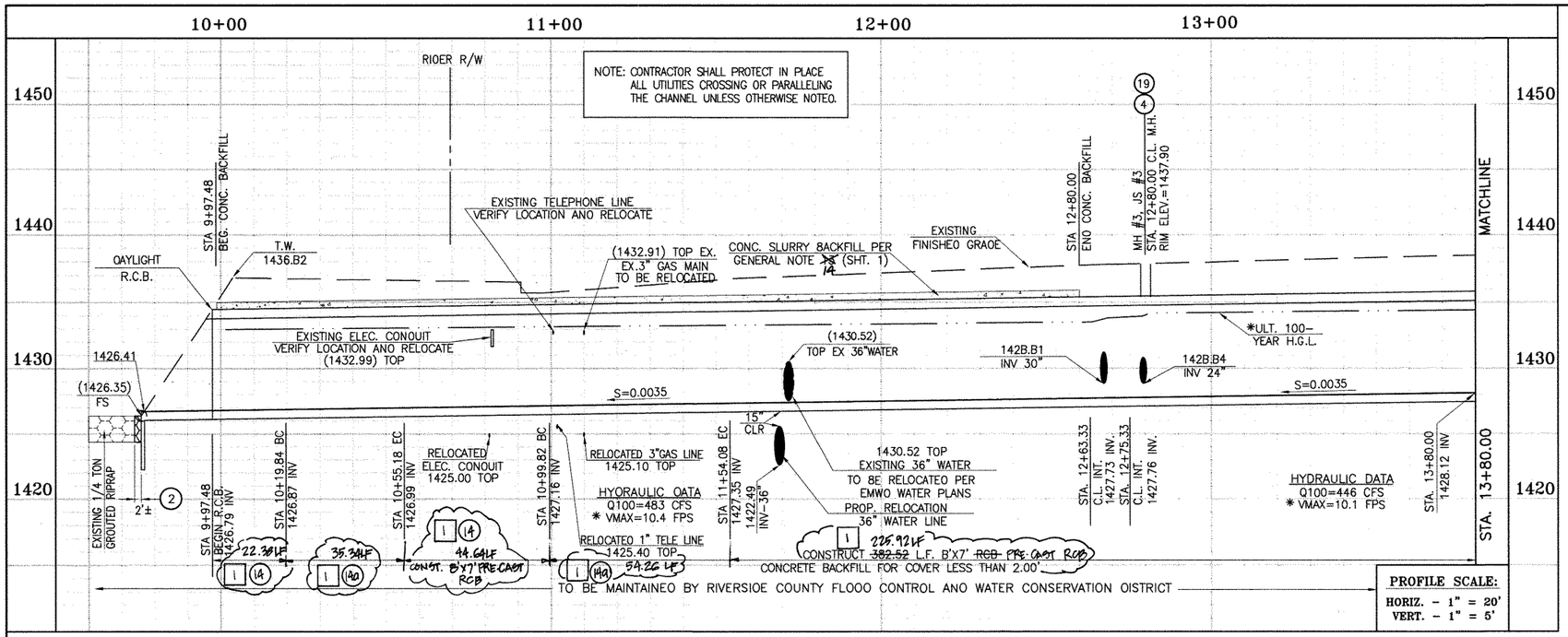
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: Mark A. Wills
PLANNING ENGINEER
DATE: 1/20/2015
APPROVED BY:
CHIEF ENGINEER
DATE: 1/20/15

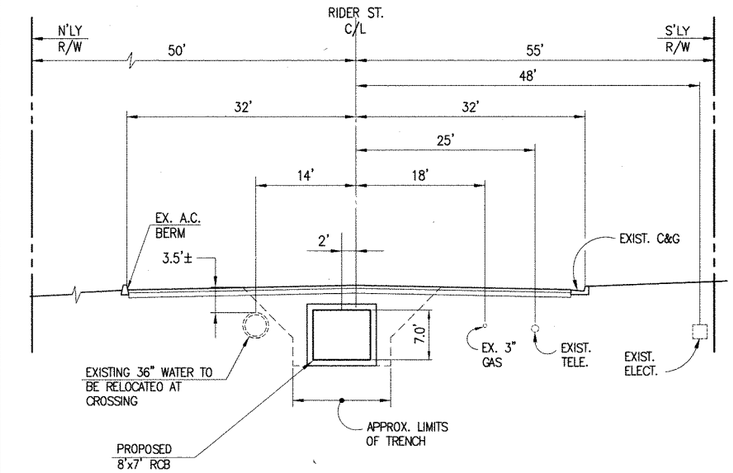
CITY OF PERRIS
APPROVED BY:
CITY ENGINEER DATE: 12-15-14
RECOMMENDED DATE:

PERRIS VALLEY MDP LINE "A-B"

PROJECT NO. 4-0-00537
DRAWING NO. 4-1063
SHEET NO. 1 OF 18

Last Update: 11/18/14
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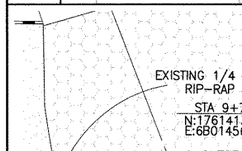


SECTION AT STA. 12+00.00

FROM STA 11+54.08 TO STA 12+11.85

0 5 10 20

SCALE:1"=10'



	DELTA	RADIUS	TANGENT	LENGTH	P.I.
A	45°00'00"	45.00'	18.64'	35.34'	N 4946.390, E 9689.352
B	69°04'49"	45.00'	30.97'	54.26'	N 5034.103, E 9654.846

* THE ULTIMATE H.C.L. IS BASED ON THE ADOPTED MDP WATER SURFACE ELEVATION OF 1433 IN THE PERRIS VALLEY STORM CHANNEL (PVSC) AT RIDER STREET, AND ASSUMES THAT FULL CHANNEL IMPROVEMENTS HAVE BEEN CONSTRUCTED PER THE ADOPTED MDP. FOR ALL WATER SURFACE ELEVATIONS BETWEEN 1433 AND THE 100-YEAR FLOOD ELEVATION FOR PVSC (1437.5), LINE "A-B" WILL NOT HAVE CAPACITY FOR LOCAL 100-YEAR FLOWS.

LEGEND:

1 — REVISION SYMBOL AND NUMBER PER EMWD REQUIREMENT (TYPICAL TO ALL SHEETS)

STORM DRAIN CONSTRUCTION NOTES:

1. DAYLIGHT R.C.B. ROOF PARALLEL TO TOP OF SLOPE. TAPER OOWN R.C.B. SIDEWALLS WITH SLOPE FACE. SEE DETAILS ON SHT. NO. 1B.
2. REMOVE AND REPLACE APPROXIMATELY 2' WIDE 1/4 TON GROUTED RIPRAP, MATCH EXISTING THICKNESS.
3. CONSTRUCT 30" R.C.P, D-LOAD PER PLAN.
4. CONSTRUCT MANHOLE NO. 3 PER R.C.F.C.&W.C.D. STD DWG. MH253
5. CONSTRUCT 24" R.C.P, D-LOAD PER PLAN.
6. SAWCUT AND REMOVE EXISTING CONCRETE SIDESLOPE. SALVAGE 30" MINIMUM LONGITUDINAL AND/OR TRANSVERSE REBAR FROM EXISTING SLOPE PROTECTION AT ALL SAWCUT LOCATIONS. SPLICE SALVAGED REBAR TO NEW CONCRETE REINFORCING PER CURRENT ACI CODE. REPLACEMENT CONCRETE TO MATCH EXISTING THICKNESS, OR MINIMUM 6" THICK, WHICHEVER IS GREATER WITH #4 BARS @ 18" ON CENTER EACH WAY.
9. REMOVE AND REPLACE APPROACH EXISTING DRIVEWAY (SEE SHEET NO. 1B).
1 14. CONSTRUCT 8' X 7' RCB PER CALTRANS STD PLAN NO. 0B0. ON 45' RADIUS CURVED SECTIONS, INSIDE WALL (41' RADIUS) MUST BE SMOOTH CURVED AND OUTSIDE WALL (49' RADIUS) MUST HAVE MAXIMUM WALL CHORD LENGTH OF 8.0'
15. CONSTRUCT CONCRETE BULKHEAD PER R.C.F.C.&W.C.D. STD. DWG. MB16
17. SAWCUT AND REMOVE EXISTING A.C. PAVEMENT.
18. UTILITY TRENCH AND SURFACE REPAIR PER CITY STANDARD ON SHT. NO. 1B, MODIFIED TO ACCOMMODATE SLURRY BACKFILL WHERE BOX COVER IS LESS THAN 2.0'.
19. CONSTRUCT JUNCTION STRUCTURE NO. 3 PER R.C.F.C.&W.C.D. STD. DWG. JS228.
22. CONSTRUCT CONCRETE COLLAR PER R.C.F.C.&W.C.D. STD DWG. MB03.
23. CONSTRUCT SLOPED PROTECTION BARRIER PER A.P.W.A. STD. PLAN NO. 360-0.
29. PROTECT IN PLACE EXISTING UTILITY
34. RELOCATE EXISTING WATER LINE PER E.M.W.D. PLANS.
39. RELOCATE EXISTING GAS LINE.
40. RELOCATE EXISTING ELECTRICAL LINE.
41. RELOCATE EXISTING TELEPHONE LINE.
44. SAWCUT, REMOVE AND REPLACE A.C. PAVEMENT SURFACE REPAIR PER CITY STD. ON SHEET 1B. SEE SEPARTE PAVING PLAN.
1 14. CONSTRUCT 8'X7' PRE-CAST RCB PER APWA STD PLAN 390-0 SEE JOINT SEALANT NOTE ON SHT. 1

0 10 20 40

SCALE:1"=20'

CITY OF PERRIS
FILE NO. P8-1013

BENCH MARK

COUNTY OF RIVERSIDE BENCHMARK NO. 24-31

COUNTY OF RIVERSIDE BENCHMARK - 3 1/4" ALUMINUM DISK MARKED R-31, LOCATED FLUSH AT THE SOUTH WEST CORNER OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB LOCATED AT THE CROSSING OF PERRIS BLVD. AND RIV. CO. FLOOD CONTROL CHANNEL (PERRIS LATERAL 7A'), 43 FT. WEST OF CENTERLINE OF PERRIS BLVD. AND 4.5 FT. EAST OF CONCRETE BRIDGE BARRIER, (EDGE OF BRIDGE) MARKED R-102 D.M.R. IN TOP OF CONC. POST FLUSH W/ GROUND

ELEVATION = 1474.674' (NAVD 1929)

REF.	DESCRIPTION	APPR.	DATE	APPR.	DATE
	REVISIONS	ENGINEER		RCFC/	
2	CHANGED SLOPE TO D.0.0FS, ADDED MH; ADDED NEW B"S, CHANGED 82" LAT TO 24" LAT, ADDED EX. UTILITIES, RELOCATE UTILITIES, REVISED QS.	H.I.A.	2/3/16	JH	2/23/16
1	CHANGED C.I.P. RCB TO PRE-CAST RCB PER APWA 390	H.I.A.	2/3/16	DK	2/27/16

DESIGNED BY: BW
DRAWN BY: ET
DATE DRAWN:

APPROVED BY: Thienes Engineering, Inc. CIVIL ENGINEERING • LAND SURVEYING 14349 FIRESTONE BOULEVARD LA MIRADA, CALIFORNIA 90638 PH.(714)521-4811 FAX(714)521-4173
Haidaok Aghaian Date: 11/18/14
HAIDOOK I. AGHAIAN RCE NO. 43293

REGISTERED PROFESSIONAL ENGINEER HAIDOOK I. AGHAIAN R.C.E. NO. 43293 Exp. 3-31-16 CIVIL STATE OF CALIFORNIA

ASH 4/10/14

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: DATE: 1/20/2015
APPROVED BY: DATE: 1/20/2015

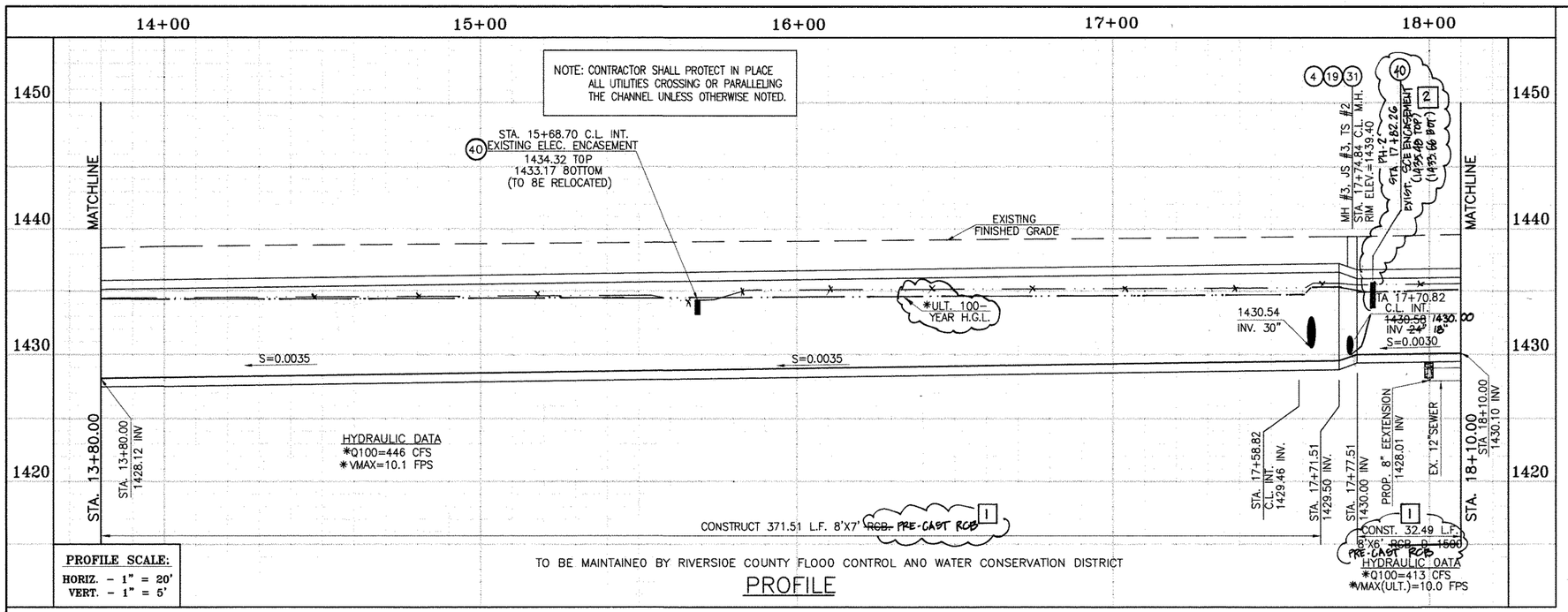
CITY OF PERRIS
APPROVED BY: CITY ENGINEER DATE: 12-15-14
RECOMMENDED DATE:

PERRIS VALLEY MDP LINE "A-B"

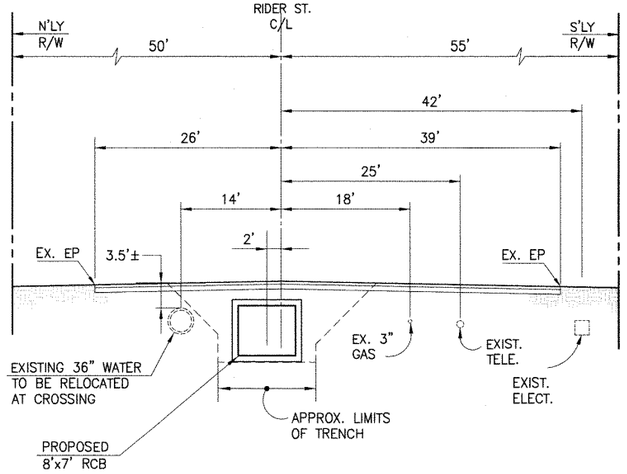
FROM STA. 9+97.48 TO STA. 13+80

PROJECT NO. 4-0-00537
DRAWING NO. 4-1063
SHEET NO. 2 OF 18

Last Update: 11/18/14
O:\2700-2799\2702\2702F\2702SD02.dwg



PROFILE SCALE:
HORIZ. - 1" = 20'
VERT. - 1" = 5'



SECTION AT STA. 16+50.00

STA 14+15.65 TO STA 17+49.84

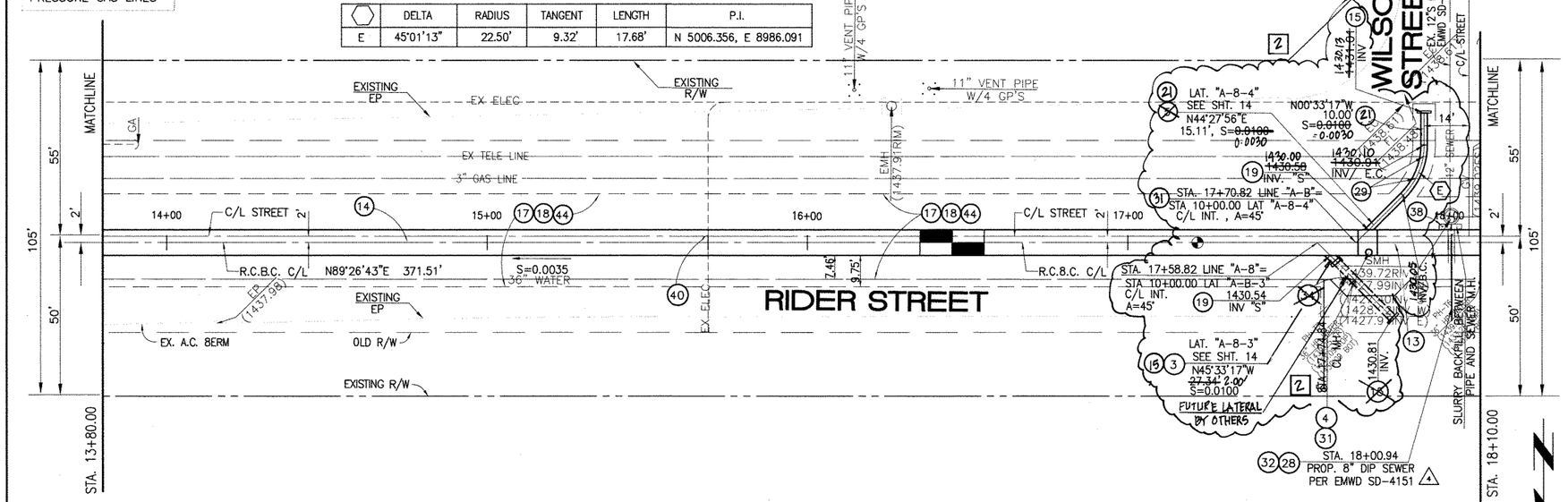
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SCALE:1"=10'

✳ THE ULTIMATE H.G.L. IS BASED ON THE ADOPTED MDP WATER SURFACE ELEVATION OF 1433 IN THE PERRIS VALLEY STORM CHANNEL (PVSC) AT RIDER STREET, AND ASSUMES THAT FULL CHANNEL IMPROVEMENTS HAVE BEEN CONSTRUCTED PER THE ADOPTED MDP. FOR ALL WATER SURFACE ELEVATIONS BETWEEN 1433 AND THE 100-YEAR FLOOD ELEVATION FOR PVSC (1437.5), LINE "A-B" WILL NOT HAVE CAPACITY FOR LOCAL 100-YEAR FLOWS.

CAUTION:
PROPOSED WORK IS IN PROXIMITY OF HIGH PRESSURE GAS LINES

	DELTA	RADIUS	TANGENT	LENGTH	P.I.
E	45°01'13"	22.50'	9.32'	17.68'	N 5006.356, E 8986.091



0 10 20 40

SCALE:1"=20'

STORM DRAIN CONSTRUCTION NOTES:

(3) CONSTRUCT 30" R.C.P, O-LOAD PER PLAN.
(4) CONSTRUCT MANHOLE NO. 3 PER R.C.F.C.&W.C.D. STD DWG. MH253
(5) CONSTRUCT 24" R.C.P, O-LOAD PER PLAN.
[1] (13) CONSTRUCT 8' X 6' ~~RCB PER CALTRANS STD PLAN NO. D80 OR APPROVED EQUAL~~ PRE CAST RCB APWA STD PLAN 300-0 OR APPROVED EQUAL SEE JOINT SEALANT NOTE ON SHT. 1.
(14) CONSTRUCT 8' X 7' ~~RCB PER CALTRANS STD PLAN NO. D80 OR APPROVED EQUAL~~ PRE-CAST RCB APWA STD PLAN 3300 OR APPROVED EQUAL. SEE JOINT SEALANT NOTE ON SHT. 1.
(15) CONSTRUCT CONCRETE BULKHEAD PER R.C.F.C.&W.C.D. STD DWG. M816.
(17) SAWCUT AND REMOVE EXISTING A.C. PAVEMENT.
(18) UTILITY TRENCH AND SURFACE REPAIR PER CITY STANDARD ON SHT. NO. 18, MODIFIED TO ACCOMMODATE SLURRY BACKFILL WHERE BOX COVER IS LESS THAN 2.0'.
(19) CONSTRUCT JUNCTION STRUCTURE NO. 3 PER R.C.F.C.&W.C.D. STD. OWG. JS228.
(28) CONSTRUCT SEWER PROTECTION PER R.C.F.C.&W.C.D. STD. OWG. M807.
(29) PROTECT IN PLACE EXISTING UTILITIES.
(31) CONSTRUCT MODIFIED TRANSITION STRUCTURE NO.2 PER R.C.F.C.&W.C.D. STD. DWG. TS302.
(32) INSTALL 8" DIP SEWER. ENCASED WITH 2500 PSI CONCRETE PER CALTRANS STD PLAN NO. 080.
(34) RELOCATE EXISTING WATER LINE PER EMWD PLANS (36" WATER LINE).
(38) SLURRY BACKFILL BETWEEN RCB AND MANHOLE.
(40) RELOCATE EXISTING ELECTRICAL LINE.
[2] (44) SAWCUT, REMOVE AND REPLACE A.C. PAVEMENT SURFACE REPAIR PER CITY STD. ON SHEET 18.
(21) CONSTRUCT 18" R.C.P., D-LOAD PER PLAN.

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for the location of buried utility lines.
Don't disrupt vital services.
TWO WORKING DAYS BEFORE YOU DIG

KRH 4/10/14

BENCH MARK
COUNTY OF RIVERSIDE BENCHMARK NO. "M-31"
COUNTY OF RIVERSIDE BENCHMARK - 3 1/4" ALUMINUM DISK MARKED M-31, LOCATED FLUSH AT THE SOUTH WEST CORNER OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB LOCATED AT THE CROSSING OF PERRIS BLVD. AND RW. CO. FLOOD CONTROL CHANNEL (PERRIS LATERAL "A"), 43 FT. WEST OF CENTERLINE OF PERRIS BLVD. AND 4.5 FT. EAST OF CONCRETE BRIDGE BARRIER. (EDGE OF BRIDGE) MARKED R-102 D.N.R. IN TOP OF CONC. POST FLUSH W/ GROUND
ELEVATION = 1474.674' (NAVD 1929)

REF.	REVISIONS	ENGINEER APPR.	ENGINEER DATE	RCFC/ APPR.	RCFC/ DATE
[2]	CHANGED SLOPE TO 0.0030, ADDED MH, ADDED NEW D'S, CHANGED 42" LAT TO 24" LAT, ADDED BY. UTILITIES, RELOCATE UTILITIES, REVISED S.D.	H.A.	2/3/16	DG	2/23/16
[1]	CHANGED C.I.P. RCB TO PRE-CAST RCB APWA 300-0	H.A.	2/3/16	DG	2/23/16

DESIGNED BY: BW
DRAWN BY: ET
DATE DRAWN:

APPROVED BY:
Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173
Haidook Aghaian Date: 11/18/14
HAIDOOK I. AGHAIAN RCE NO. 43293

REGISTERED PROFESSIONAL ENGINEER HAIDOOK I. AGHAIAN R.C.E. NO. 43293 Exp. 3-31-18 CIVIL STATE OF CALIFORNIA

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: DATE: 1/20/2015
APPROVED BY: Mark H. Wills DATE: 1/20/2015

CITY OF PERRIS
APPROVED BY:
CITY ENGINEER DATE: 12-15-14
RECOMMENDED DATE:

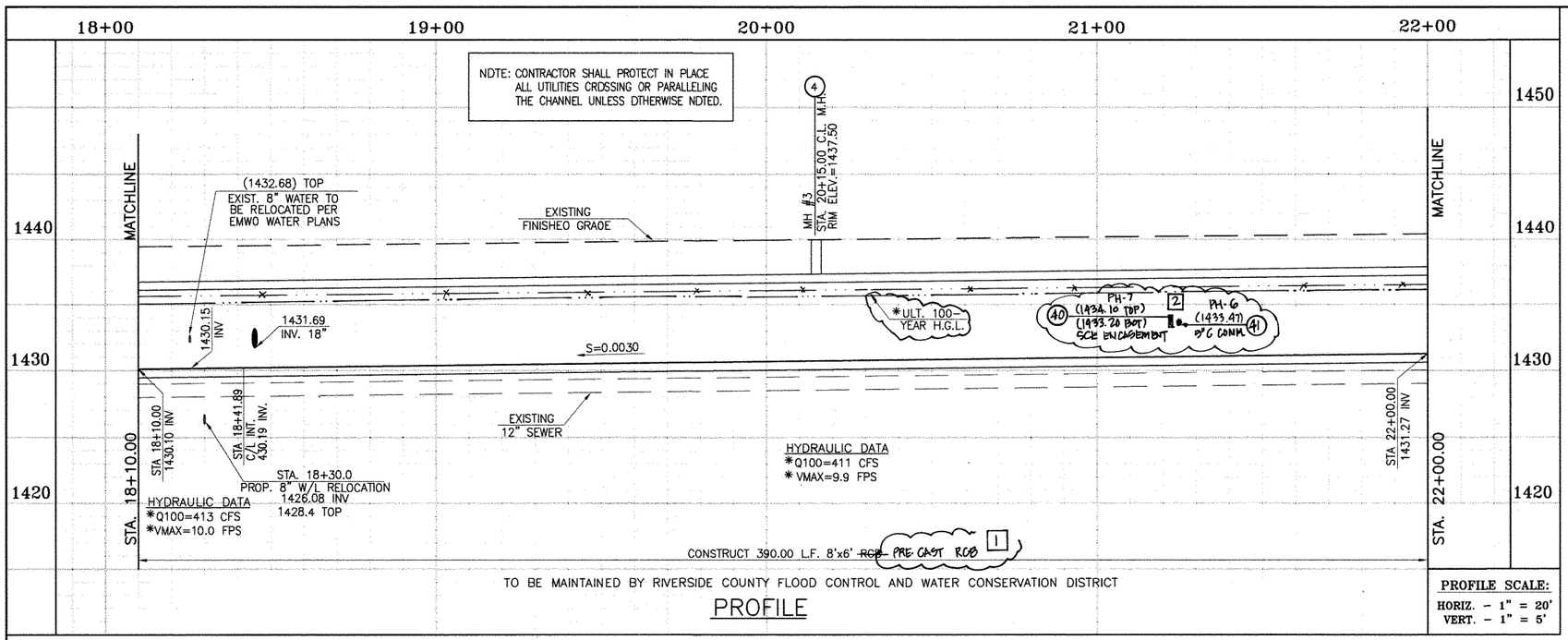
CITY OF PERRIS
FILE NO. P8-1013

PERRIS VALLEY MDP LINE "A-B"

FROM STA. 13+80 TO STA. 18+10

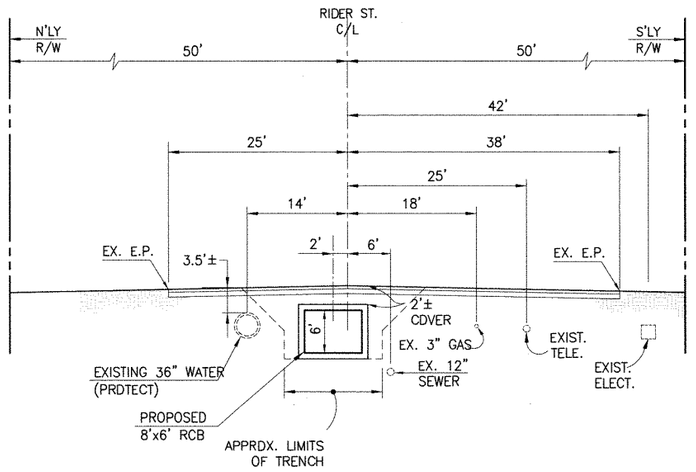
PROJECT NO. 4-0-00537
DRAWING NO. 4-1063
SHEET NO. 3 OF 18

Last Update: 11/18/14
0:\2700-2799\2702\2702F\2702SD03.dwg



PROFILE

PROFILE SCALE:
HORIZ. – 1" = 20'
VERT. – 1" = 5'



SECTION AT STA. 20+00.00

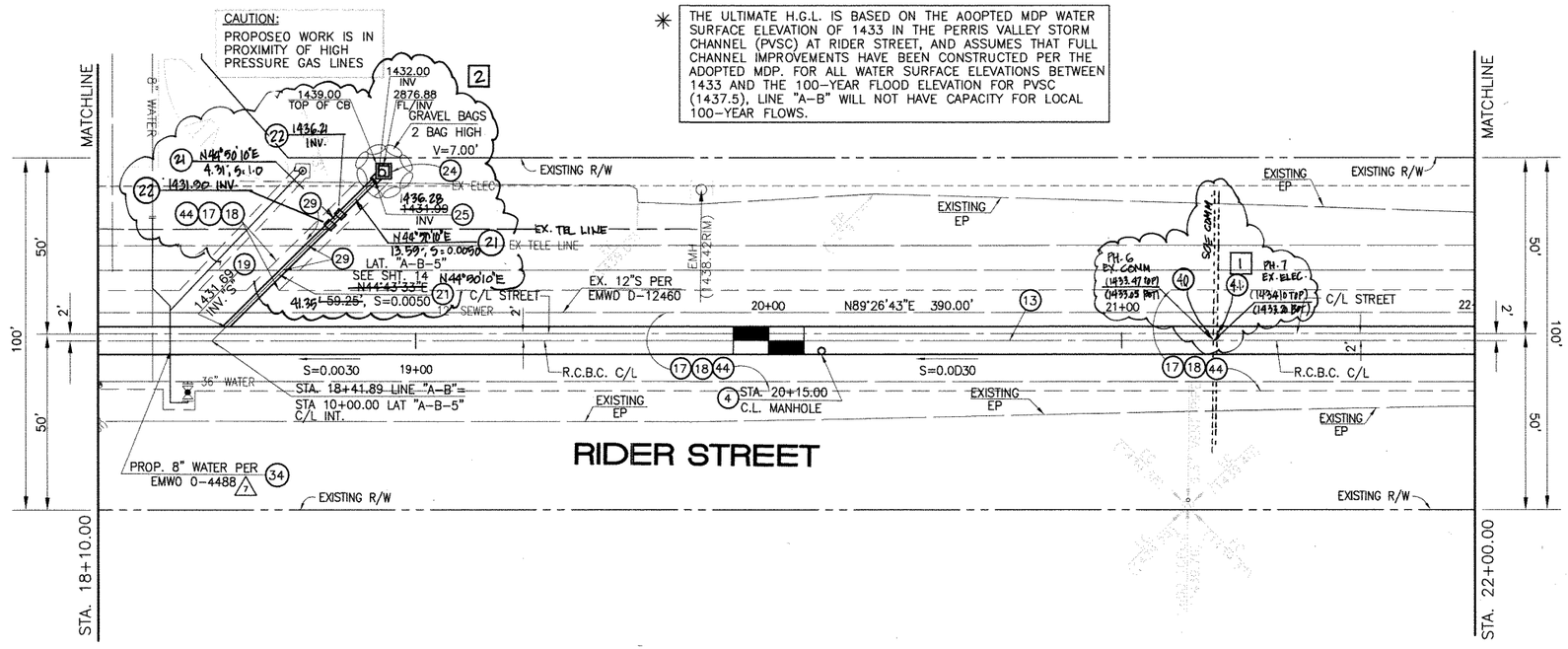
FROM STA 18+63.90 TO STA 22+00

0 5 10 20

SCALE:1"=10'

CAUTION:
PROPOSED WORK IS IN PROXIMITY OF HIGH PRESSURE GAS LINES

✳ THE ULTIMATE H.G.L. IS BASED ON THE ADOPTED MDP WATER SURFACE ELEVATION OF 1433 IN THE PERRIS VALLEY STORM CHANNEL (PVSC) AT RIDER STREET, AND ASSUMES THAT FULL CHANNEL IMPROVEMENTS HAVE BEEN CONSTRUCTED PER THE ADOPTED MDP. FOR ALL WATER SURFACE ELEVATIONS BETWEEN 1433 AND THE 100-YEAR FLOOD ELEVATION FOR PVSC (1437.5), LINE "A-B" WILL NOT HAVE CAPACITY FOR LOCAL 100-YEAR FLOWS.



RIDER STREET

PLAN

0 10 20 40

SCALE:1"=20'

STORM DRAIN CONSTRUCTION NOTES:

(4) CONSTRUCT MANHOLE NO. 3 PER R.C.F.C.&W.C.O. STD OWG. MH253
(1) (13) CONSTRUCT 8' X 6' ~~RCB PER CALTRANS STD PLAN NO. D80 OR APPROVED EQUAL.~~ PRE-CAST RCB APWA STD PLAN 390-0 OR APPROVED EQUAL. SEE JOINT SEALANT NOTE ON SHT. 1.
(17) SAWCUT AND REMOVE EXISTING A.C. PAVEMENT.
(18) UTILITY TRENCH AND SURFACE REPAIR PER CITY STANDARD ON SHT. NO. 18, MODIFIED TO ACCOMMODATE SLURRY BACKFILL WHERE BOX COVER IS LESS THAN 2.0'.
(19) CONSTRUCT JUNCTION STRUCTURE NO. 3 PER R.C.F.C.&W.C.O. STD. OWG. JS228.
(21) CONSTRUCT 18" R.C.P, 0-LOAD PER SHEET #14.
(24) CONSTRUCT CONCRETE ORDP INLET PER R.C.F.C.&W.C.O. STD DWG. CB110
(25) CONSTRUCT SPECIAL CONNECTION PER R.C.F.C.&W.C.O. STD OWG. CB109
(29) PROTECT IN PLACE EXISTING UTILITIES.
(34) RELOCATE EXISTING WATER LINE PER E.M.W.D. PLANS.
(44) SAWCUT, REMOVE AND REPLACE A.C. PAVEMENT SURFACE REPAIR PER CITY STD. ON SHEET 18. SEE SEPARATE PAVING PLANS.
(2) (22) CONSTRUCT CONCRETE COLLAR PER R.C.F.C.&W.C.D. STD DWG M803.
(40) RELOCATE EXISTING ELECTRICAL LINE.
(41) RELOCATE EXISTING TELEPHONE LINE.

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

BENCH MARK
COUNTY OF RIVERSIDE BENCHMARK NO. "A-31"
COUNTY OF RIVERSIDE BENCHMARK – 3 1/4" ALUMINUM DISK MARKED "A-31", LOCATED FLUSH AT THE SOUTH WEST CORNER OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB LOCATED AT THE CROSSING OF PERRIS BLVD. AND RIV. CO. FLOOD CONTROL CHANNEL (PERRIS LATERAL 7-7), 4.3 FT. WEST OF CENTERLINE OF PERRIS BLVD. AND 4.5 FT. EAST OF CONCRETE BRIDGE BARRIER. (EDGE OF BRIDGE) MARKED R-102 D.M.E. IN TOP OF CONC. POST FLUSH W/ GROUND
ELEVATION = 1474.674' (NAVD 1929)

REF.	REVISIONS	ENGINEER APPR.	ENGINEER DATE	RCFC/ APPR.	RCFC/ DATE
2	CHANGED SLOPE TO 0.0018, ADDED MH, ADDED NEW 10"S, CHANGED 42" LAT TO 24" LAT. ADDED EX. UTILITIES, RELOCATE UTILITIES, REV. S.D.	H.I.A.	2/3/16	2/3/14	
1	CHANGED CLP RCP TO PRE-CAST RCB APWA 390-0	H.I.A.	2/3/16	2/3/14	

DESIGNED BY: BW
DRAWN BY: ET
DATE DRAWN:

APPROVED BY:
Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173
Haidook Aghaian Date: 11/18/14
HAIDOOK I. AGHAIAN RCE NO. 43293

REGISTERED PROFESSIONAL ENGINEER HAIDOOK I. AGHAIAN R.C.E. NO. 43293 Exp. 3-31-16 CIVIL STATE OF CALIFORNIA

KRH 4/10/14

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: DATE: 1/22/2015
APPROVED BY: Mark H. Wills DATE: 1/20/2015

CITY OF PERRIS
APPROVED BY:
CITY ENGINEER DATE: 12-15-14
RECOMMENDED DATE:

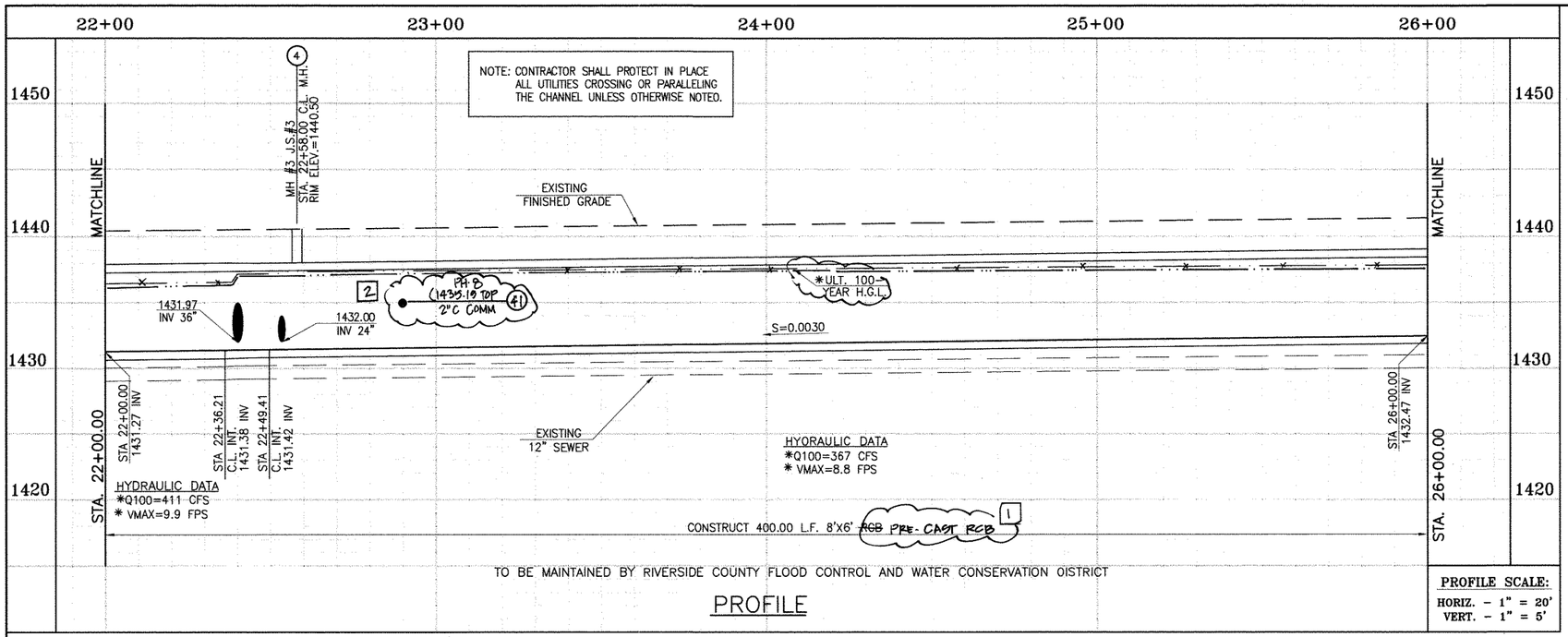
CITY OF PERRIS
FILE NO. P8-1013

PERRIS VALLEY MDP LINE "A-B"

FROM STA. 18+10 TO STA. 22+00

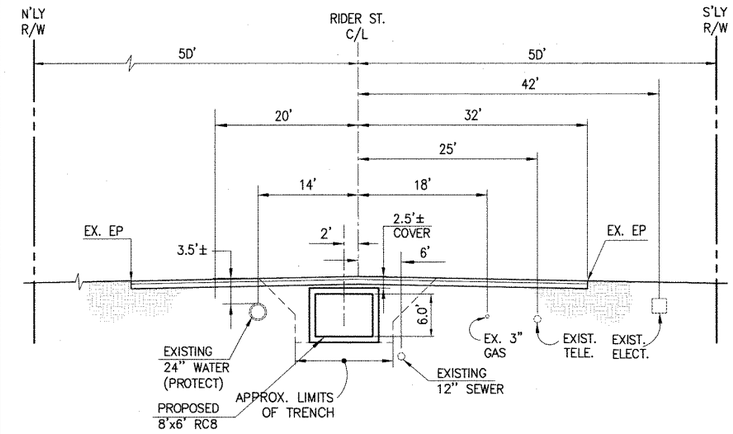
PROJECT NO. 4-0-00537
DRAWING NO. 4-1063
SHEET NO. 4 OF 18

Last Update: 11/18/14
O:\2700-2799\2702\2702P\2702SD04.dwg



PROFILE

PROFILE SCALE:
HORIZ. - 1" = 20'
VERT. - 1" = 5'

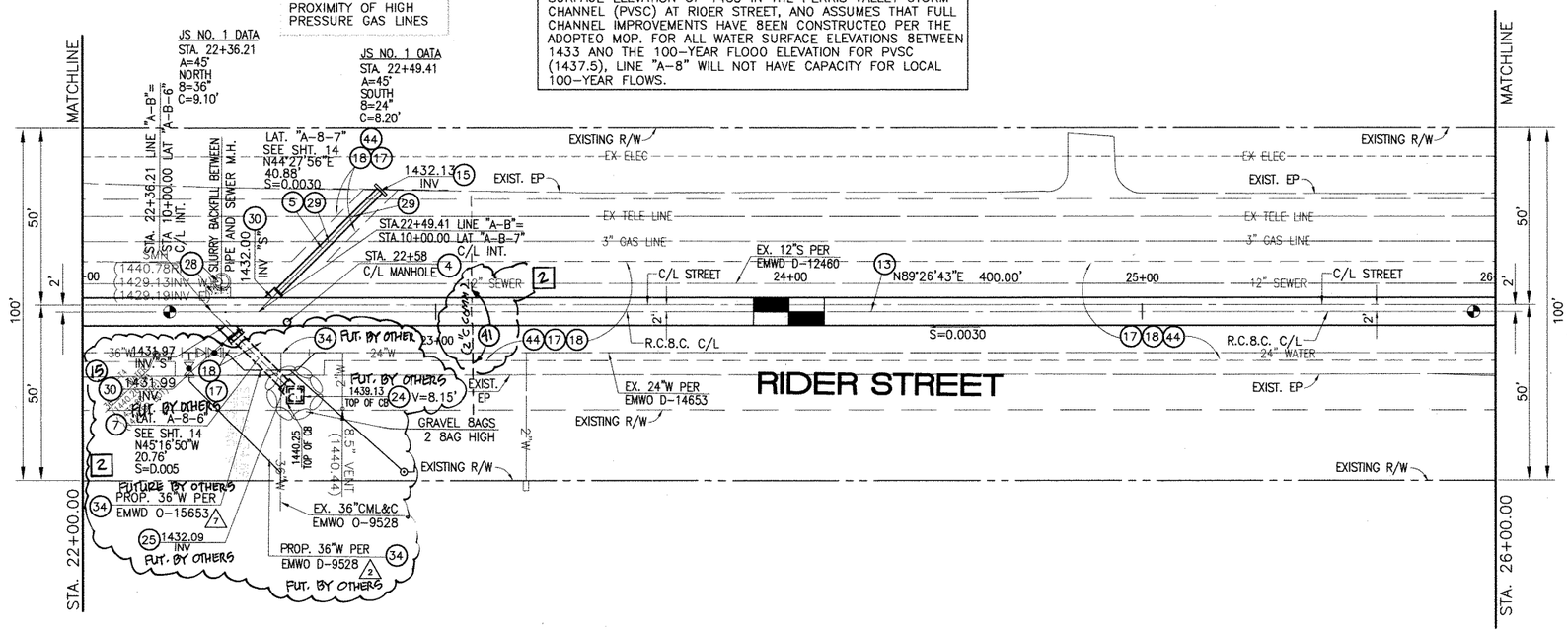


SECTION AT STA. 24+00.00
FROM STA 22+00 TO STA 26+00

0 5 10 20
SCALE:1"=10'

CAUTION:
PROPOSED WORK IS IN PROXIMITY OF HIGH PRESSURE GAS LINES

* THE ULTIMATE H.G.L. IS BASED ON THE ADOPTED MDP WATER SURFACE ELEVATION OF 1433 IN THE PERRIS VALLEY STORM CHANNEL (PVSC) AT RIDER STREET, AND ASSUMES THAT FULL CHANNEL IMPROVEMENTS HAVE BEEN CONSTRUCTED PER THE ADOPTED MDP. FOR ALL WATER SURFACE ELEVATIONS BETWEEN 1433 AND THE 100-YEAR FLOOD ELEVATION FOR PVSC (1437.5), LINE "A-8" WILL NOT HAVE CAPACITY FOR LOCAL 100-YEAR FLOWS.



PLAN

0 10 20 40
SCALE:1"=20'

STORM DRAIN CONSTRUCTION NOTES:

(4) CONSTRUCT MANHOLE NO. 3 PER R.C.F.C.&W.C.D. STD OWG. MH253
(5) CONSTRUCT 24" R.C.P, O-LOAD PER PLAN.
(7) CONSTRUCT 36" R.C.P, O-LOAD PER PLAN.
(1) (13) CONSTRUCT 8' X 6' ~~RCB PER CALTRANS STD PLAN NO. D86 OR APPROVED EQUAL.~~ PRE-CAST RCB PER APWA STD PLAN 330-0 OR APPROVED EQUAL. SEE JOINT SEALANT NOTE ON SHT. 1
(15) CONSTRUCT CONCRETE BULKHEAD PER R.C.F.C.&W.C.D. STD OWG. M816.
(17) SAWCUT AND REMOVE EXISTING A.C. PAVEMENT.
(18) UTILITY TRENCH AND SURFACE REPAIR PER CITY STANDARD ON SHT. NO. 18, MODIFIED TO ACCOMMODATE SLURRY BACKFILL WHERE BOX COVER IS LESS THAN 2.0'.
(24) CONSTRUCT CONCRETE DROP INLET PER R.C.F.C.&W.C.D. STD OWG. C8110 W=3.50'
(25) CONSTRUCT SPECIAL CONNECTION PER R.C.F.C.&W.C.D. STD OWG. C8109
(28) CONSTRUCT SEWER PROTECTION PER R.C.F.C.&W.C.D. STD. DWG. M807. OR CONCRETE ENCASEMENT NO. 2 PER EMWD STD. NO. S8-157.
(29) PROTECT IN PLACE EXISTING UTILITIES.
(30) CONSTRUCT JUNCTION STRUCTURE NO.1 PER R.C.F.C.&W.C.D. STD. OWG. JS226.
(34) RELOCATE EXISTING WATER LINE PER E.M.W.D. PLANS.
(44) SAWCUT, REMOVE AND REPLACE A.C. PAVEMENT SURFACE REPAIR PER CITY STD. ON SHEET 18. SEE SEPARATE PAVING PLANS.
(2) (41) RELOCATE EXISTING TELEPHONE LINE.

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

BENCH MARK
COUNTY OF RIVERSIDE BENCHMARK NO. "M-31"
COUNTY OF RIVERSIDE BENCHMARK - 3 1/4" ALUMINUM DISK MARKED M-31, LOCATED FLUSH AT THE SOUTH WEST CORNER OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB LOCATED AT THE CROSSING OF PERRIS BLVD. AND RIV. CO. FLOOD CONTROL CHANNEL (PERRIS LATERAL "A"), 43 FT. WEST OF CENTERLINE OF PERRIS BLVD. AND 4.5 FT. EAST OF CONCRETE BRIDGE BARRIER. (EDGE OF BRIDGE) MARKED R-102 D.M.R. IN TOP OF CONC. POST FLUSH W/ GROUND
ELEVATION = 1474.674' (NAVD 1929)

REF.	REVISIONS	ENGINEER APPR.	ENGINEER DATE	RCFC/ APPR.	RCFC/ DATE
2	CHANGED SLOPE TO 0.0015, NOTED MH, ADDED NEW 10"S CHANGED 42" LAT TO 24" LAT, ADDED EX. UTILITIES, RELOCATE UTILITIES, REV. S.D.	H.L.A.	2/3/16	DG	2/23/16
1	CHANGED C.I.P. RCB TO PRECAST RCB APWA 330-0	H.L.A.	2/3/16	DG	2/23/16

DESIGNED BY: BW
DRAWN BY: ET
DATE DRAWN:

APPROVED BY:
Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173
Haidook I. Aghaian Date: 11/18/14
HAIDOOK I. AGHAIAN RCE NO. 43293

REGISTERED PROFESSIONAL ENGINEER HAIDOOK I. AGHAIAN R.C.E. NO. 43293 Exp. 3-31-16 CIVIL STATE OF CALIFORNIA

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: DATE: 1/26/2015
APPROVED BY: Mark A. Wills DATE: 1/20/2015

CITY OF PERRIS
APPROVED BY: CITY ENGINEER DATE: 12-18-14
RECOMMENDED DATE:

KRL 4/9/14

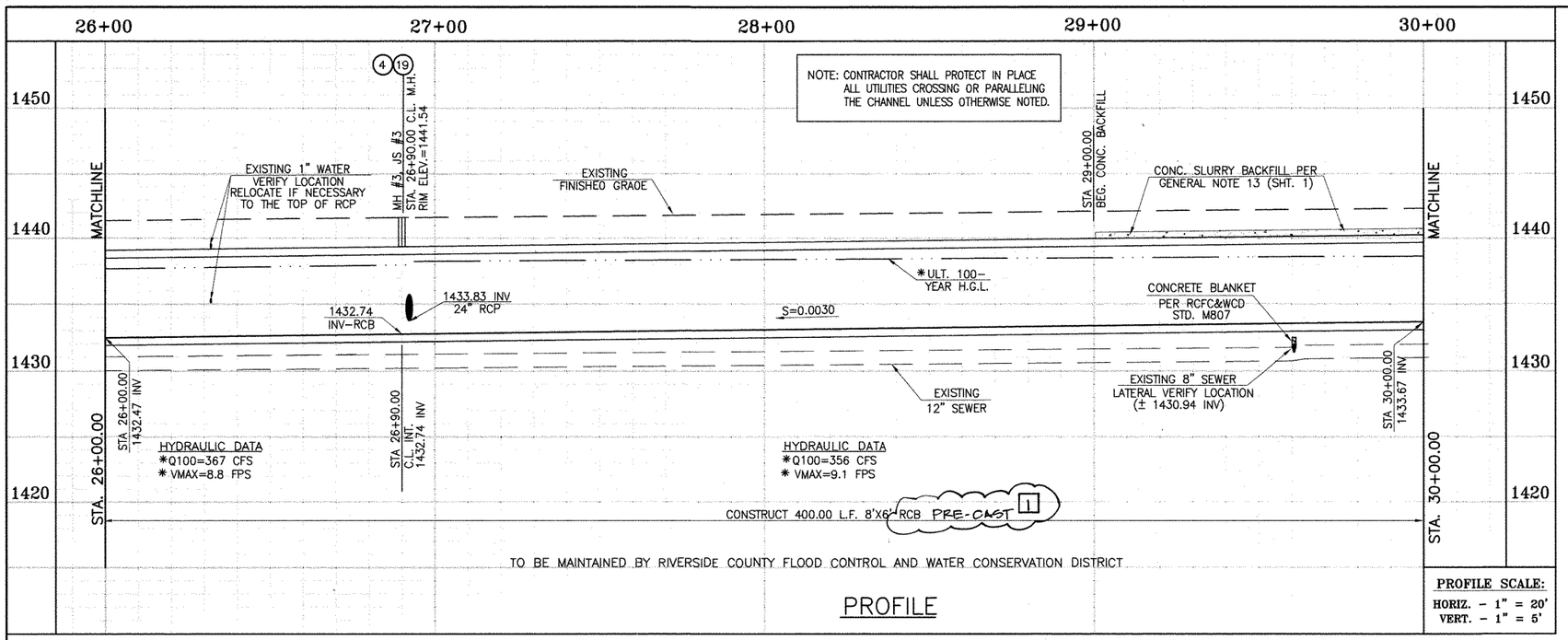
CITY OF PERRIS
FILE NO. P8-1013

PERRIS VALLEY MDP LINE "A-B"

FROM STA. 22+00 TO STA. 26+00

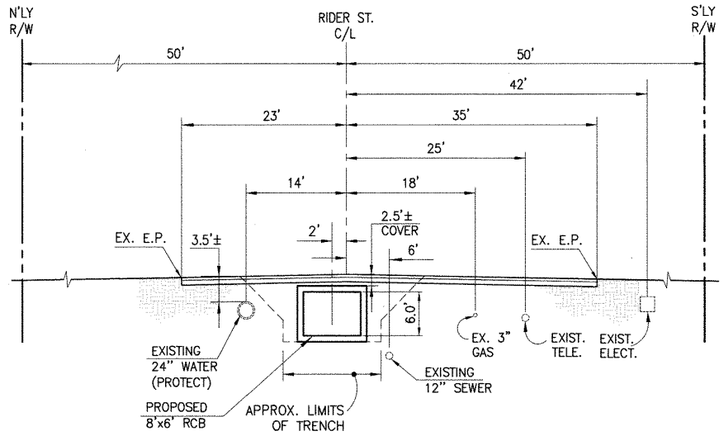
PROJECT NO. 4-0-00537
DRAWING NO. 4-1063
SHEET NO. 5 OF 18

Last Update: 11/18/14
O:\2700-2799\2702\2702F\2702SD05.dwg



PROFILE

PROFILE SCALE:
HORIZ. - 1" = 20'
VERT. - 1" = 5'



SECTION AT STA. 28+00.00

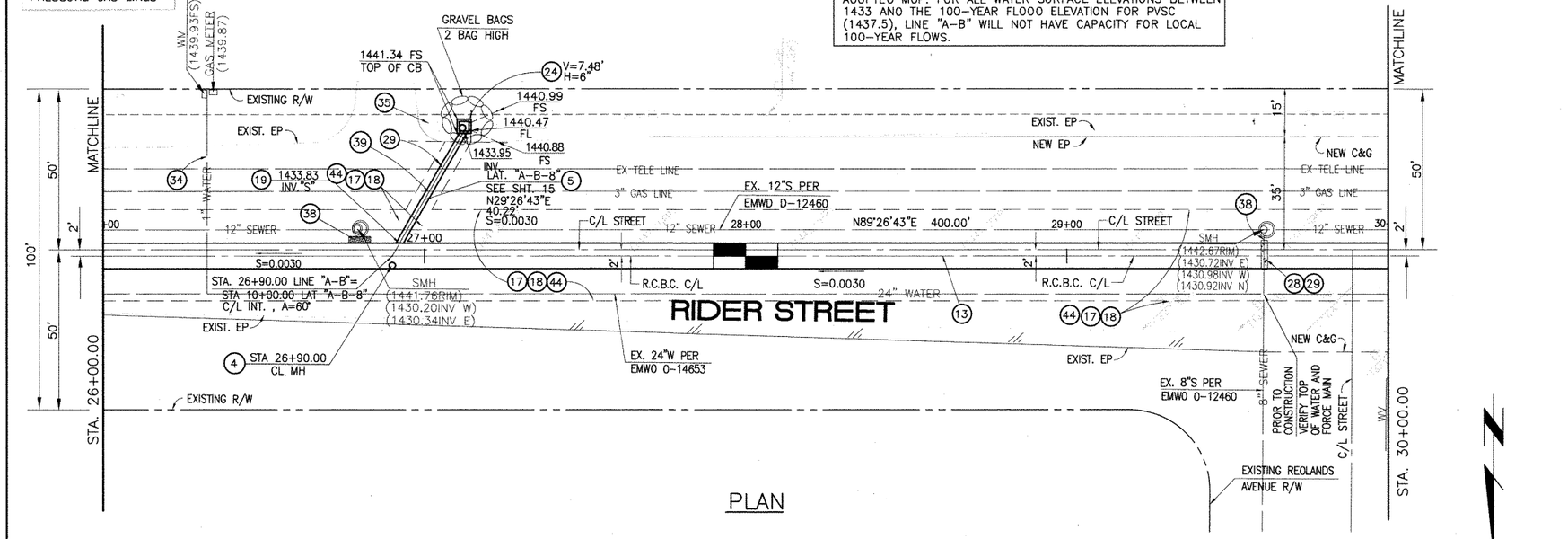
FROM STA 26+00 TO STA 29+62.72

0 5 10 20

SCALE:1"=10'

CAUTION:
PROPOSED WORK IS IN PROXIMITY OF HIGH PRESSURE GAS LINES

* THE ULTIMATE H.G.L. IS BASED ON THE ADOPTED MDP WATER SURFACE ELEVATION OF 1433 IN THE PERRIS VALLEY STORM CHANNEL (PVSC) AT RIDER STREET, AND ASSUMES THAT FULL CHANNEL IMPROVEMENTS HAVE BEEN CONSTRUCTED PER THE ADOPTED MDP. FOR ALL WATER SURFACE ELEVATIONS BETWEEN 1433 AND THE 100-YEAR FLOOD ELEVATION FOR PVSC (1437.5), LINE "A-B" WILL NOT HAVE CAPACITY FOR LOCAL 100-YEAR FLOWS.



PLAN

0 10 20 40

SCALE:1"=20'

STORM DRAIN CONSTRUCTION NOTES:

(4) CONSTRUCT MANHOLE NO. 3 PER R.C.F.C.&W.C.D. STD DWG. MH253

(5) CONSTRUCT 24" R.C.P. 0-LOAD PER PLAN.

(1) (13) CONSTRUCT 8' X 6' ~~RCB PER CALTRANS STD PLAN NO. D80 OR APPROVED EQUAL~~ PRE-CAST RCB APWA STD PLAN 390-0 OR APPROVED EQUAL ~~SEE JOINT SEALANT NOTE ON SHT. 1~~

(17) SAWCUT AND REMOVE EXISTING A.C. PAVEMENT.

(18) UTILITY TRENCH AND SURFACE REPAIR PER CITY STANDARD ON SHT. NO. 18, MODIFIED TO ACCOMMODATE SLURRY BACKFILL WHERE BOX COVER IS LESS THAN 2.0'.

(19) CONSTRUCT JUNCTION STRUCTURE NO.3 PER R.C.F.C.&W.C.D. STD. DWG. JS228.

(24) CONSTRUCT CONCRETE DROP INLET PER R.C.F.C.&W.C.D. STD DWG. CB110

(28) CONSTRUCT SEWER PROTECTION PER R.C.F.C.&W.C.D. STD. DWG. M807.

(29) PROTECT IN PLACE EXISTING UTILITIES.

(34) RELOCATE EXISTING WATER LINE PER E.M.W.D. PLANS.

(35) CONSTRUCT 4" THICK AC PAVEMENT OVER NATIVE.

(38) SLURRY BACKFILL BETWEEN RCB AND MANHOLE.

(39) RELOCATE EXISTING GAS LINE.

(44) SAWCUT, REMOVE AND REPLACE A.C. PAVEMENT SURFACE REPAIR PER CITY STD. ON SHEET 18. SEE SEPARATE PAVING PLANS.

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

BENCH MARK
COUNTY OF RIVERSIDE BENCHMARK NO. "M-31"
COUNTY OF RIVERSIDE BENCHMARK - 3 1/4" ALUMINUM DISK MARKED M-31, LOCATED FLUSH AT THE SOUTH WEST CORNER OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB LOCATED AT THE CROSSING OF PERRIS BLVD. AND RIV. CO. FLOOD CONTROL CHANNEL (PERRIS LATERAL "A"), 43 FT. WEST OF CENTERLINE OF PERRIS BLVD. AND 4.3 FT. EAST OF CONCRETE BRIDGE BARRIER. (EDGE OF BRIDGE) MARKED R-102 D.W.R. IN TOP OF CONC. POST FLUSH W/ GROUND
ELEVATION = 1474.674' (NAVD 1929)

REF.	REVISIONS	ENGINEER APPR.	ENGINEER DATE	RCFC/ APPR.	RCFC/ DATE
1	CHANGED CAP. RCB TO PRE-CAST RCB APWA 390-0	H.LA		JG	2/27/14

DESIGNED BY: BW
DRAWN BY: ET
DATE DRAWN:

APPROVED BY: Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173
HAIDOOK I. AGHAIAN Date: 11/18/14
RCE NO. 43293

REGISTERED PROFESSIONAL ENGINEER HAIDOOK I. AGHAIAN R.C.E. NO. 43293 Exp. 3-31-16 CIVIL STATE OF CALIFORNIA

KAI 4/10/14

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: DATE: 1/20/2015
APPROVED BY: Mark A. Wills DATE: 1/20/2015

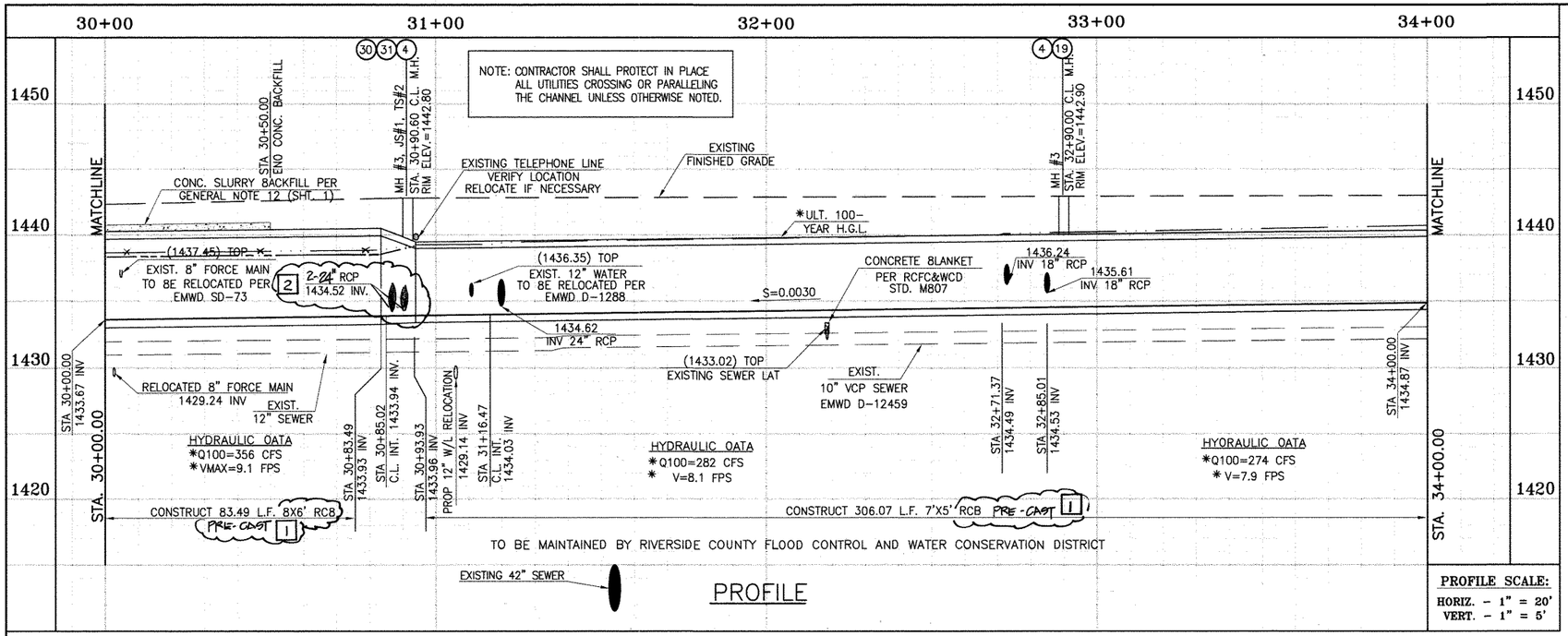
CITY OF PERRIS
APPROVED BY: CITY ENGINEER DATE: 12-15-14
RECOMMENDED DATE:

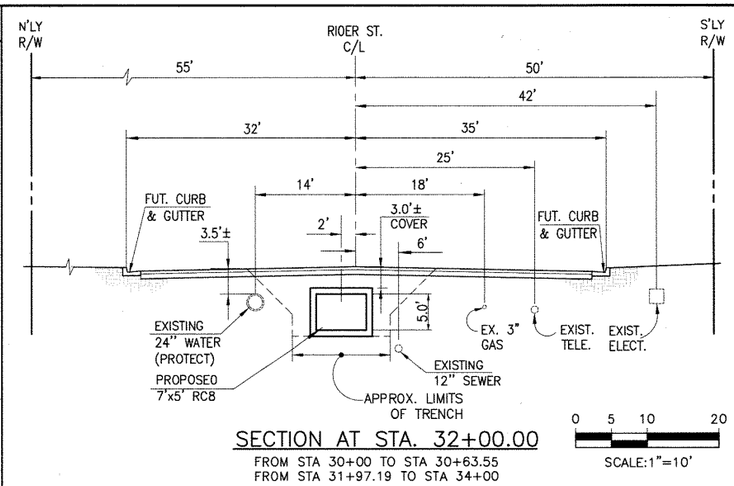
CITY OF PERRIS
FILE NO. P8-1013

PERRIS VALLEY MDP
LINE "A-B"
FROM STA. 26+00 TO STA. 30+00

PROJECT NO. 4-0-00537
DRAWING NO. 4-1063
SHEET NO. 6 OF 18

Last Update: 11/18/14
O:\2700-2799\2702\2702F\2702SD06.dwg





SECTION AT STA. 32+00.00

FROM STA 30+00 TO STA 30+63.55
FROM STA 31+97.19 TO STA 34+00

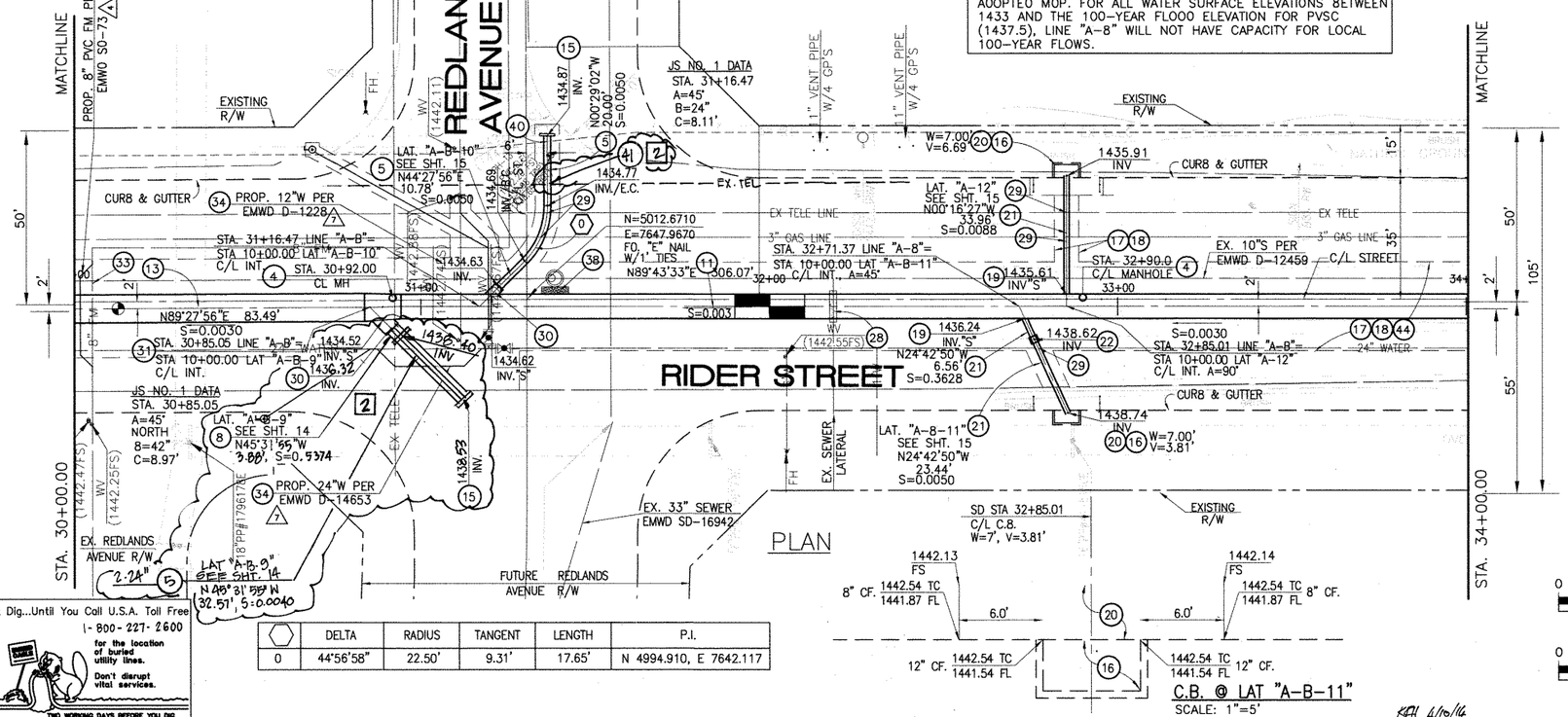
STORM DRAIN CONSTRUCTION NOTES:

4. CONSTRUCT MANHOLE NO. 3 PER R.C.F.C.&W.C.D. STD DWG. MH253
5. CONSTRUCT 24" R.C.P, D-LOAD PER PLAN.
8. CONSTRUCT 42" R.C.P, D-LOAD PER PLAN.
11. CONSTRUCT 7' X 5' ~~RCB PER CALTRANS STD PLAN NO. D86~~ PRE-CAST RCB PER STD PLAN 3900 OR APPROVED EQUAL. ~~SEE JOINT SEALANT NOTE ON SHT. 1~~
13. CONSTRUCT 8' X 6' ~~RCB PER CALTRANS STD PLAN NO. D86~~ PRE-CAST RCB STD PLAN 3900 OR APPROVED EQUAL. ~~SEE JOINT SEALANT NOTE ON SHT. 1~~
15. CONSTRUCT CONCRETE BULKHEAD PER R.C.F.C.&W.C.D. STD DWG. M816.
16. CONSTRUCT CATCH BASIN NO.1 PER R.C.F.C.&W.C.D. STD. DWG. CB100
17. SAWCUT AND REMOVE EXISTING A.C. PAVEMENT.
18. UTILITY TRENCH AND SURFACE REPAIR PER CITY STANDARD ON SHT. NO. 18, MODIFIED TO ACCOMMODATE SLURRY BACKFILL WHERE BOX COVER IS LESS THAN 2.0'.
19. CONSTRUCT JUNCTION STRUCTURE NO.3 PER R.C.F.C.&W.C.D. STD. DWG. JS228.
20. CONSTRUCT LOCAL DEPRESSION NO. 2 CASE "B" PER R.C.F.C.&W.C.D. STD. DWG. L0201.
21. CONSTRUCT 18" R.C.P, D-LOAD PER PLAN.
22. CONSTRUCT CONCRETE COLLAR PER R.C.F.C.&W.C.D. STD DWG. M803.
28. CONSTRUCT SEWER PROTECTION PER R.C.F.C.&W.C.D. STD. DWG. M807.
29. PROTECT IN PLASE EXISTING UTILITIES.
30. CONSTRUCT JUNCTION STRUCTURE NO.1 PER R.C.F.C.&W.C.D. STD. DWG. JS226.
31. CONSTRUCT TRANSITION STRUCTURE NO.2 PER R.C.F.C.&W.C.D. STD. DWG. TS302.
33. RELOCATE EXISTING SEWER LATERALS PER E.M.W.D. PLANS.
34. RELOCATE EXISTING WATER LINE PER E.M.W.D. PLANS.
38. SLURRY BACKFILL BETWEEN RCB AND MANHOLE.
40. RELOCATE EXISTING ELECTRICAL LINE.
44. SAWCUT, REMOVE AND REPLACE A.C. PAVEMENT SURFACE REPAIR PER CITY STD. ON SHEET 18. SEE SEPARATE PAVING PLANS.

2 4H RELOCATE EXISTING TELEPHONE LINE.

CAUTION: PROPOSED WORK IS IN PROXIMITY OF HIGH PRESSURE GAS LINES

* THE ULTIMATE H.G.L. IS BASED ON THE ADOPTED MDP WATER SURFACE ELEVATION OF 1433 IN THE PERRIS VALLEY STORM CHANNEL (PVSC) AT RIOER STREET, AND ASSUMES THAT FULL CHANNEL IMPROVEMENTS HAVE BEEN CONSTRUCTED PER THE ADOPTED MDP. FOR ALL WATER SURFACE ELEVATIONS BETWEEN 1433 AND THE 100-YEAR FLOOD ELEVATION FOR PVSC (1437.5), LINE "A-8" WILL NOT HAVE CAPACITY FOR LOCAL 100-YEAR FLOWS.



	DELTA	RADIUS	TANGENT	LENGTH	P.I.
0	44°56'58"	22.50'	9.31'	17.65'	N 4994.910, E 7642.117

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

BENCH MARK
COUNTY OF RIVERSIDE BENCHMARK NO. "M-31"
COUNTY OF RIVERSIDE BENCHMARK - 3 1/4" ALUMINUM DISK MARKED M-31, LOCATED FLUSH AT THE SOUTH WEST CORNER OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB LOCATED AT THE CROSSING OF PERRIS BLVD. AND RAY CO. FLOOD CONTROL CHANNEL (PERRIS LATERAL 7-7, 43 FT. WEST OF CENTERLINE OF PERRIS BLVD. AND 4.5 FT. EAST OF CONCRETE BRIDGE BARRIER. (EDGE OF BRIDGE) MARKED R-102 D.M.S. IN TOP OF CONC. POST FLUSH W/ GROUND
ELEVATION = 1474.674' (NAVD 1929)

REF.	REVISIONS	ENGINEER APPR.	ENGINEER DATE	RCFC/ APPR.	RCFC/ DATE
2	CHANGED SLOPE TO 0.005, ADDED MH, ADDED 10"S, CHANGED 42"LAT TO 24"LAT, ADDED RCB UNLINED, RELOCATE UTILITIES, REV. S.D.	H.I.A	2/6/14	0/0	2/13/14
1	CHANGED C.I.P. RCB TO PRE-CAST RCB PER APWA STD	H.I.A	2/6/14	0/0	2/13/14

DESIGNED BY: BW
DRAWN BY: ET
DATE DRAWN:

APPROVED BY: Thienes Engineering, Inc. CIVIL ENGINEERING • LAND SURVEYING 14349 FIRESTONE BOULEVARD LA MIRADA, CALIFORNIA 90638 PH.(714)521-4811 FAX(714)521-4173
Haidook Aghaian Date: 11/18/14
HAIDOOK I. AGHAIAN RCE NO. 43293

REGISTERED PROFESSIONAL ENGINEER HAIDOOK L. AGHAIAN R.C.E. NO. 43293 Exp. 3-31-16 CIVIL STATE OF CALIFORNIA

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: DATE: 1/20/2015
APPROVED BY: DATE: 1/20/2015

CITY OF PERRIS APPROVED BY:
CITY ENGINEER DATE: 12-15-14
RECOMMENDED DATE:

KFH 4/10/14

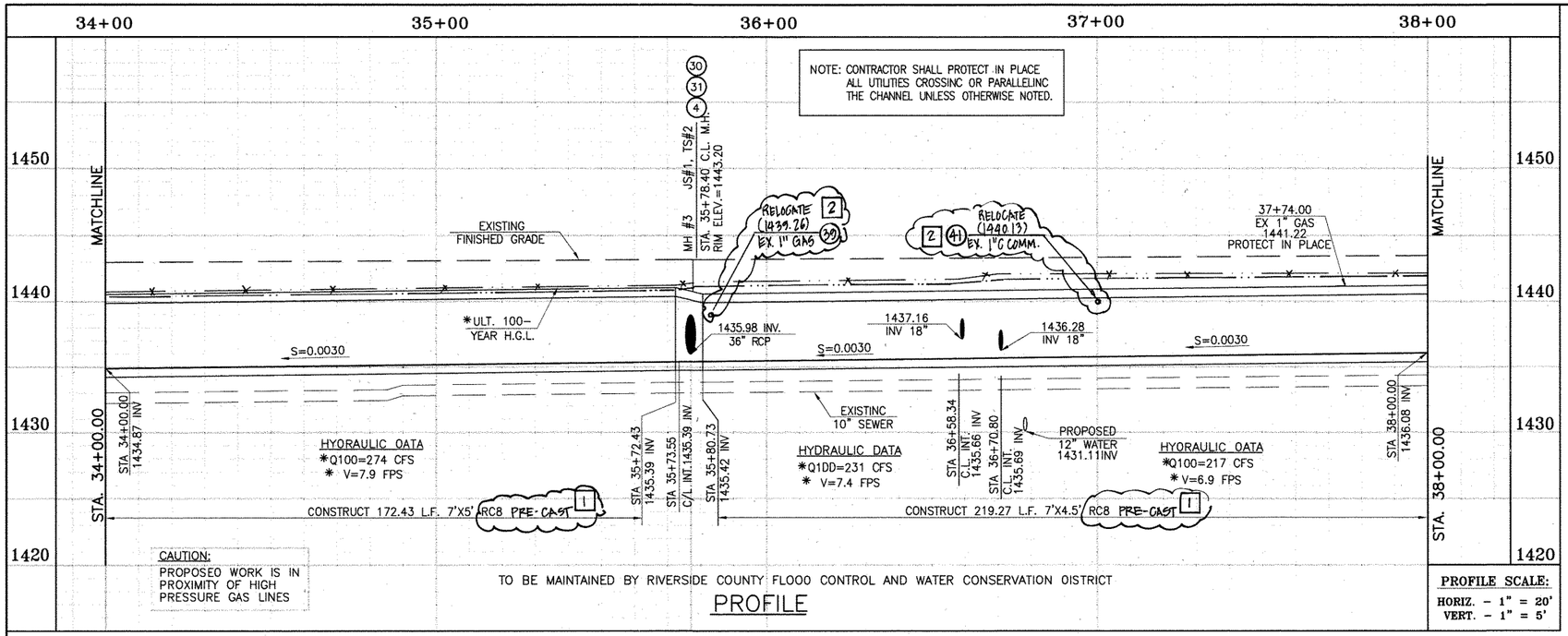
CITY OF PERRIS FILE NO. P8-1013

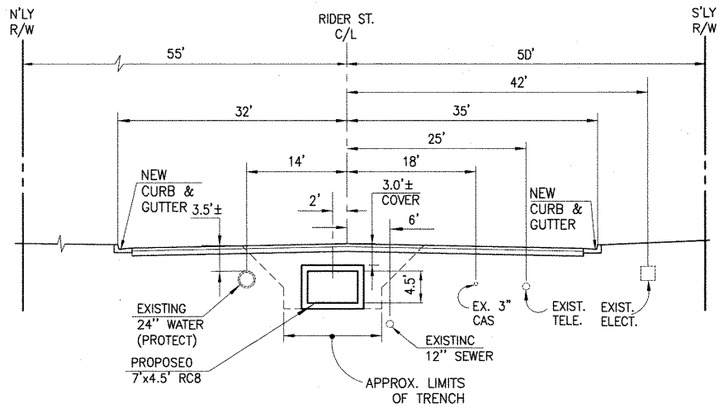
PERRIS VALLEY MDP LINE "A-B"

FROM STA. 30+00 TO STA. 34+00

PROJECT NO. 4-0-00537
DRAWING NO. 4-1063
SHEET NO. 7 OF 18

Last Update: 11/18/14
O:\2700-2799\2702\27028\2702SD07.dwg





SECTION AT STA. 36+00.00

FROM STA 34+00 TO STA 35+62.28
FROM STA 36+52.28 TO STA 38+00

0 5 10 20
SCALE:1"=10'

STORM DRAIN CONSTRUCTION NOTES:

(4) CONSTRUCT MANHOLE NO. 3 PER R.C.F.C.&W.C.D. STD DWC. MH253

(7) CONSTRUCT 36" R.C.P, D-LOAD PER PLAN.

(10) CONSTRUCT 7' x 4.5' ~~PER CALTRANS STD PLAN D80~~ PRE-CAST RCB APWA STD PLAN 330-0 OR APPROVED EQUAL. SEE JOINT SEALANT NOTE ON SHT. 1.

(11) CONSTRUCT 7' X 5' ~~RCB PER CALRANS STD PLAN D80~~ PRE-CAST RCB APWA STD PLAN 330-0 OR APPROVED EQUAL. SEE JOINT SEALANT ON SHT. 1.

(15) CONSTRUCT CONCRETE BULKHEAD PER R.C.F.C.&W.C.D. STD DWC. M816.

(16) CONSTRUCT CATCH BASIN NO.1 PER R.C.F.C.&W.C.D. STD. DWC. C8100

(17) SAWCUT AND REMOVE EXISTINC A.C. PAVEMENT.

(18) UTILITY TRENCH AND SURFACE REPAIR PER CITY STANDARD ON SHT. NO. 18, MOOIFIED TO ACCOMMOOATE SLURRY BACKFILL WHERE 8OX COVER IS LESS THAN 2.0'.

(19) CONSTRUCT JUNCTION STRUCTURE NO. 3 PER R.C.F.C.&W.C.D. STD. DWC. JS228.

(20) CONSTRUCT LOCAL DEPRESSION #2 CASE "B" PER R.C.F.C.&W.C.D. STD. DWC. LD201.

(21) CONSTRUCT 18" R.C.P, D-LOAD PER PLAN.

(22) CONSTRUCT CONCRETE COLLAR PER R.C.F.C.&W.C.D. STD DWC. M803.

(29) PROTECT IN PLACE EXISTING UTILITIES.

(30) CONSTRUCT JUNCTION STRUCTURE NO. 1 PER R.C.F.C.&W.C.D. STD. DWC. JS226.

(31) CONSTRUCT TRANSITION STRUCTURE NO. 2 PER R.C.F.C.&W.C.D. STD. DWC. TS302.

(34) RELOCATE EXISTING WATER LINE PER E.M.W.D. PLANS.

(38) SLURRY BACKFILL BETWEEN RC8 AND MANHOLE.

(39) RELOCATE EXISTINC CAS LINE.

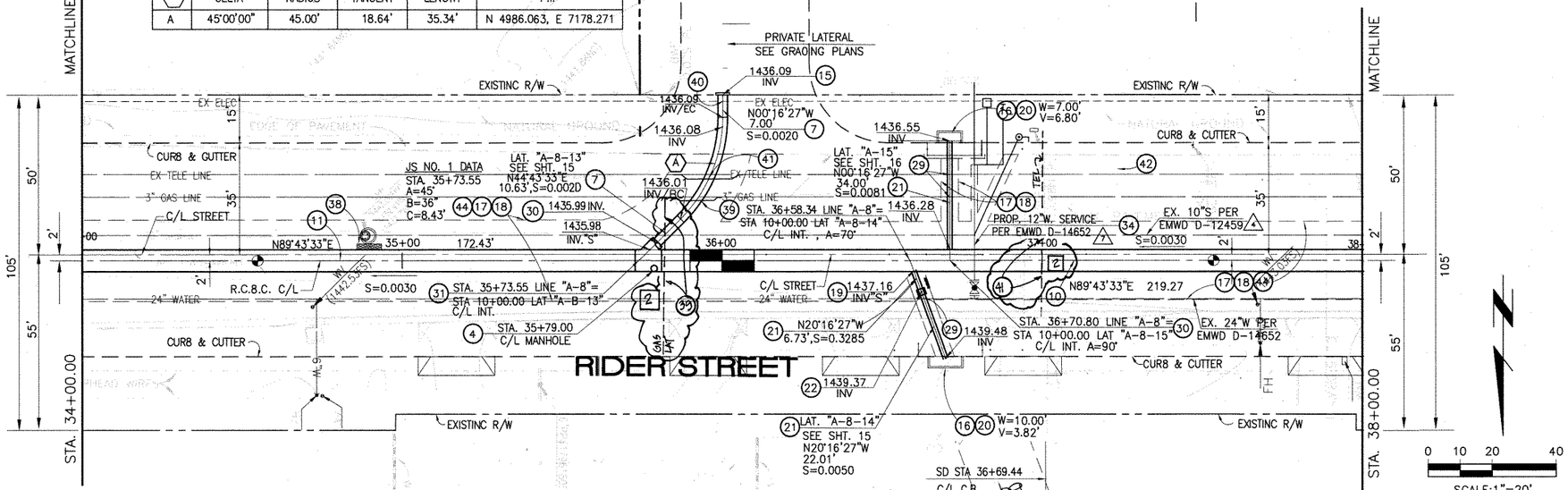
(40) RELOCATE EXISTINC ELECTRICAL LINE.

(41) RELOCATE EXISTINC TELEPHONE LINE.

(42) INSTALL NEW SEWER LATERAL PER E.M.W.D. PLANS.

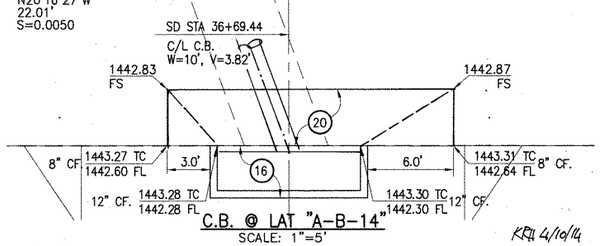
(44) SAWCUT, REMOVE AND REPLACE A.C. PAVEMENT SURFACE REPAIR PER CITY STD. ON SHEET 18. SEE SEPARATE PAVINC PLANS.

Δ	DELTA	RADIUS	TANCENT	LENCTH	P.I.
A	45°00'00"	45.00'	18.64'	35.34'	N 4986.063, E 7178.271



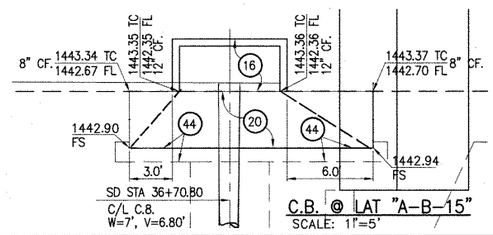
PLAN

0 10 20 40
SCALE:1"=20'



C.B. @ LAT "A-B-14"
SCALE: 1"=5'

0 2.5 5 10
SCALE:1"=5'



C.B. @ LAT "A-B-15"
SCALE: 1"=5'

✳ THE ULTIMATE H.G.L. IS BASED ON THE ADOPTED MDP WATER SURFACE ELEVATION OF 1433 IN THE PERRIS VALLEY STORM CHANNEL (PVSC) AT RIDER STREET, AND ASSUMES THAT FULL CHANNEL IMPROVEMENTS HAVE BEEN CONSTRUCTED PER THE ADOPTED MDP. FOR ALL WATER SURFACE ELEVATIONS BETWEEN 1433 AND THE 100-YEAR FLOOD ELEVATION FOR PVSC (1437.5), LINE "A-B" WILL NOT HAVE CAPACITY FOR LOCAL 100-YEAR FLOWS.

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

BENCH MARK
COUNTY OF RIVERSIDE BENCHMARK NO. "A-31"
COUNTY OF RIVERSIDE BENCHMARK - 3 1/4" ALUMINUM DISK MARKED M-31, LOCATED FLUSH AT THE SOUTH WEST CORNER OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB LOCATED AT THE CROSSING OF PERRIS BLVD. AND RIV. CO. FLOOD CONTROL CHANNEL (PERRIS LATERAL 7A7), 43 FT. WEST OF CENTERLINE OF PERRIS BLVD. AND 4.5 FT. EAST OF CONCRETE BRIDGE BARRIER. (EDGE OF BRIDGE) MARKED R-102 D.M.R. IN TOP OF CONC. POST FLUSH W/ GROUND
ELEVATION = 1476.674' (NAVD 1929)

REF.	REVISIONS	ENGINEER APPR.	RCFC/ DATE	RCFC/ APPR.	DATE
2	CHANGED SLOPE TO 0.00%, ADDED MH, ADDED 10"S, CHANGED 42"LAT TO 24"LAT, ADDED EX. UTILITIES, RELOCATE UTILITIES, REV. SD.	H.A	2/6/16		2/23/16
1	CHANGED C.I.P. RCB TO PRECAST RCB APWA 330-0	H.A	2/6/16		2/23/16

DESIGNED BY: BW
DRAWN BY: ET
DATE DRAWN:

APPROVED BY:
Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173
HAIDOOK I. AGHAIAN Date: 11/18/14 RCE NO. 43293

REGISTERED PROFESSIONAL ENGINEER HAIDOOK L AGHAIAN R.C.E. NO. 43293 Exp. 3-31-16 CIVIL STATE OF CALIFORNIA

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: DATE: 11/20/2015
APPROVED BY: Mark H. Wills DATE: 11/20/2015

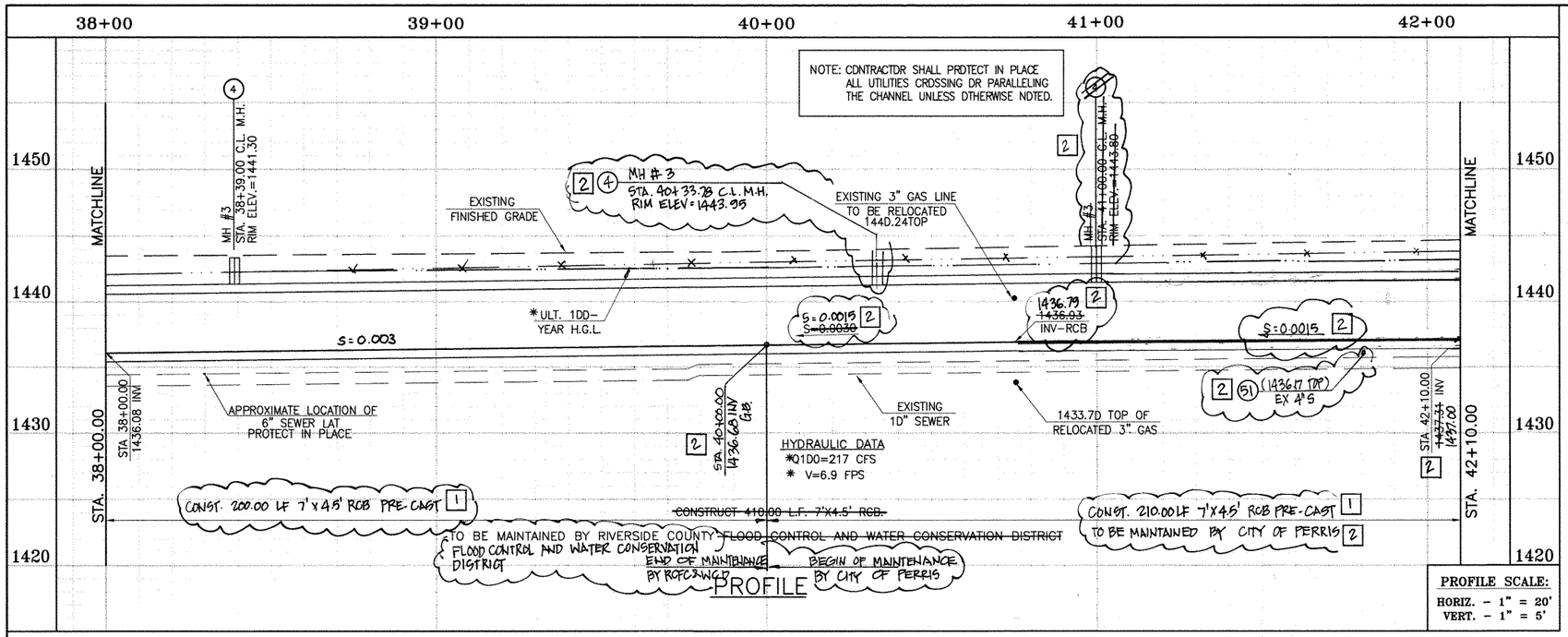
CITY OF PERRIS
APPROVED BY:
CITY ENGINEER DATE: 12-15-14
RECOMMENDED DATE:

PERRIS VALLEY MDP LINE "A-B"

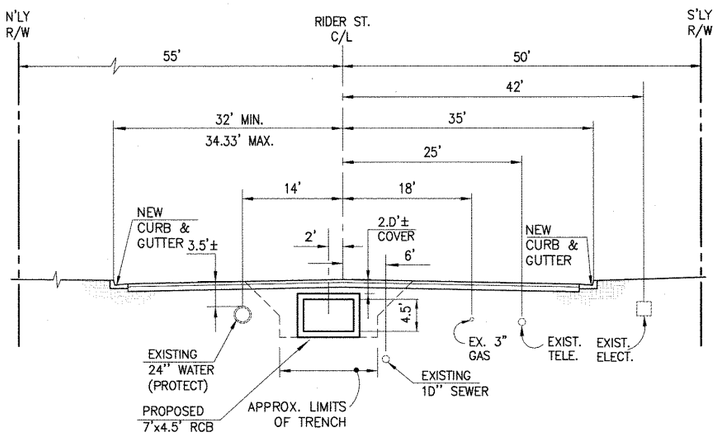
FROM STA. 34+00 TO STA. 38+00

CITY OF PERRIS FILE NO. P8-1013
PROJECT NO. 4-0-00537
DRAWING NO. 4-1063
SHEET NO. 8 OF 18

Last Update: 11/18/14
O:\2700-2799\2702\2702F\2702SD08.dwg

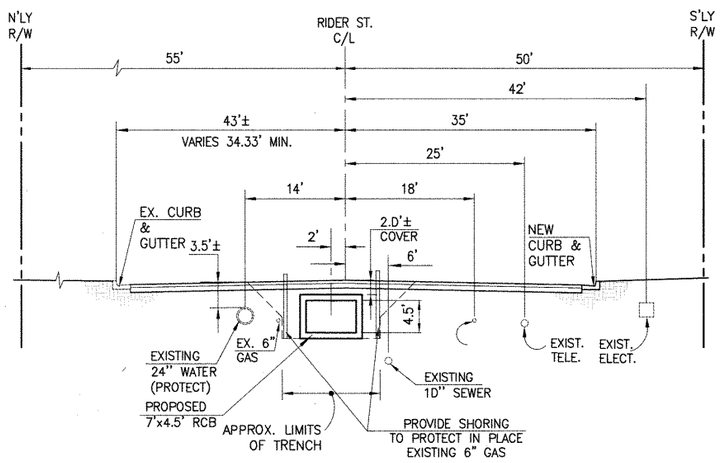


PROFILE SCALE:
HORIZ. - 1" = 20'
VERT. - 1" = 5'



SECTION AT STA. 40+00.00
FROM STA 38+00 TO STA 41+14.24

SCALE:1"=10'

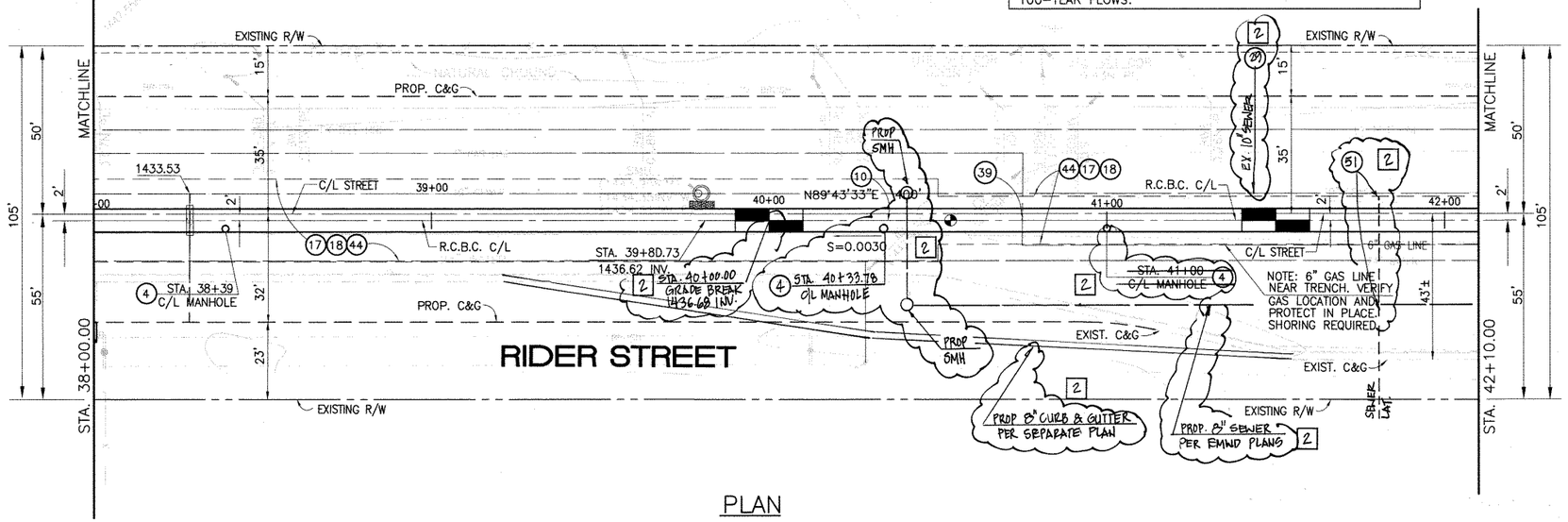


SECTION AT STA. 41+50.00
FROM STA 41+14.24 TO STA 42+10

SCALE:1"=10'

CAUTION:
PROPOSED WORK IS IN PROXIMITY OF HIGH PRESSURE GAS LINES

✳ THE ULTIMATE H.G.L. IS BASED ON THE ADOPTED MDP WATER SURFACE ELEVATION OF 1433 IN THE PERRIS VALLEY STORM CHANNEL (PVSC) AT RIDER STREET, AND ASSUMES THAT FULL CHANNEL IMPROVEMENTS HAVE BEEN CONSTRUCTED PER THE ADOPTED MDP. FOR ALL WATER SURFACE ELEVATIONS BETWEEN 1433 AND THE 100-YEAR FLOOD ELEVATION FOR PVSC (1437.5), LINE "A-B" WILL NOT HAVE CAPACITY FOR LOCAL 100-YEAR FLOWS.



PLAN

STORM DRAIN CONSTRUCTION NOTES:

4. CONSTRUCT MANHOLE #3 PER R.C.F.C.&W.C.D. STD DWG. MH253.
1 10. CONSTRUCT 7' X 4.5' ~~RCB PER CALTRANS STD PLAN D88~~ PRE-CAST RCB APWA STD PLAN 330-0 OR APPROVED EQUAL. SEE JOINT SEALANT NOTE ON SHT. 1.
17. SAWCUT AND REMOVE EXISTING A.C. PAVEMENT.
18. UTILITY TRENCH AND SURFACE REPAIR PER CITY STANDARD ON SHT. NO. 18, MODIFIED TO ACCOMMODATE SLURRY BACKFILL WHERE BOX COVER IS LESS THAN 2.D'.
28. CONSTRUCT SEWER PROTECTION PER R.C.F.C.&W.C.D. STD. DWG. M8D7.
44. SAWCUT, REMOVE AND REPLACE A.C. PAVEMENT SURFACE REPAIR PER CITY STD. ON SHEET 18. SEE SEPARATE PAVING PLANS.
29. PROTECT IN PLACE EXISTING UTILITIES.
2 51. REMOVE EXISTING SEWER LATERALS PER EMWD PLANS

0 10 20 40
SCALE:1"=20'

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

KEH 4/10/14

BENCH MARK
COUNTY OF RIVERSIDE BENCHMARK NO. "M-31"
COUNTY OF RIVERSIDE BENCHMARK - 3 1/4" ALUMINUM DISK MARKED M-31, LOCATED FLUSH AT THE SOUTH WEST CORNER OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB LOCATED AT THE CROSSING OF PERRIS BLVD. AND RIV. CO. FLOOD CONTROL CHANNEL (PERRIS LATERAL 7J), 43 FT. WEST OF CENTERLINE OF PERRIS BLVD. AND 4.5 FT. EAST OF CONCRETE BRIDGE BARRIER. (EDGE OF BRIDGE) MARKED R-102 D.W.R. IN TOP OF CONC. POST FLUSH W/ GROUND
ELEVATION = 1474.674' (NAVD 1929)

REF.	DESCRIPTION	ENGINEER APPR.	ENGINEER DATE	RCFC/ APPR.	RCFC/ DATE
2	CHANGED SLOPE TO 0.0015, ADDED MH, MODIFIED VIEW				
	10"S CHANGED 42"LAT TO 24"LAT, ADDED EX. UTILITIES, RELOCATE UTILITIES, REV. S.D.	H.I.A.	2/3/16	DG	2/23/16
1	CHANGED C.I.P. RCB TO PRE-CAST RCB APWA 330-0	H.I.A.	2/3/16	DG	2/23/16

DESIGNED BY: BW
DRAWN BY: ET
DATE DRAWN:

APPROVED BY:
Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173
Haidook L. Aghaian Date: 11/18/14
HAIDOOK I. AGHAIAN RCE NO. 43293

REGISTERED PROFESSIONAL ENGINEER HAIDOOK L. AGHAIAN R.C.E. NO. 43293 Exp. 3-31-16 CIVIL STATE OF CALIFORNIA

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL: DATE: 1/26/2015
APPROVED BY: Mark H. Wills DATE: 1/20/2015

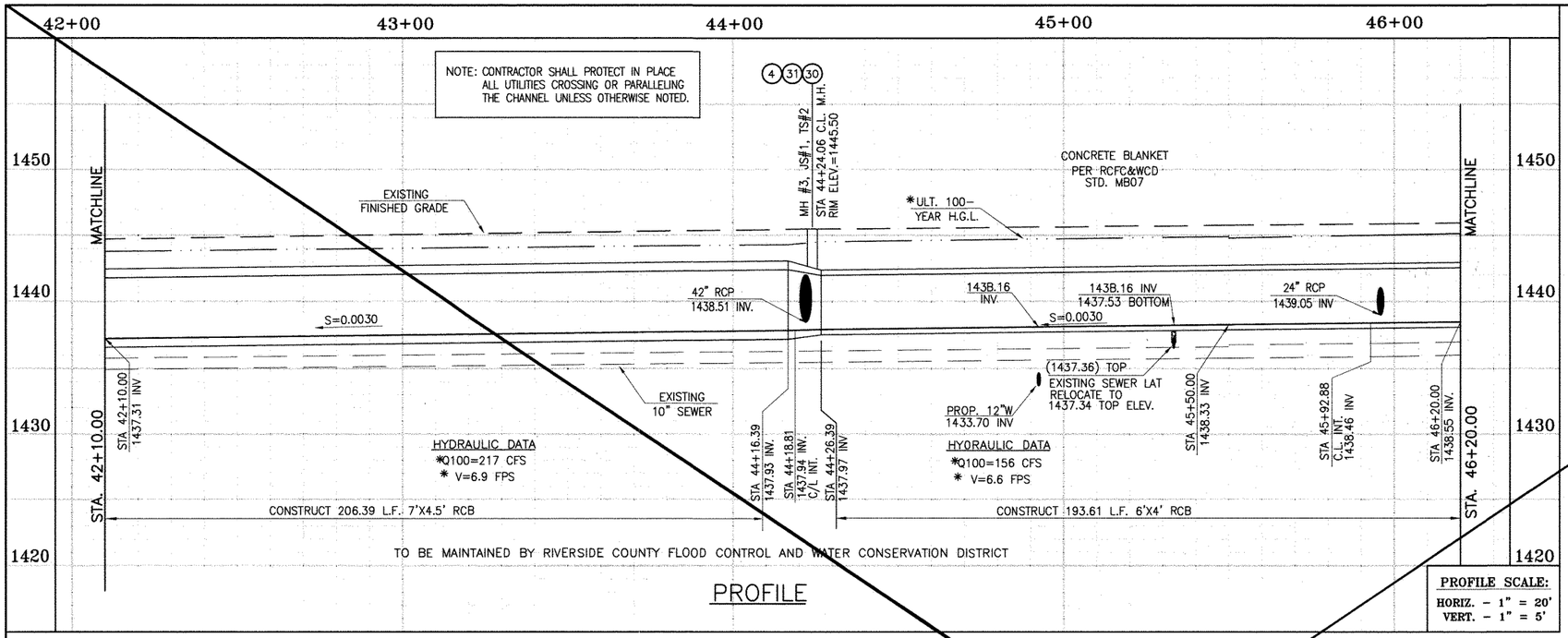
CITY OF PERRIS
APPROVED BY:
CITY ENGINEER DATE: 12-15-14
RECOMMENDED DATE:

CITY OF PERRIS
FILE NO. P8-1013

PERRIS VALLEY MDP
LINE "A-B"
FROM STA. 38+00 TO STA. 42+00

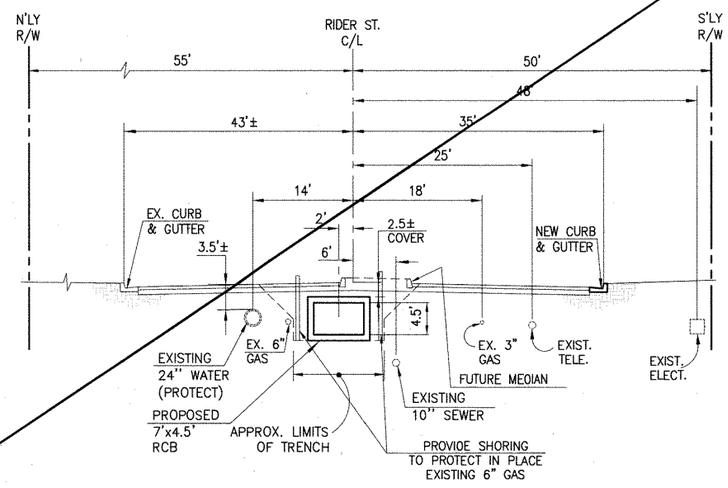
PROJECT NO. 4-0-00537
DRAWING NO. 4-1063
SHEET NO. 9 OF 18

Last Update: 11/18/14
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PROFILE

PROFILE SCALE:
HORIZ. - 1" = 20'
VERT. - 1" = 5'

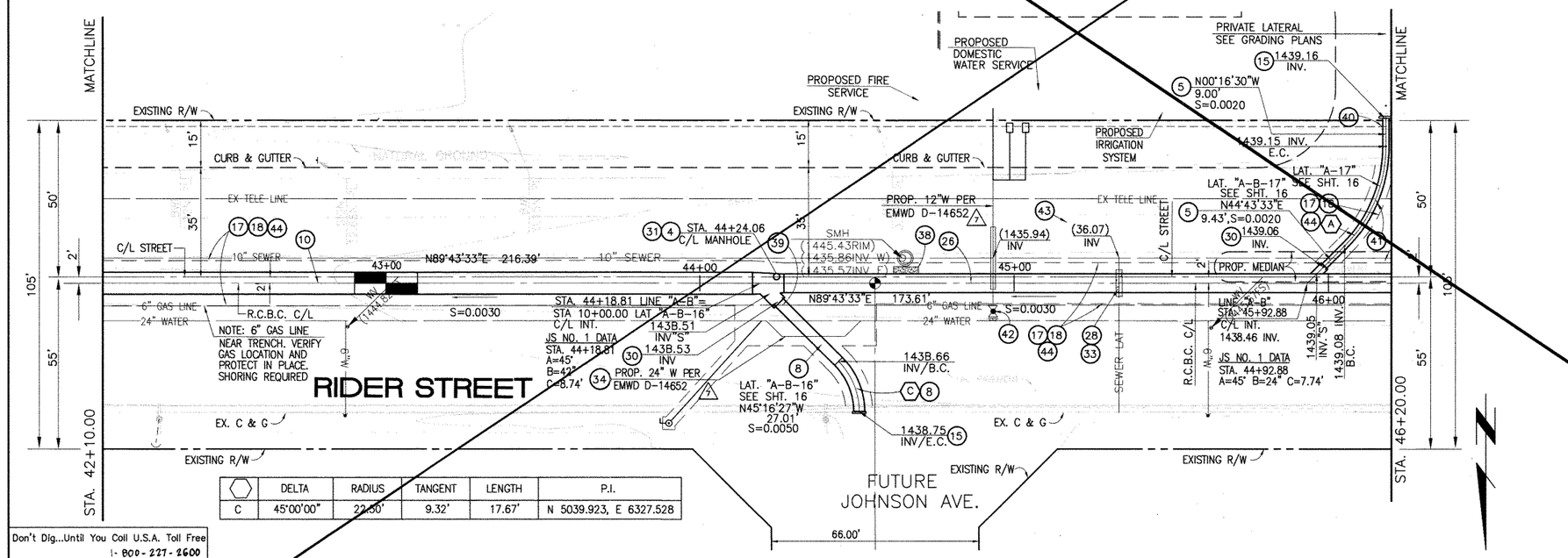


SECTION AT STA. 43+00.00

FROM STA 42+10.00 TO STA 45+77.27

0 5 10 20
SCALE:1"=10'

CAUTION:
PROPOSED WORK IS IN PROXIMITY OF HIGH PRESSURE GAS LINES



	DELTA	RADIUS	TANGENT	LENGTH	P.I.
C	45°00'00"	22.50'	9.32'	17.67'	N 5039.923, E 6327.528

PLAN

0 10 20 40
SCALE:1"=20'

✳ THE ULTIMATE H.G.L. IS BASED ON THE ADOPTED MDP WATER SURFACE ELEVATION OF 1433 IN THE PERRIS VALLEY STORM CHANNEL (PVSC) AT RIDER STREET, AND ASSUMES THAT FULL CHANNEL IMPROVEMENTS HAVE BEEN CONSTRUCTED PER THE ADOPTED MDP. FOR ALL WATER SURFACE ELEVATIONS BETWEEN 1433 AND THE 100-YEAR FLOOD ELEVATION FOR PVSC (1437.5), LINE "A-B" WILL NOT HAVE CAPACITY FOR LOCAL 100-YEAR FLOWS.

STORM DRAIN CONSTRUCTION NOTES:

(4) CONSTRUCT MANHOLE NO. 3 PER R.C.F.C.&W.C.O. STD OWG. MH253
(5) CONSTRUCT 24" R.C.P, D-LOAD PER PLAN.
(7) CONSTRUCT 36" R.C.P, D-LOAD PER PLAN.
(8) CONSTRUCT 42" R.C.P, D-LOAD PER PLAN.
(10) CONSTRUCT 7' x 4.5' RCB PER CALTRANS STD PLAN NO. DB0 OR APPROVED EQUAL.
(15) CONSTRUCT CONCRETE BULKHEAD PER R.C.F.C.&W.C.O. STD OWG. M816.
(17) SAWCUT AND REMOVE EXISTING A.C. PAVEMENT.
(18) UTILITY TRENCH AND SURFACE REPAIR PER CITY STANDARD ON SHT. NO. 18, MODIFIED TO ACCOMMODATE SLURRY BACKFILL WHERE BOX COVER IS LESS THAN 2.0'.
(26) CONSTRUCT 6' X 4' RCB PER CALTRANS STD PLAN NO. DB0. OR APPROVED EQUAL.
(28) CONSTRUCT SEWER PROTECTION PER R.C.F.C.&W.C.O. STD. OWG. M807.
(30) CONSTRUCT JUNCTION STRUCTURE NO.1 PER R.C.F.C.&W.C.D. STD. DWG. JS226.
(31) CONSTRUCT TRANSITION STRUCTURE NO. 2 PER R.C.F.C.&W.C.D. STD. DWG. TS302.
(33) RELOCATE EXISTING 6" SEWER LAT. PER E.M.W.D. PLANES
(34) RELOCATE EXISTING WATER LINE PER E.M.W.D. PLANS.
(3B) SLURRY BACKFILL BETWEEN RCB AND MANHOLE.
(39) RELOCATE EXISTING GAS LINE.
(40) RELOCATE EXISTING ELECTRICAL LINE.
(41) RELOCATE EXISTING TELEPHONE LINE.
(42) CONSTRUCT PROPOSED 12" WATER MAIN, PER E.M.W.D. PLANS.
(43) CONSTRUCT PROPOSED 6" SEWER LATERAL, PER E.M.W.D. PLANS.
(44) SAWCUT, REMOVE AND REPLACE A.C. PAVEMENT SURFACE REPAIR PER CITY STD. ON SHEET 18. SEE SEPARTE PAVING PLANS.

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

BENCH MARK
COUNTY OF RIVERSIDE BENCHMARK NO. "M-31"
COUNTY OF RIVERSIDE BENCHMARK 3 1/4" ALUMINUM DISK MARKED M-31, LOCATED FLUSH AT THE SOUTH WEST CORNER OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB LOCATED AT THE CROSSING OF PERRIS BLVD. AND RIV. CO. FLOOD CONTROL CHANNEL (PERRIS LATERAL "A") 43 FT. WEST OF CENTERLINE OF PERRIS BLVD. AND 4.5 FT. EAST OF CONCRETE BRIDGE BARRIER. (EDGE OF BRIDGE) MARKED B.M.#10 D.M.R. IN TOP OF CONC. POST FLUSH W/ GROUND
ELEVATION = 1474.674' (NAVD 1929)

REF.	REVISIONS	ENGINEER	DATE	RCFC/	DATE
	SHEET SUPERSEDED BY 10A	#14	2/25/16	06	2/25/16

DESIGNED BY: BW
DRAWN BY: ET
DATE DRAWN:

APPROVED BY:
Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173
HAIDOOK I. AGHAIAN Date: 11/18/14
HAIDOOK I. AGHAIAN RCE NO. 43293

REGISTERED PROFESSIONAL ENGINEER HAIDOOK I. AGHAIAN R.C.E. NO. 43293 Exp. 3-31-16 CIVIL STATE OF CALIFORNIA

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: DATE: 1/20/2015
APPROVED BY: DATE: 1/20/2015

CITY OF PERRIS
APPROVED BY:
CITY ENGINEER DATE: 12-15-14
RECOMMENDED DATE:

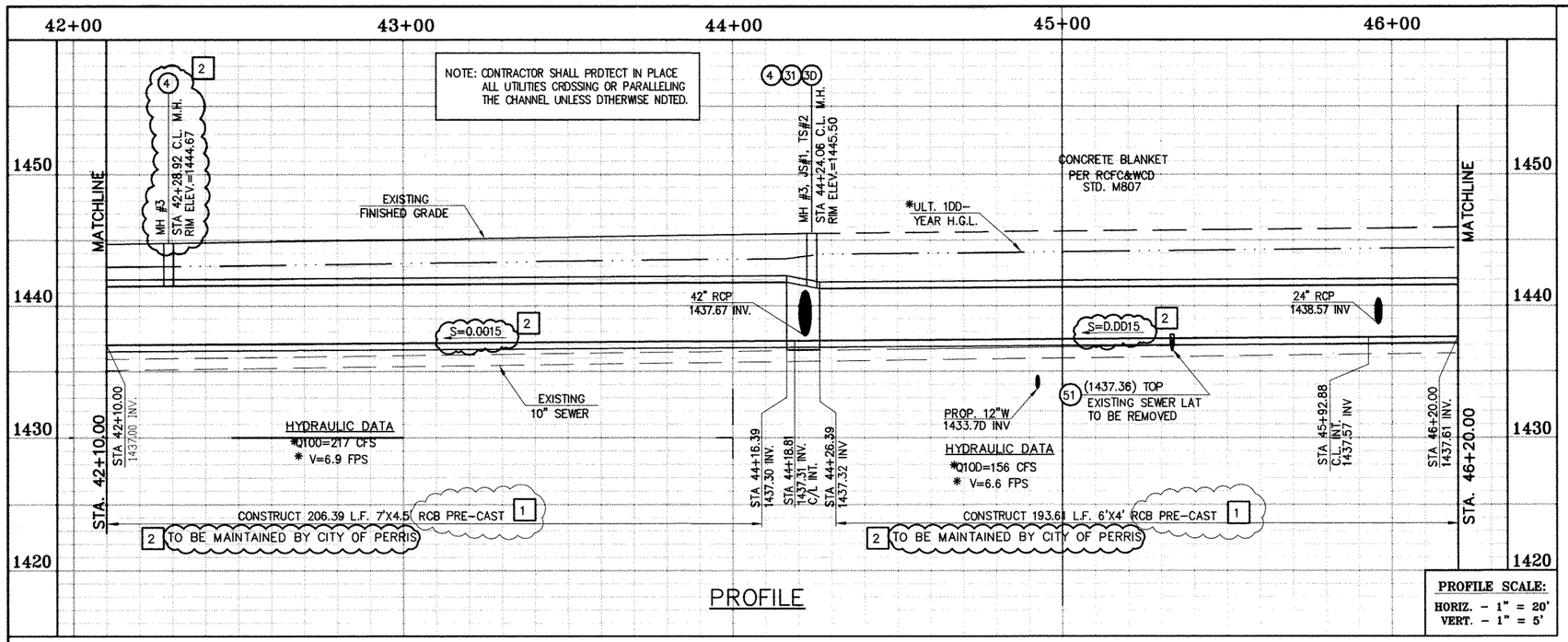
CITY OF PERRIS
FILE NO. P8-1013

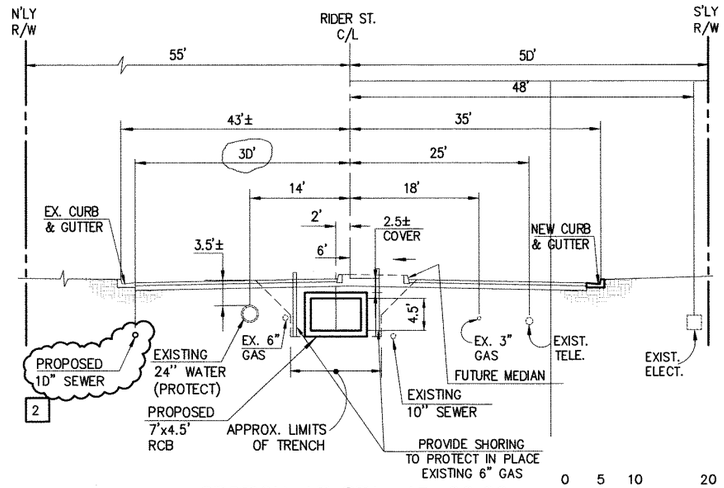
PERRIS VALLEY MDP LINE "A-B"

FROM STA. 42+10 TO STA. 46+20

PROJECT NO. 4-0-00537
DRAWING NO. 4-1063
SHEET NO. 10 OF 18

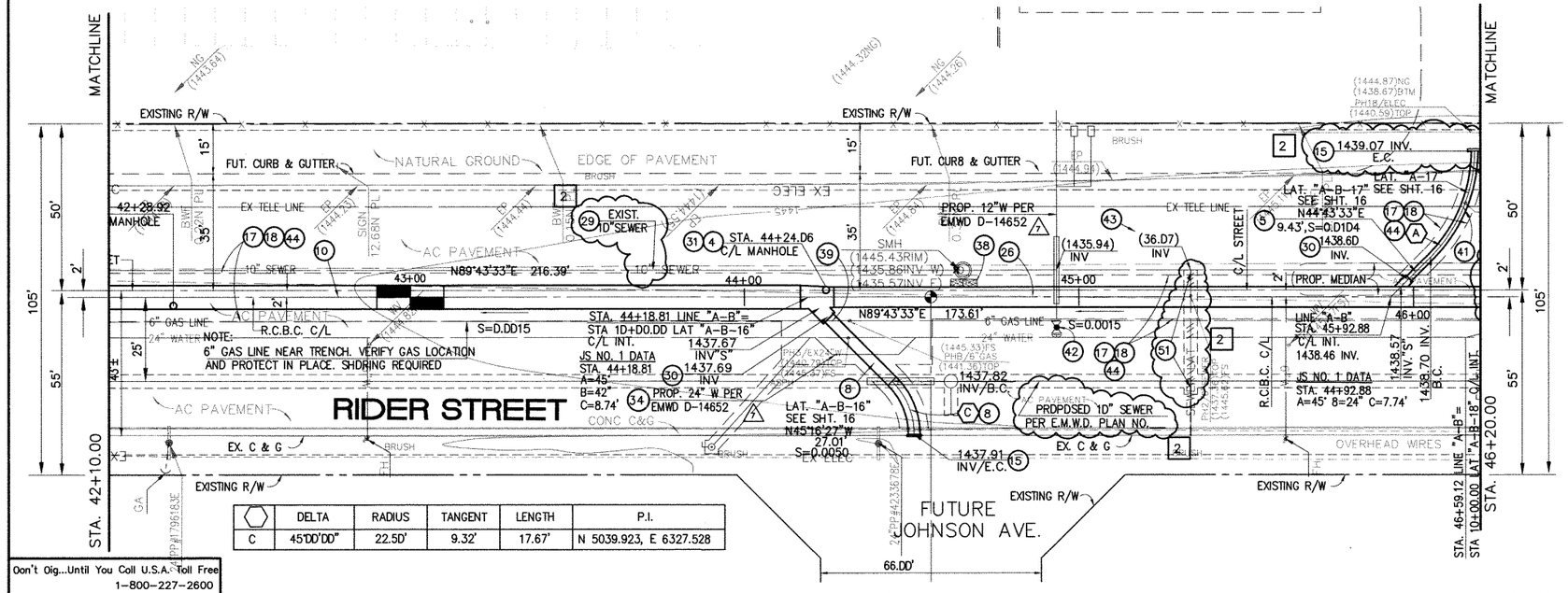
Last Update: 11/18/14
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✳ THE ULTIMATE H.G.L. IS BASED ON THE ADOPTED MDP WATER SURFACE ELEVATION OF 1433 IN THE PERRIS VALLEY STORM CHANNEL (PVSC) AT RIDER STREET, AND ASSUMES THAT FULL CHANNEL IMPROVEMENTS HAVE BEEN CONSTRUCTED PER THE ADOPTED MDP. FOR ALL WATER SURFACE ELEVATIONS BETWEEN 1433 AND THE 100-YEAR FLOOD ELEVATION FOR PVSC (1437.5), LINE "A-B" WILL NOT HAVE CAPACITY FOR LOCAL 100-YEAR FLOWS.

CAUTION: PROPOSED WORK IS IN PROXIMITY OF HIGH PRESSURE GAS LINES



	DELTA	RADIUS	TANGENT	LENGTH	P.I.
C	45°DD'DD"	22.5D'	9.32'	17.67'	N 5039.923, E 6327.528

PLAN

0 10 20 40
SCALE: 1"=20'

STORM DRAIN CONSTRUCTION NOTES:

(4) CONSTRUCT MANHOLE NO. 3 PER R.C.F.C.&W.C.D. STD DWG. MH253
(5) CONSTRUCT 24" R.C.P, D-LOAD PER PLAN.
(7) CONSTRUCT 36" R.C.P, D-LOAD PER PLAN.
(8) CONSTRUCT 42" R.C.P, D-LOAD PER PLAN.
[1] (10) CONSTRUCT 7' X 4.5' PRE-CAST RCB APWA STD PLAN 39D-D OR APPROVED EQUAL. SEE JOINT SEALANT NOTE ON SHEET #1.
(15) CONSTRUCT CONCRETE BULKHEAD PER R.C.F.C.&W.C.D. STD DWG. M816.
(17) SAWCUT AND REMOVE EXISTING A.C. PAVEMENT.
(18) UTILITY TRENCH AND SURFACE REPAIR PER CITY STANDARD ON SHT. NO. 18, MODIFIED TO ACCOMMODATE SLURRY BACKFILL WHERE BOX COVER IS LESS THAN 2.0'
[1] (26) CONSTRUCT 6' X 4' PRE-CAST RCB APWA STD PLAN 39D-D OR APPOVED EQUAL. SEE JOINT SEALANT NOTE ON SHEET #1.
(28) CONSTRUCT SEWER PROTECTION PER R.C.F.C.&W.C.D. STD. DWG. M8D7.
(29) PROTECT IN PLACE EXISTING UTILITIES
(30) CONSTRUCT JUNCTION STRUCTURE NO.1 PER R.C.F.C.&W.C.D. STD. DWG. JS226.
(31) CONSTRUCT TRANSITION STRUCTURE NO. 2 PER R.C.F.C.&W.C.D. STD. DWG. TS3D2.
(33) RELOCATE EXISTING 6" SEWER LAT. PER E.M.W.D. PLANS
(34) RELOCATE EXISTING WATER LINE PER E.M.W.D. PLANS.
(38) SLURRY BACKFILL BETWEEN RCB AND MANHOLE.
(39) RELOCATE EXISTING GAS LINE.
(40) RELOCATE EXISTING ELECTRICAL LINE.
(41) RELOCATE EXISTING TELEPHONE LINE.
(42) CONSTRUCT PROPOSED 12" WATER MAIN, PER E.M.W.D. PLANS.
(43) CONSTRUCT PROPOSED 6" SEWER LATERAL, PER E.M.W.D. PLANS.
(44) SAWCUT, REMOVE AND REPLACE A.C. PAVEMENT SURFACE REPAIR PER CITY STD. ON SHEET 18. SEE SEPARTE PAVING PLANS.
(51) REMOVE EXISTING SEWER LATERALS PER E.M.W.D. PLANS.
[2]

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

BENCH MARK
COUNTY OF RIVERSIDE BENCHMARK NO. "M-31"
COUNTY OF RIVERSIDE BENCHMARK - 3 1/4" ALUMINUM DISK MARKED M-31, LOCATED FLUSH AT THE SOUTH WEST CORNER OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB LOCATED AT THE CROSSING OF PERRIS BLVD. AND RIV. CO. FLOOD CONTROL CHANNEL (PERRIS LATERAL "A") 43 FT. WEST OF CENTERLINE OF PERRIS BLVD. AND 4.5 FT. EAST OF CONCRETE BRIDGE BARRIER. (EDGE OF BRIDGE) MARKED R-102 D.M.R. IN TOP OF CONC. POST FLUSH W/ GROUND
ELEVATION = 1474.674' (NAVD 1929)

REF.	REVISIONS	ENGINEER APPR.	ENGINEER DATE	RCFC/ APPR.	RCFC/ DATE
[2]	CHANGED SLOPE TO 0.0015, ADDED MH, ADDED NEW 10"S, CHANGED 42" LAT TO 24" LAT ADDED EX. UTILITIES, RELOCATE UTILITIES, REVISED SD	H.I.A	2/29/16	96	2/27/16
[1]	CHANGED CAST IN PLACE RCB TO PRE-CAST RCB PER APWA 390-0	H.I.A	2/29/16	96	2/27/16

DESIGNED BY:
DRAWN BY:
DATE DRAWN:

APPROVED BY:
Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173
Haidook I. Aghaian Date: 2/1/16
HAIDOOK I. AGHAIAN RCE NO. 43293

REGISTERED PROFESSIONAL ENGINEER HAIDOOK I. AGHAIAN R.C.E. NO. 43293 Exp. 3-31-16 CIVIL STATE OF CALIFORNIA

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

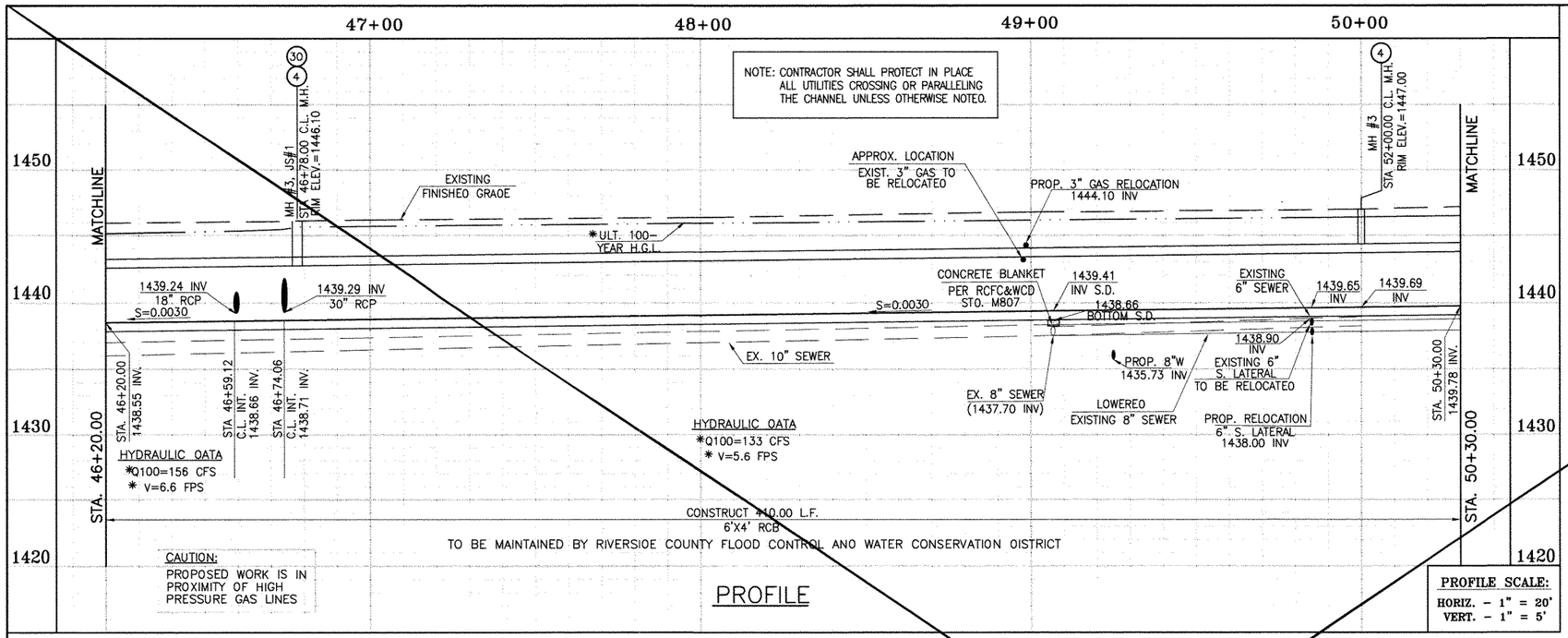
CITY OF PERRIS
APPROVED BY:
CITY ENGINEER DATE: 2-9-16
RECOMMENDED DATE:

CITY OF PERRIS
FILE NO. P8-1013

PERRIS VALLEY MDP LINE "A-B"
FROM STA. 42+10 TO STA. 46+20

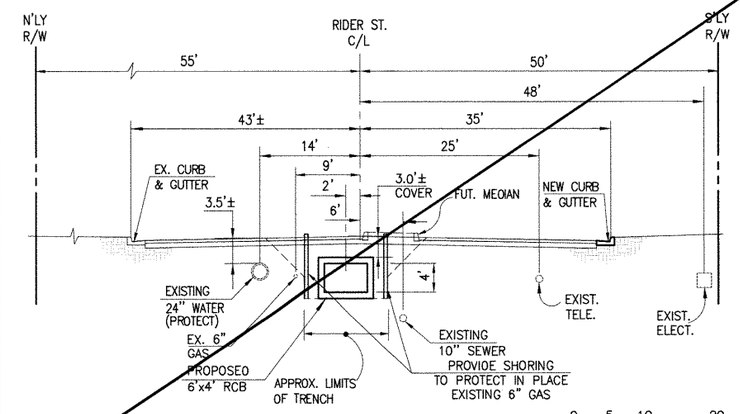
PROJECT NO. 4-0-00537
DRAWING NO. 4-1063
SHEET NO. 10A OF 18

Last Update: 1/29/16
O:\2700-2799\2702\2702F\2702SD10.dwg



PROFILE

PROFILE SCALE:
HORIZ. - 1" = 20'
VERT. - 1" = 5'

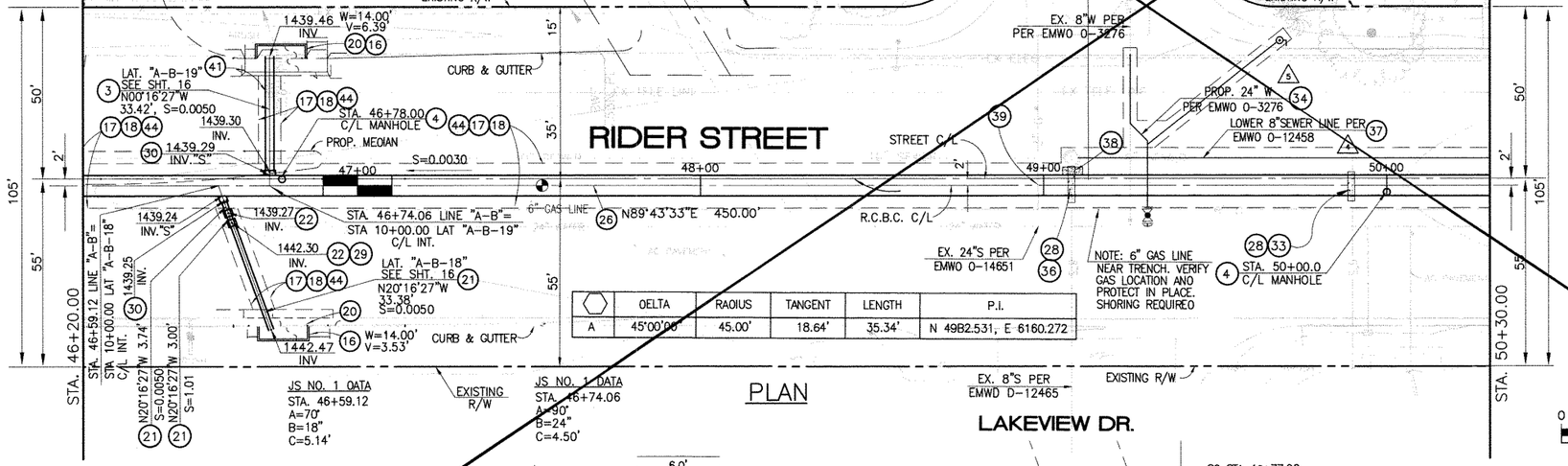


SECTION AT STA. 47+00.00

FROM STA 46+67.27 TO STA 47+76.81

SCALE:1"=10'

* THE ULTIMATE H.G.L. IS BASED ON THE ADOPTED MDP WATER SURFACE ELEVATION OF 1433 IN THE PERRIS VALLEY STORM CHANNEL (PVSC) AT RIDER STREET, AND ASSUMES THAT FULL CHANNEL IMPROVEMENTS HAVE BEEN CONSTRUCTED PER THE ADOPTED MDP. FOR ALL WATER SURFACE ELEVATIONS BETWEEN 1433 AND THE 100-YEAR FLOOD ELEVATION FOR PVSC (1437.5), LINE "A-B" WILL NOT HAVE CAPACITY FOR LOCAL 100-YEAR FLOWS.



	DELTA	RADIUS	TANGENT	LENGTH	P.I.
A	45°00'00"	45.00'	18.64'	35.34'	N 49B2.531, E 6160.272

PLAN

0 10 20 40
SCALE:1"=20'

C.B. @ LAT "A-B-19"

SCALE: 1"=5'

C.B. @ LAT "A-B-18"

SCALE:1"=5'

0 2.5 5 10
SCALE:1"=5'

STORM DRAIN CONSTRUCTION NOTES:

(3) CONSTRUCT 30" R.C.P, 0-LOAD PER PLAN.
(4) CONSTRUCT MANHOLE NO.3 PER R.C.F.C.&W.C.D. STD OWG. MH253
(16) CONSTRUCT CATCH BASIN NO.1 PER R.C.F.C.&W.C.D. STD. OWG. CB100
(17) SAWCUT AND REMOVE EXISTING A.C. PAVEMENT.
(18) UTILITY TRENCH AND SURFACE REPAIR PER CITY STANDARD ON SHT. NO. 18, MODIFIED TO ACCOMMODATE SLURRY BACKFILL WHERE BOX COVER IS LESS THAN 2.0'.
(20) CONSTRUCT LOCAL DEPRESSION NO. 2 CASE "B" PER R.C.F.C.&W.C.D. STD. OWG. L0201.
(21) CONSTRUCT 18" R.C.P, 0-LOAD PER PLAN.
(22) CONSTRUCT CONCRETE COLLAR PER R.C.F.C.&W.C.D. STD OWG. M803.
(26) CONSTRUCT 6' X 4' RCB PER CALTRANS STD PLAN NO. 080. OR APPROVED EQUAL.
(28) CONSTRUCT SEWER PROTECTION PER R.C.F.C.&W.C.D. STD. OWG. M807.
(29) PROTECT IN PLACE EXISTING UTILITY
(30) CONSTRUCT JUNCTION STRUCTURE NO.1 PER R.C.F.C.&W.C.D. STD. OWG. JS226.
(33) RELOCATE EXISTING SEWER LATERALS PER E.M.W.D. PLANS.
(34) RELOCATE EXISTING WATER LINE PER E.M.W.D. PLANS.
(36) INSTALL NEW SEWER LATERAL PER E.MW.D. PLANS.
(37) LOWER EXISTING SEWER MAIN PER E.M.W.D. PLANS.
(38) SLURRY BACKFILL BETWEEN RCB AND MANHOLE.
(39) RELOCATE EXISTING GAS LINE.
(41) RELOCATE EXISTING TELEPHONE LINE.
(44) SAWCUT, REMOVE AND REPLACE A.C. PAVEMENT SURFACE REPAIR PER CITY STD. ON SHEET 18. SEE SEPARATE PAVING PLANS.
(45) REMOVE EXISTING CONCRETE CURB AND GUTTER.

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

BENCH MARK
COUNTY OF RIVERSIDE BENCHMARK NO. "M-31"
COUNTY OF RIVERSIDE BENCHMARK 3-3 1/4" ALUMINUM DISK MARKED M-31, LOCATED FLUSH AT THE SOUTH WEST CORNER OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB LOCATED AT THE CROSSING OF PERRIS BLVD. AND RIV. CO. FLOOD CONTROL CHANNEL (PERRIS LATERAL 7-2) 43 FT. WEST OF CENTERLINE OF PERRIS BLVD. AND 4.5 FT. EAST OF CONCRETE BRIDGE BARRIER. (EDGE OF BRIDGE) MARKED PUNCH D.M.R. IN TOP OF CONC. POST FLUSH W/ GROUND.
ELEVATION = 1474.674' (NAVD 1929)

REF.	REVISIONS / DESCRIPTION	ENGINEER APPR.	RCFC/ DATE	APPR.	DATE
	SUPERSEDED BY SHEET 11A	H.L.A.	2/25/16	KFH	4/19/16

DESIGNED BY: BW
DRAWN BY: ET
DATE DRAWN:

APPROVED BY:
Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173
HAIDOOK I. AGHAIAN Date: 11/18/14
RCE NO. 43293

REGISTERED PROFESSIONAL ENGINEER HAIDOOK I. AGHAIAN R.C.E. NO. 43293 Exp. 3-31-16 CIVIL STATE OF CALIFORNIA

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: DATE: 1/20/2015
APPROVED BY: Mark A. Wills DATE: 1/20/2015

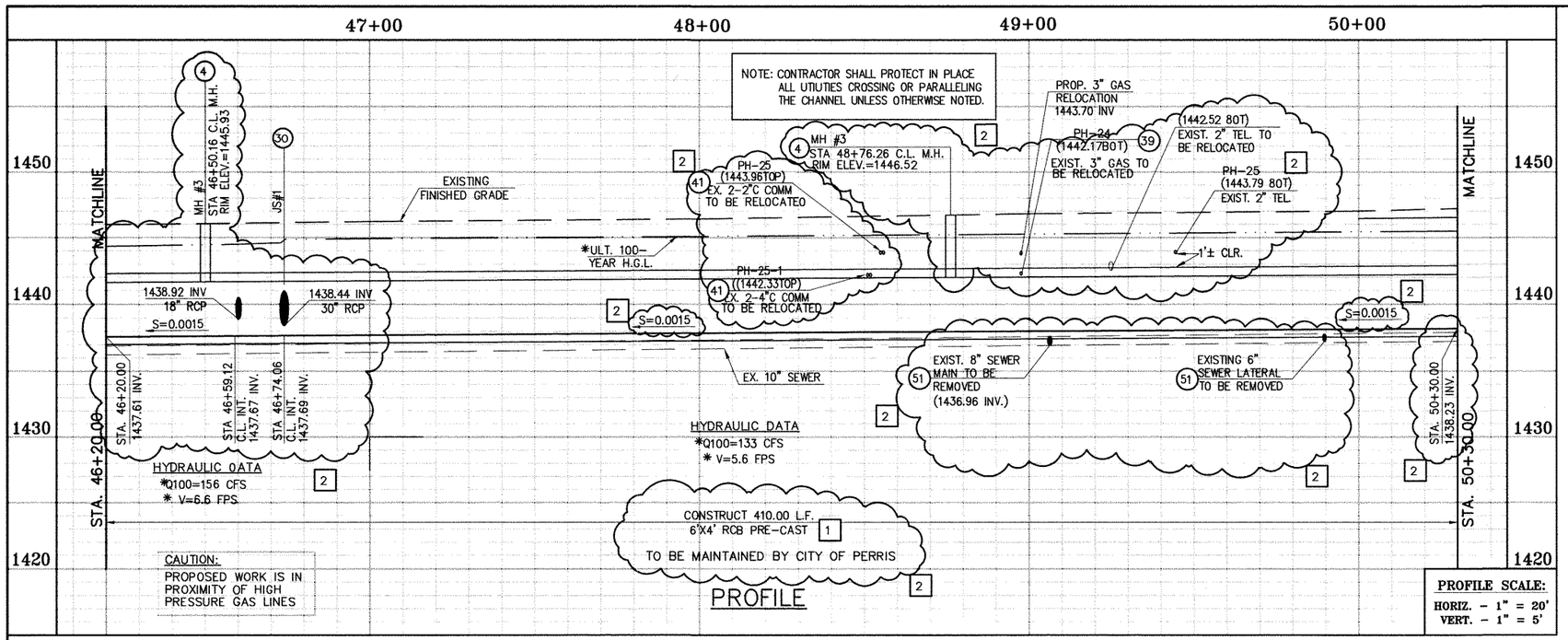
CITY OF PERRIS
APPROVED BY: CITY ENGINEER DATE: 12-15-14
RECOMMENDED DATE:

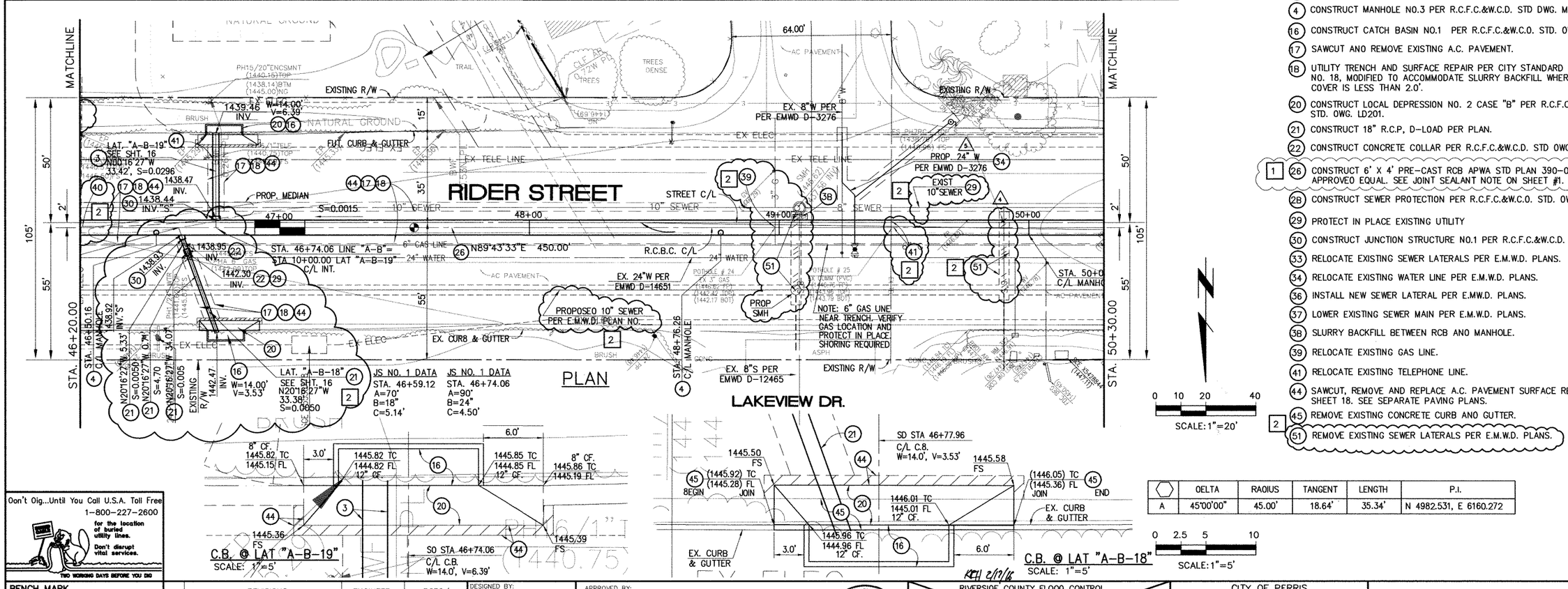
PERRIS VALLEY MDP LINE "A-B"

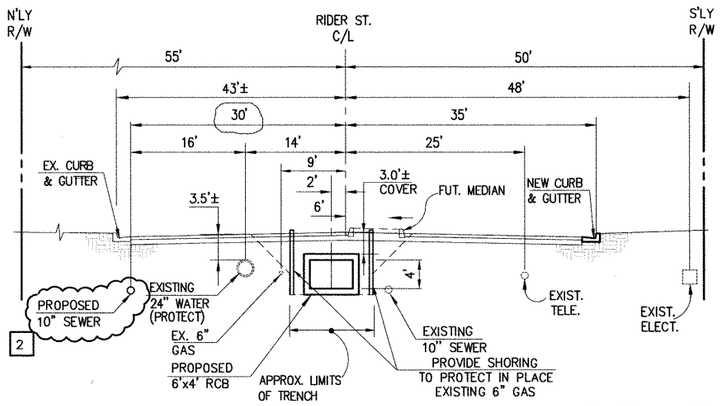
FROM STA. 46+20 TO STA. 50+30

CITY OF PERRIS FILE NO. P8-1013
PROJECT NO. 4-0-00537
DRAWING NO. 4-1063
SHEET NO. 11 OF 18

Last Update: 11/18/14
O:\2700-2799\2702\2702F\2702SD11.dwg







SECTION AT STA. 47+00.00

FROM STA 46+67.27 TO STA 47+76.81

✳ THE ULTIMATE H.G.L. IS BASED ON THE ADOPTED MDP WATER SURFACE ELEVATION OF 1433 IN THE PERRIS VALLEY STORM CHANNEL (PVSC) AT RIDER STREET, AND ASSUMES THAT FULL CHANNEL IMPROVEMENTS HAVE BEEN CONSTRUCTED PER THE ADOPTED MDP. FOR ALL WATER SURFACE ELEVATIONS BETWEEN 1433 AND THE 100-YEAR FLOOD ELEVATION FOR PVSC (1437.5), LINE "A-B" WILL NOT HAVE CAPACITY FOR LOCAL 100-YEAR FLOWS.

STORM DRAIN CONSTRUCTION NOTES:

(3) CONSTRUCT 30" R.C.P, D-LOAD PER PLAN.
(4) CONSTRUCT MANHOLE NO.3 PER R.C.F.C.&W.C.D. STD DWG. MH253
(16) CONSTRUCT CATCH BASIN NO.1 PER R.C.F.C.&W.C.D. STD. DWG. CB100
(17) SAWCUT AND REMOVE EXISTING A.C. PAVEMENT.
(18) UTILITY TRENCH AND SURFACE REPAIR PER CITY STANDARD ON SHT. NO. 18, MODIFIED TO ACCOMMODATE SLURRY BACKFILL WHERE BOX COVER IS LESS THAN 2.0'.
(20) CONSTRUCT LOCAL DEPRESSION NO. 2 CASE "B" PER R.C.F.C.&W.C.D. STD. DWG. LD201.
(21) CONSTRUCT 18" R.C.P, D-LOAD PER PLAN.
(22) CONSTRUCT CONCRETE COLLAR PER R.C.F.C.&W.C.D. STD DWG. M803.
[1] (26) CONSTRUCT 6' X 4' PRE-CAST RCB APWA STD PLAN 390-0 OR APPROVED EQUAL. SEE JOINT SEALANT NOTE ON SHEET #1.
(28) CONSTRUCT SEWER PROTECTION PER R.C.F.C.&W.C.D. STD. DWG. M807.
(29) PROTECT IN PLACE EXISTING UTILITY
(30) CONSTRUCT JUNCTION STRUCTURE NO.1 PER R.C.F.C.&W.C.D. STD. DWG. JS226.
(33) RELOCATE EXISTING SEWER LATERALS PER E.M.W.D. PLANS.
(34) RELOCATE EXISTING WATER LINE PER E.M.W.D. PLANS.
(36) INSTALL NEW SEWER LATERAL PER E.MW.D. PLANS.
(37) LOWER EXISTING SEWER MAIN PER E.M.W.D. PLANS.
(38) SLURRY BACKFILL BETWEEN RCB AND MANHOLE.
(39) RELOCATE EXISTING GAS LINE.
(41) RELOCATE EXISTING TELEPHONE LINE.
(44) SAWCUT, REMOVE AND REPLACE A.C. PAVEMENT SURFACE REPAIR PER CITY STD. ON SHEET 18. SEE SEPARATE PAVING PLANS.
(45) REMOVE EXISTING CONCRETE CURB AND GUTTER.
[2] (51) REMOVE EXISTING SEWER LATERALS PER E.M.W.D. PLANS.

	DELTA	RADIUS	TANGENT	LENGTH	P.I.
A	45°00'00"	45.00'	18.64'	35.34'	N 4982.531, E 6160.272

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

BENCH MARK
COUNTY OF RIVERSIDE BENCHMARK NO. "M-31"
COUNTY OF RIVERSIDE BENCHMARK - 3 1/4" ALUMINUM DISK MARKED M-31, LOCATED FLUSH AT THE SOUTH WEST CORNER OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB LOCATED AT THE CROSSING OF PERRIS BLVD. AND RIV. CO. FLOOD CONTROL CHANNEL (PERRIS LATERAL "A"), 43 FT. WEST OF CENTERLINE OF PERRIS BLVD. AND 4.5 FT. EAST OF CONCRETE BRIDGE BARRIER. (EDGE OF BRIDGE) MARKED R-102 D.W.R. IN TOP OF CONC. POST FLUSH W/ GROUND
ELEVATION = 1474.674' (NAVD 1929)

REF.	REVISIONS	ENGINEER APPR.	ENGINEER DATE	RCFC/ APPR.	RCFC/ DATE
2	CHANGED SLOPE TO 0.0015, ADDED MH, ADDED NEW 10"S, CHANGED 42" LAT TO 24" LAT. ADDED EX. UTILITIES, RELOCATE UTILITIES, REVISED SD	H.I.A.	2/29/16	[illegible]	4-21-16
1	CHANGED CAST IN PLACE RCB TO PRE-CAST RCB PER APWA 390-0	H.I.A.	2/29/16	[illegible]	4-21-16

DESIGNED BY:
DRAWN BY:
DATE DRAWN:

APPROVED BY:
Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173
Haidook Aghaian Date: 2/1/16
HAIDOOK I. AGHAIAN RCE NO. 43293

REGISTERED PROFESSIONAL ENGINEER HAIDOOK I. AGHAIAN R.C.E. NO. 43293 Exp. 3-31-16 CIVIL STATE OF CALIFORNIA

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

CITY OF PERRIS APPROVED BY:
CITY ENGINEER DATE: 2-9-16
RECOMMENDED DATE:

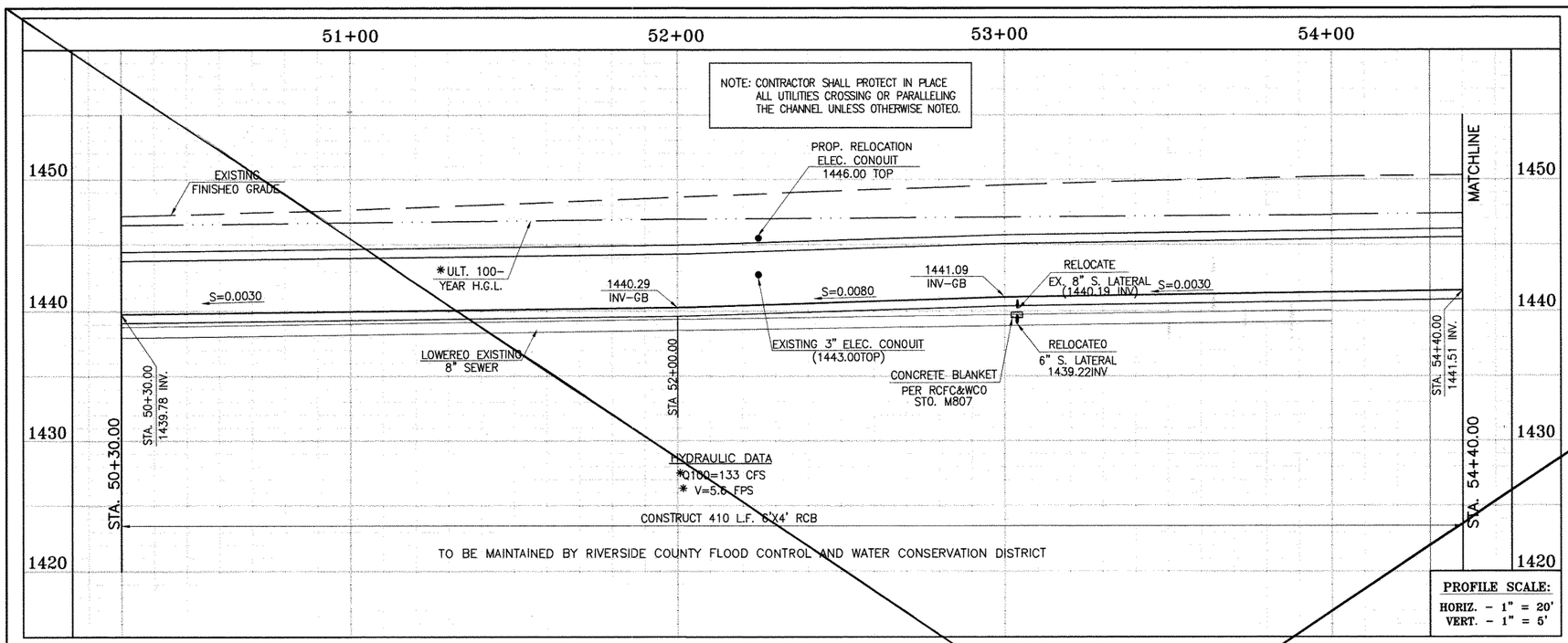
CITY OF PERRIS FILE NO. P8-1013

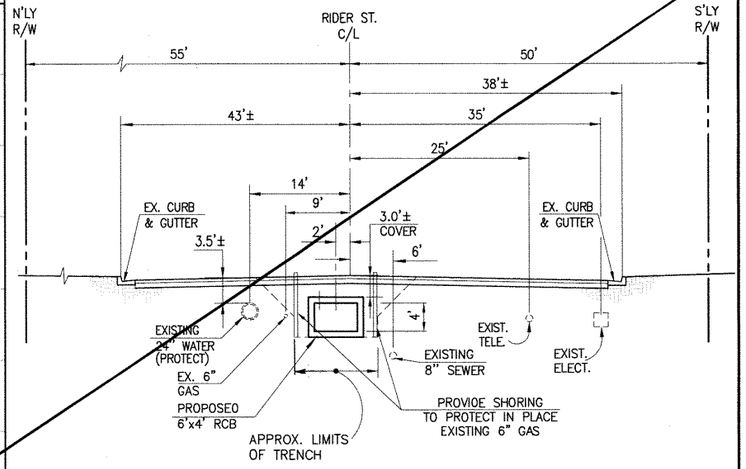
PERRIS VALLEY MDP LINE "A-B"

FROM STA. 46+20 TO STA. 50+30

PROJECT NO. 4-0-00537
DRAWING NO. 4-1063
SHEET NO. 11A OF 18

Last Update: 1/15/16
O:\2700-2799\2702\2702F\2702SD11.dwg





SECTION AT STA. 51+00

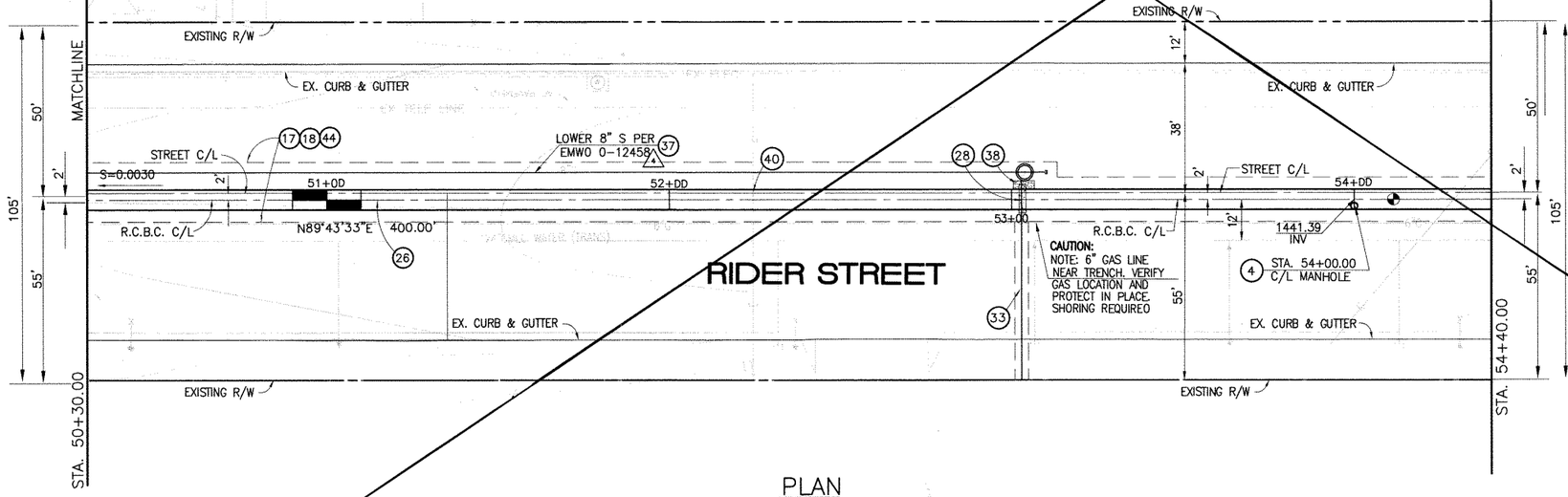
FROM STA 50+30.00 TO STA 54+40.00

0 5 10 20

SCALE:1"=10'

✳ THE ULTIMATE H.G.L. IS BASED ON THE ADOPTED MDP WATER SURFACE ELEVATION OF 1433 IN THE PERRIS VALLEY STORM CHANNEL (PVSC) AT RIDER STREET, AND ASSUMES THAT FULL CHANNEL IMPROVEMENTS HAVE BEEN CONSTRUCTED PER THE ADOPTED MDP. FOR ALL WATER SURFACE ELEVATIONS BETWEEN 1433 AND THE 100-YEAR FLOOD ELEVATION FOR PVSC (1437.5), LINE "A-B" WILL NOT HAVE CAPACITY FOR LOCAL 100-YEAR FLOWS.

CAUTION:
PROPOSED WORK IS IN PROXIMITY OF HIGH PRESSURE GAS LINES



PLAN

0 10 20 40

SCALE:1"=20'

STORM DRAIN CONSTRUCTION NOTES:

(4) CONSTRUCT MANHOLE NO. 3 PER R.C.F.C.&W.C.D. STD OWG. MH253

(17) SAWCUT AND REMOVE EXISTING A.C. PAVEMENT.

(18) UTILITY TRENCH AND SURFACE REPAIR PER CITY STANDARD ON SHT. NO. 18, MODIFIED TO ACCOMMODATE SLURRY BACKFILL WHERE BOX COVER IS LESS THAN 2.0'.

(26) CONSTRUCT 6' X 4' RCB PER CALTRANS STD. PLAN NO. 080 OR APPROVED EQUAL.

(28) CONSTRUCT SEWER PROTECTION PER R.C.F.C.&W.C.D. STD. OWG. M807.

(33) RELOCATE EXISTING 6" SEWER LATERAL PER E.M.W.D. PLANS.

(37) LOWER EXISTING 8" SEWER MAIN PER E.M.W.D. PLANS.

(38) SLURRY BACKFILL BETWEEN RCB AND MANHOLE.

(39) RELOCATE EXISTING GAS LINE.

(40) RELOCATE EXISTING ELECTRICAL LINE.

(44) SAWCUT, REMOVE AND REPLACE A.C. PAVEMENT SURFACE REPAIR PER CITY STD. ON SHEET 18. SEE SEPARATE PAVING PLANS.

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

BENCH MARK

COUNTY OF RIVERSIDE BENCHMARK NO. "M-31"
COUNTY OF RIVERSIDE BENCHMARK - 3 1/4" ALUMINUM DISK MARKED M-31, LOCATED FLUSH @ THE SOUTH WEST CORNER OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB LOCATED AT THE CROSSING OF PERRIS BLVD. AND RIV. CO. FLOOD CONTROL CHANNEL (PERRIS LATERAL "F"), 43 FT. WEST OF CENTERLINE OF PERRIS BLVD. AND 4.5 FT. EAST OF CONCRETE BRIDGE BARRIER. (EDGE OF BRIDGE) MARKED B-102 D.N.R. IN TOP OF CONC. POST FLUSH W/ GROUND
ELEVATION = 1474.674' (NAVD 1929)

REF.	REVISIONS	ENGINEER	DATE	RCFC/	DATE
	SUPERSEDED BY SHEET 12A	H.I.A.	2/26/14	[illegible]	2/27/14

DESCRIPTION | APPR. | DATE | APPR. | DATE

DESIGNED BY: BW
DRAWN BY: ET
DATE DRAWN:

APPROVED BY:
Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173
Haidook I. Aghaian Date: 11/18/14
HAIDOOK I. AGHAIAN RCE NO. 43293

REGISTERED PROFESSIONAL ENGINEER HAIDOOK I. AGHAIAN R.C.E. NO. 43293 Exp. 3-31-16 CIVIL STATE OF CALIFORNIA

KEH 4/10/14

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: DATE: 1/20/2015
APPROVED BY: Mark A. Wills DATE: 1/20/2015

CITY OF PERRIS
APPROVED BY:
CITY ENGINEER DATE: 12-15-14
RECOMMENDED DATE:

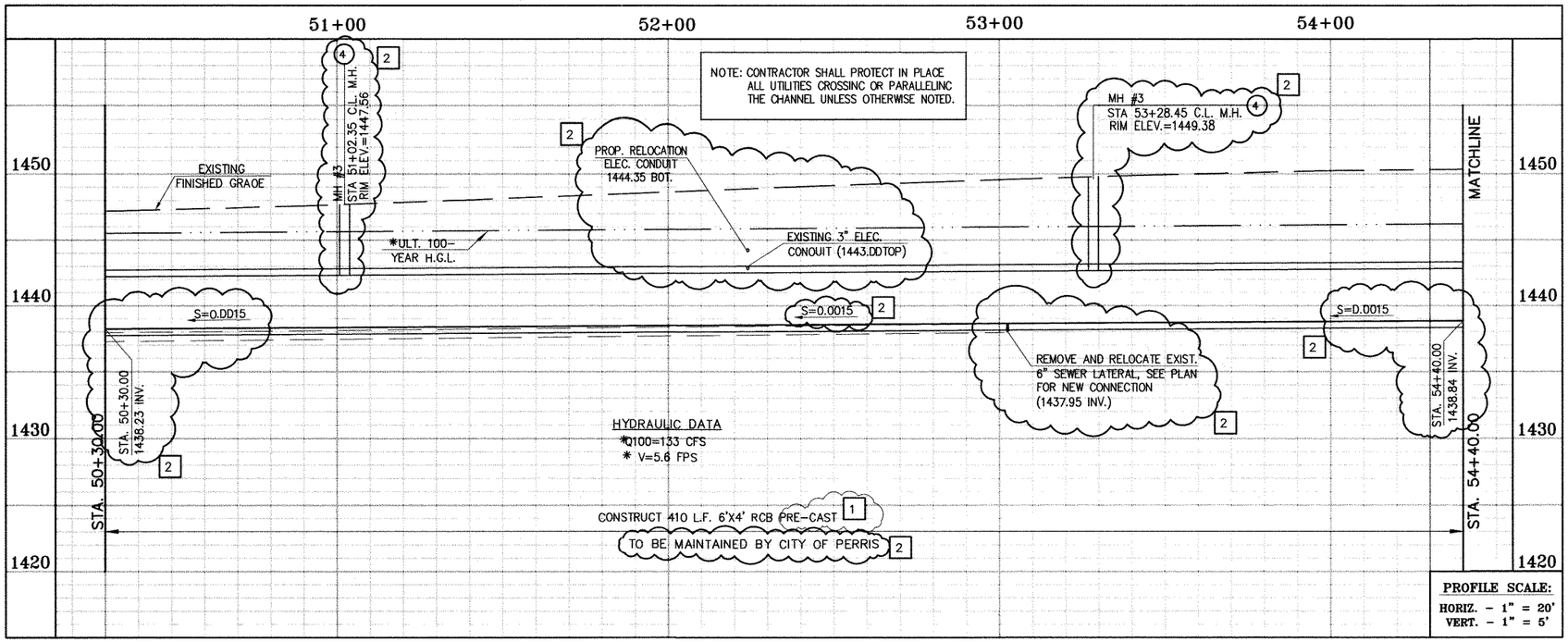
CITY OF PERRIS
FILE NO. P8-1013

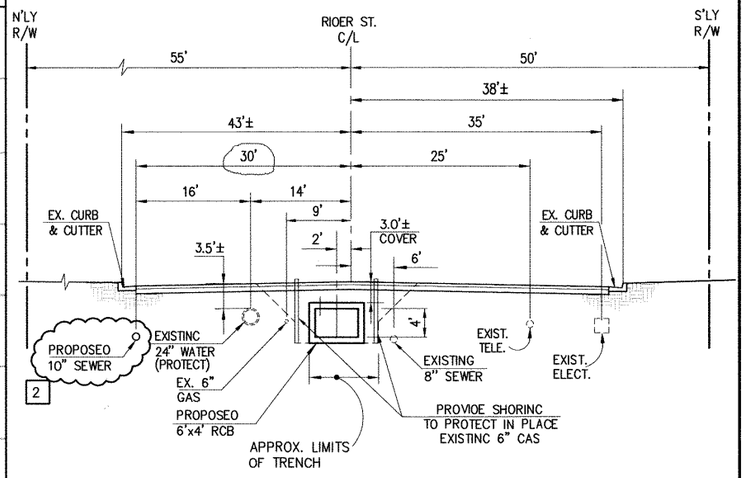
PERRIS VALLEY MDP LINE "A-B"

FROM STA. 50+30 TO STA. 54+40

PROJECT NO. 4-0-00537
DRAWING NO. 4-1063
SHEET NO. 12 OF 18

Last Update: 11/18/14
O:\2700-2799\2702\2702F\2702SD12.dwg





SECTION AT STA. 51+00.00

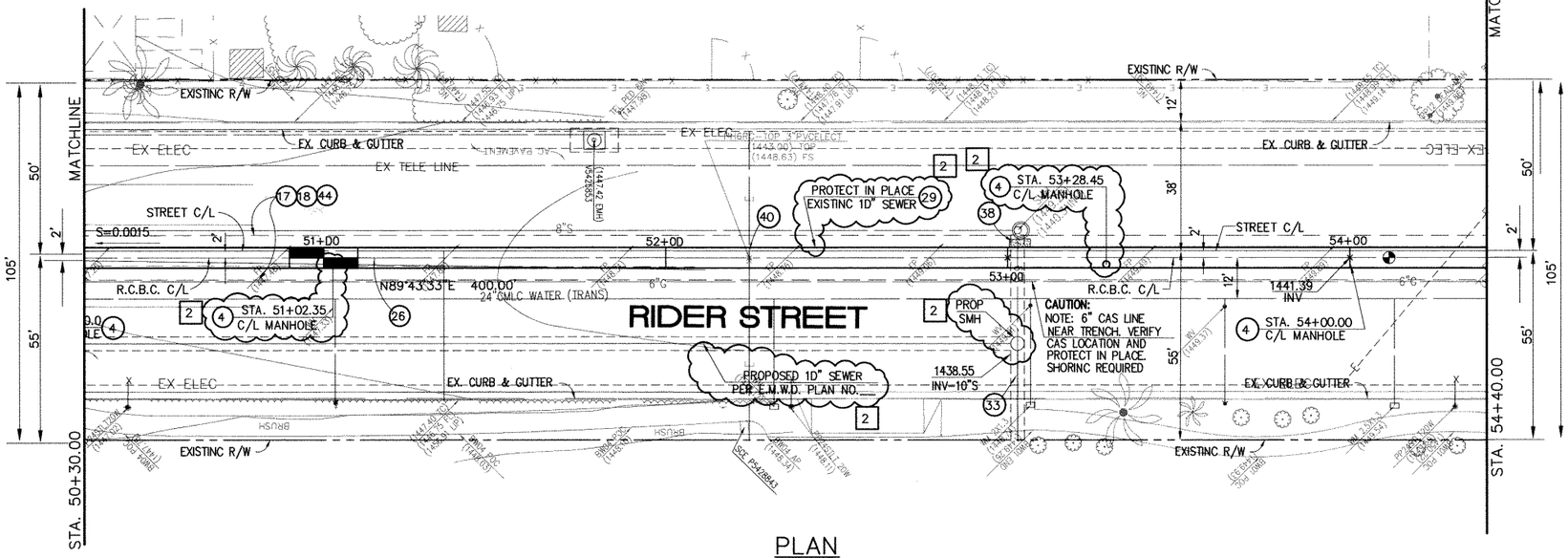
FROM STA 50+30.00 TO STA 54+40.00

0 5 10 20

SCALE: 1"=10'

CAUTION:
PROPOSED WORK IS IN PROXIMITY OF HIGH PRESSURE GAS LINES

✳ THE ULTIMATE H.G.L. IS BASED ON THE AOOPTEO MOP WATER SURFACE ELEVATION OF 1433 IN THE PERRIS VALLEY STORM CHANNEL (PVSC) AT RIOER STREET, AND ASSUMES THAT FULL CHANNEL IMPROVEMENTS HAVE BEEN CONSTRUCTEO PER THE AOOPTED MOP. FOR ALL WATER SURFACE ELEVATIONS BETWEEN 1433 ANO THE 100-YEAR FLOOO ELEVATION FOR PVSC (1437.5), LINE "A-B" WILL NOT HAVE CAPACITY FOR LOCAL 100-YEAR FLOWS.



PLAN

0 10 20 40

SCALE: 1"=20'

STORM DRAIN CONSTRUCTION NOTES:

(4) CONSTRUCT MANHOLE NO. 3 PER R.C.F.C.&W.C.O. STD DWC. MH253

(17) SAWCUT ANO REMOVE EXISTING A.C. PAVEMENT.

(18) UTILITY TRENCH AND SURFACE REPAIR PER CITY STANDARD ON SHT. NO. 18, MOOIFIEO TO ACCOMMOOATE SLURRY BACKFILL WHERE BOX COVER IS LESS THAN 2.0'.

[1] (26) CONSTRUCT 6' X 4' PRE-CAST RCB APWA STD PLAN 390-0 OR APPROVEO EQUAL. SEE JOINT SEALANT NOTE ON SHEET #1.

(28) CONSTRUCT SEWER PROTECTION PER R.C.F.C.&W.C.O. STD. OWG. M807.

(29) PROTECT IN PLACE EXISTINC UTILITY

(33) RELOCATE EXISTING 6" SEWER LATERAL PER E.M.W.O. PLANS.

(38) SLURRY BACKFILL BETWEEN RCB ANO MANHOLE.

(39) RELOCATE EXISTINC CAS LINE.

(40) RELOCATE EXISTINC ELECTRICAL LINE.

(44) SAWCUT, REMOVE AND REPLACE A.C. PAVEMENT SURFACE REPAIR PER CITY STD. ON SHEET 18. SEE SEPARATE PAVINC PLANS.

Don't Dig...Until You Coll U.S.A. Toll Free 1-800-227-2600



for the location of buried utility lines.
Don't disrupt vital services.
TWO WORKING DAYS BEFORE YOU DIG

BENCH MARK
COUNTY OF RIVERSIDE BENCHMARK NO. "H-31"
COUNTY OF RIVERSIDE BENCHMARK - 3 1/4" ALUMINUM DISK MARKED H-31, LOCATED FLUSH AT THE SOUTH WEST CORNER OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB LOCATED AT THE CROSSING OF PERRIS BLVD. AND RIV. CO. FLOOD CONTROL CHANNEL (PERRIS LATERAL "A") 43 FT. WEST OF CENTERLINE OF PERRIS BLVD. AND 4.5 FT. EAST OF CONCRETE BRIDGE BARRIER (EDGE OF BRIDGE) MARKED R-102 D.WR. IN TOP OF CONC. POST FLUSH W/ GROUND
ELEVATION = 1474.874' (NAVD 1929)

REF.	REVISIONS	ENGINEER APPR.	ENGINEER DATE	RCFC/ APPR.	RCFC/ DATE
2	CHANGED SLOPE TO 0.0015, ADDED MH, ADDED NEW 10"S, CHANGED 42" LAT TO 24" LAT ADDED EX. UTILITIES, RELOCATE UTILITIES, REVISED SD	H.I.A	2/25/16	076	2/27/16
1	CHANGED CAST IN PLACE RCB TO PRE-CAST RCB PER APWA 390-0	H.I.A	2/25/16	076	2/27/16

DESIGNED BY:
DRAWN BY:
DATE DRAWN:

APPROVED BY:
Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173
Haidook K. Aghaian Date: 2/1/16
HAIDOOK I. AGHAIAN RCE NO. 43293

REGISTERED PROFESSIONAL ENGINEER HAIDOOK I. AGHAIAN R.C.E. NO. 43293 Exp. 3-31-16 CIVIL STATE OF CALIFORNIA

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

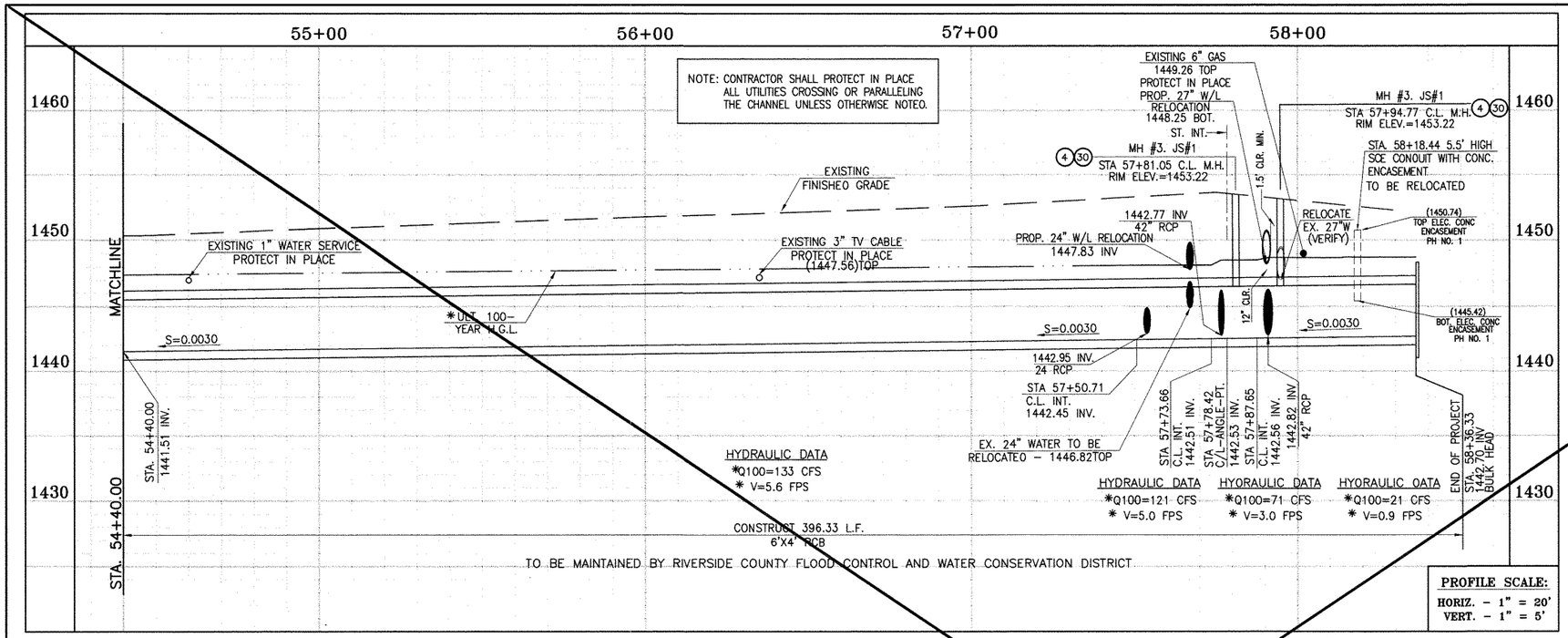
CITY OF PERRIS
APPROVED BY:
CITY ENGINEER DATE: 2-8-16
RECOMMENDED DATE:

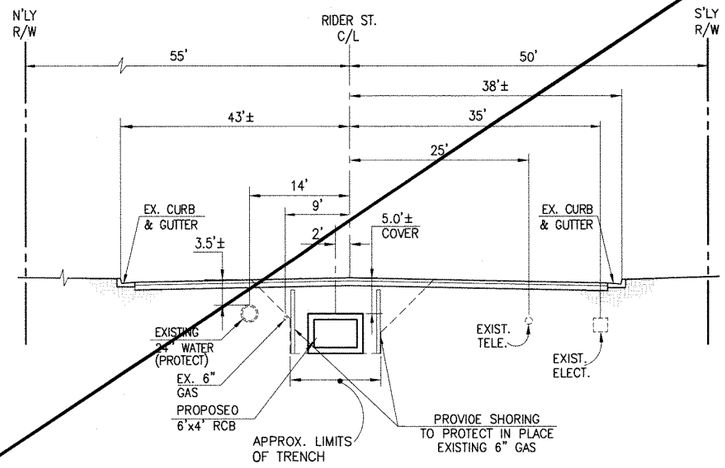
PERRIS VALLEY MDP LINE "A-B"

FROM STA. 50+30 TO STA. 54+40

CITY OF PERRIS FILE NO. P8-1013
PROJECT NO. 4-0-00537
DRAWING NO. 4-1063
SHEET NO. 12A OF 18

Last Update: 1/29/16
O:\2700-2799\2702\2702F\2702SD12.dwg





SECTION AT STA. 55+00.00

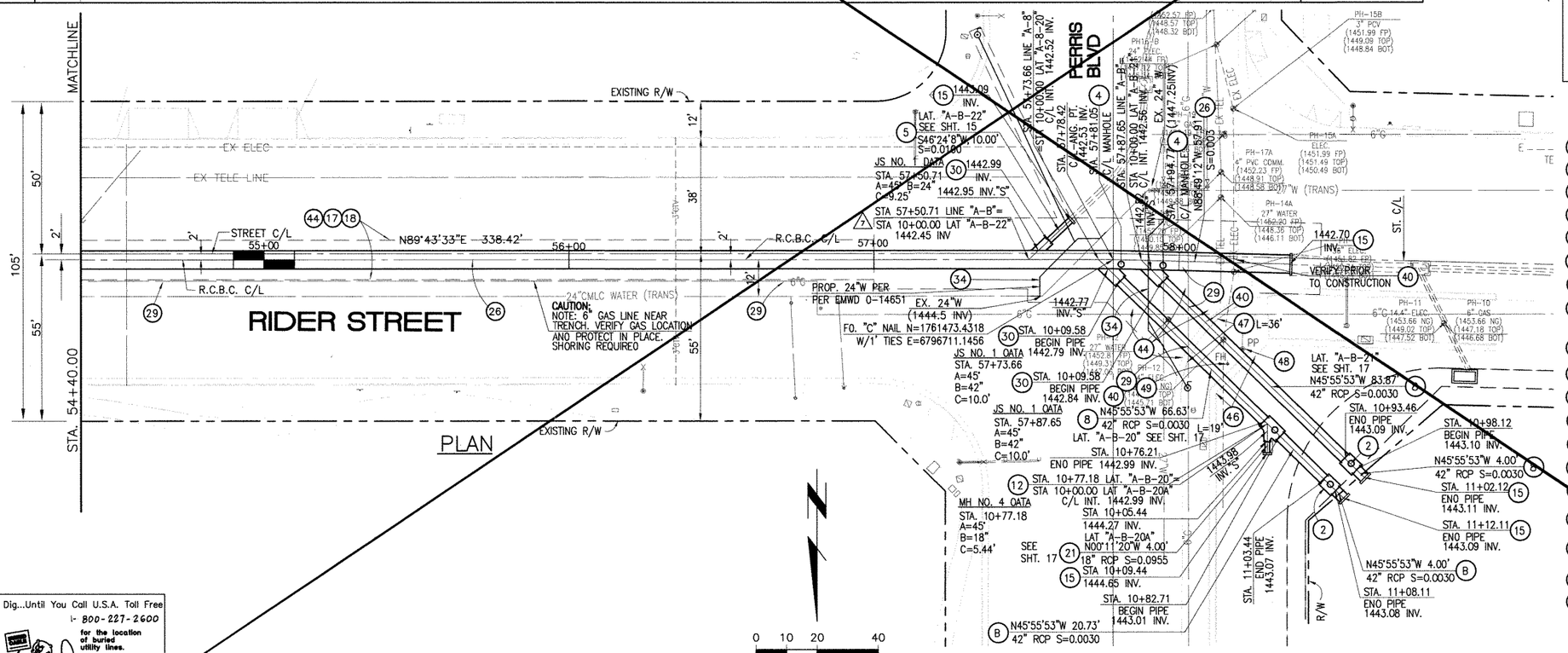
FROM STA 54+40.00 TO STA 58+36.36

0 5 10 20

SCALE:1"=10'

CAUTION:
PROPOSED WORK IS IN PROXIMITY OF HIGH PRESSURE GAS LINES

✳ THE ULTIMATE H.G.L. IS BASED ON THE ADOPTED MOP WATER SURFACE ELEVATION OF 1433 IN THE PERRIS VALLEY STORM CHANNEL (PVSC) AT RIDER STREET, AND ASSUMES THAT FULL CHANNEL IMPROVEMENTS HAVE BEEN CONSTRUCTED PER THE ADOPTED MOP. FOR ALL WATER SURFACE ELEVATIONS BETWEEN 1433 AND THE 100-YEAR FLOOD ELEVATION FOR PVSC (1437.5), LINE "A-B" WILL NOT HAVE CAPACITY FOR LOCAL 100-YEAR FLOWS.



STORM DRAIN CONSTRUCTION NOTES:

(2) CONSTRUCT MANHOLE #2 PER R.C.F.C.&W.C.O. STO OWG. MH252
(4) CONSTRUCT MANHOLE #3 PER R.C.F.C.&W.C.D. STO DWG. MH253
(5) CONSTRUCT 24" R.C.P, O-LOAD PER PLAN.
(B) CONSTRUCT 42" R.C.P, O-LOAO PER PLAN.
(12) CONSTRUCT MANHOLE #4 PER R.C.F.C.&W.C.O. STO OWG. MH254
(15) CONSTRUCT CONCRETE BULKHEAD PER R.C.F.C.&W.C.O. STO OWG. M816.
(17) SAWCUT ANO REMOVE EXISTING A.C. PAVEMENT.
(18) UTILITY TRENCH ANO SURFACE REPAIR PER CITY STANOARO ON SHT. NO. 1B, MOOIFIED TO ACCOMMOOATE SLURRY BACKFILL WHERE BOX COVER IS LESS THAN 2.0'.
(21) CONSTRUCT 18" R.C.P, O-LOAD PER PLAN.
(26) CONSTRUCT 6' X 4' RCB PER CALTRANS STO. PLAN NO. 0BO OR APPROVED EQUAL.
(29) PROTECT IN PLACE EXISTING UTILITIES.
(30) CONSTRUCT JUNCTION STRUCTURE NO. 1 PER R.C.F.C.&W.C.O. STO. OWG. JS226.
(34) RELOCATE EXISTING WATER LINE PER E.M.W.O. PLANS.
(40) RELOCATE EXISTING ELECTRICAL LINE.
(44) SAWCUT, REMOVE ANO REPLACE A.C. PAVEMENT SURFACE REPAIR PER CITY STD. ON SHEET 18.
(46) SAWCUT, REMOVE ANO REPLACE EXISTING 2'± WIOE CONCRETE GUTTER, LENGTH PER PLAN.
(47) SAWCUT, REMOVE ANO REPLACE EXISTING CONCRETE CURB & GUTTER, LENGTH PER PLAN. SEE SEPARATE PAVING PLANS.
(48) EXISTING POWER POLE TO BE RELOCATED BY OTHERS.
(49) EXISTING FIRE HYORANT TO BE RELOCATED BY OTHERS.

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

KFH 4/16/14

BENCH MARK
COUNTY OF RIVERSIDE BENCHMARK NO. "M-31"
COUNTY OF RIVERSIDE BENCHMARK – 3 1/4" ALUMINUM DISK MARKED M-31, LOCATED FLUSH AT THE SOUTH WEST CORNER OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB LOCATED AT THE CROSSING OF PERRIS BLVD. AND RAY. CO. FLOOD CONTROL CHANNEL (PERRIS LATERAL "A"), 43 FT. WEST OF CENTERLINE OF PERRIS BLVD. AND 4.5 FT. EAST OF CONCRETE BRIDGE BARRIER. (EDGE OF BRIDGE) MARKED BY 102 D.M.R. IN TOP OF CONC. POST FLUSH W/ GROUND
ELEVATION = 1474.674' (NAVD 1929)

REF.	REVISIONS	ENGINEER APPR.	ENGINEER DATE	RCFC/ APPR.	RCFC/ DATE
	SUPERSEDED BY SHEET 13A	H.I.A.	2/25/14	CJG	3/27/14

DESIGNED BY: BW
DRAWN BY: ET
DATE DRAWN:

APPROVED BY:
Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173
HAIOOOK I. AGHAIAN Date: 11/18/14
RCE NO. 43293

REGISTERED PROFESSIONAL ENGINEER – HAIOOOK I. AGHAIAN – R.C.E. NO. 43293 – Exp. 3-31-16 – CIVIL – STATE OF CALIFORNIA

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: DATE: 1/20/2015
APPROVED BY: DATE: 1/20/2015

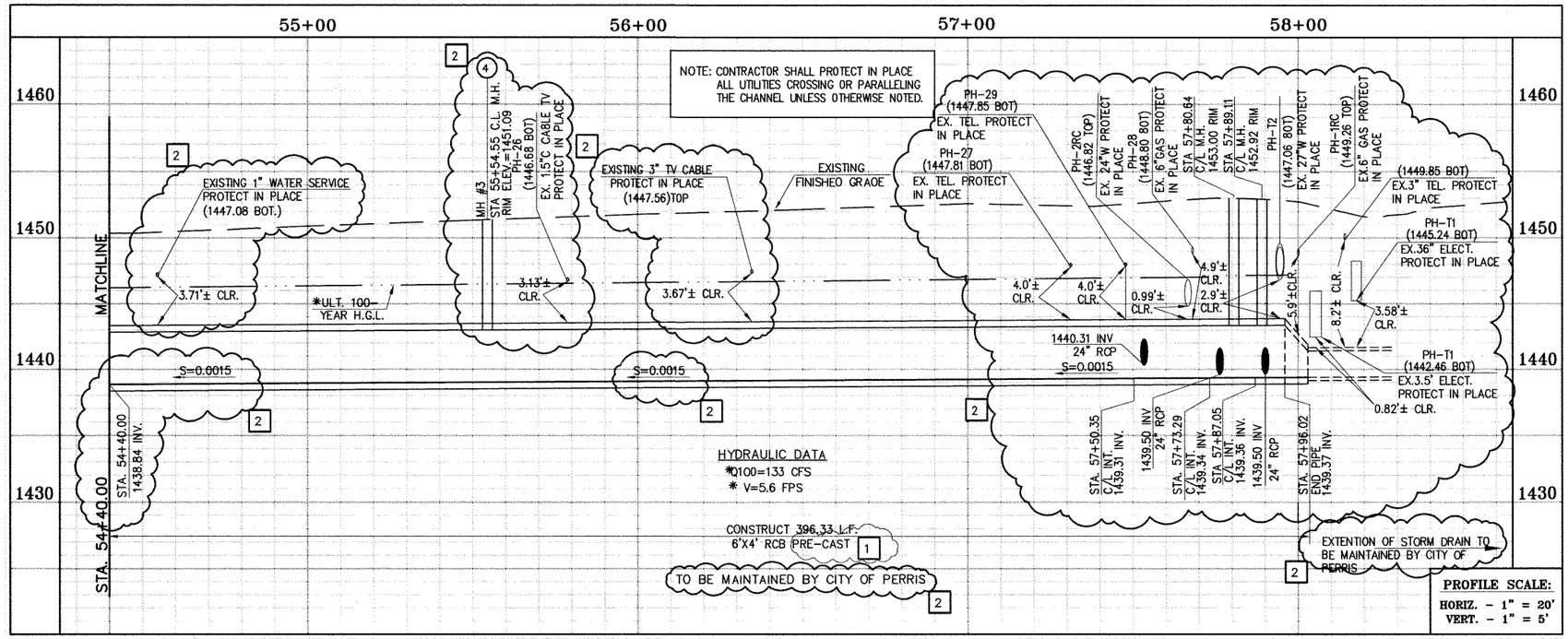
CITY OF PERRIS
APPROVED BY:
CITY ENGINEER DATE: 12-15-14
RECOMMENDED DATE:

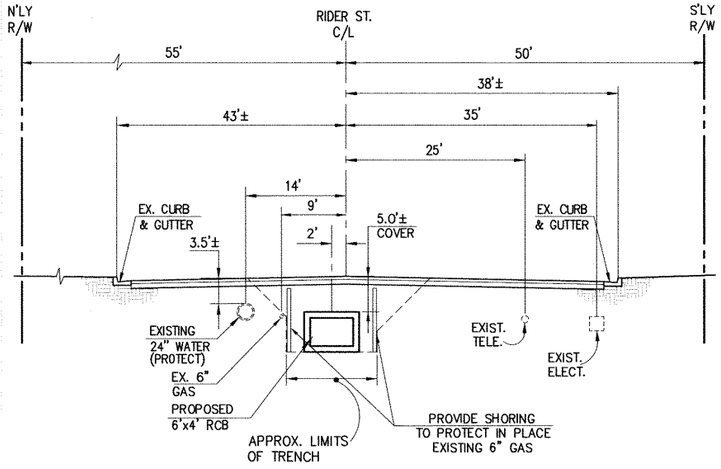
CITY OF PERRIS
FILE NO. P8-1013

PERRIS VALLEY MDP
LINE "A-B"
FROM STA. 54+40 TO STA. 58+36

PROJECT NO. 4-0-00537
DRAWING NO. 4-1063
SHEET NO. 13 OF 18

Last Update: 11/18/14
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SECTION AT STA. 55+00.00

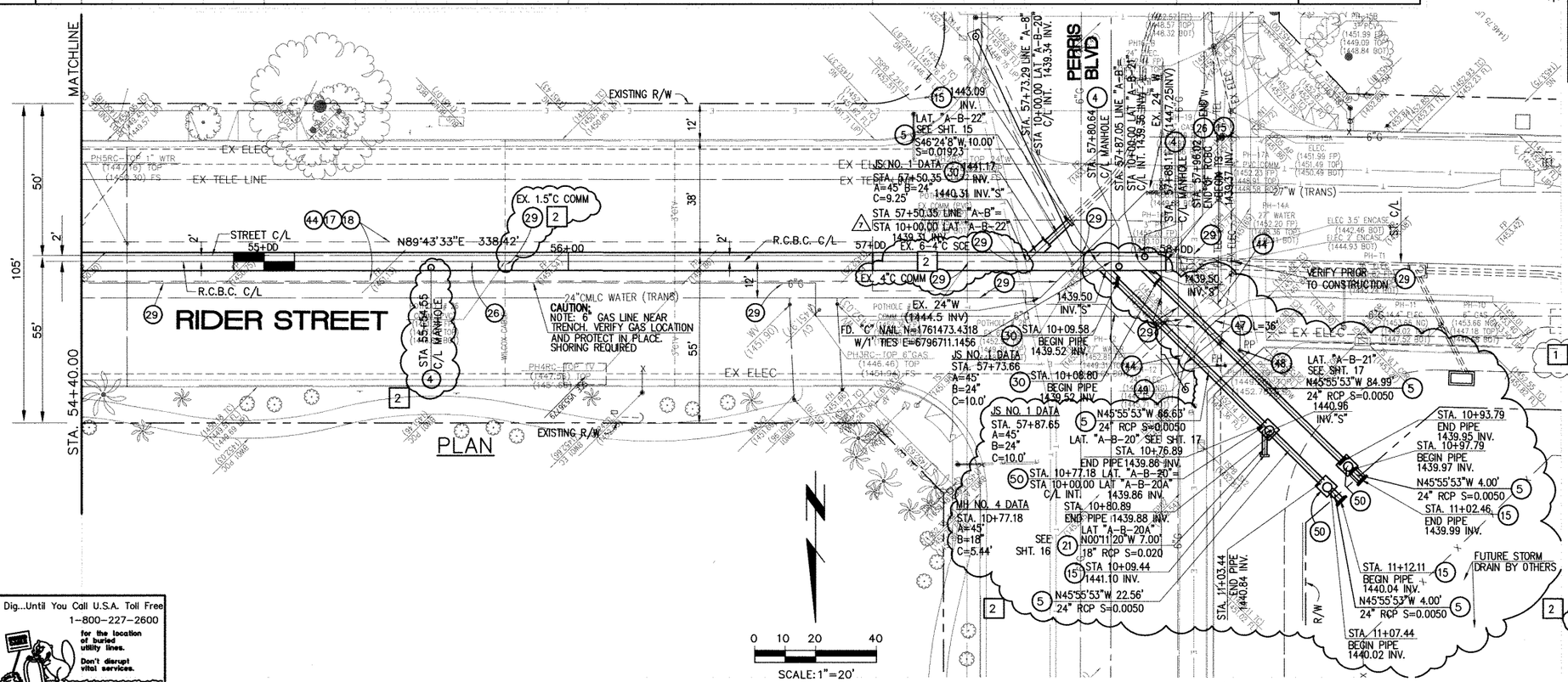
FROM STA 54+40.00 TO STA 58+36.36

0 5 10 20

SCALE: 1"=10'

CAUTION:
PROPOSED WORK IS IN PROXIMITY OF HIGH PRESSURE GAS LINES

* THE ULTIMATE H.G.L. IS BASED ON THE ADOPTED MDP WATER SURFACE ELEVATION OF 1433 IN THE PERRIS VALLEY STORM CHANNEL (PVSC) AT RIDER STREET, AND ASSUMES THAT FULL CHANNEL IMPROVEMENTS HAVE BEEN CONSTRUCTED PER THE ADOPTED MDP. FOR ALL WATER SURFACE ELEVATIONS BETWEEN 1433 AND THE 100-YEAR FLOOD ELEVATION FOR PVSC (1437.5), LINE "A-B" WILL NOT HAVE CAPACITY FOR LOCAL 100-YEAR FLOWS.



STORM DRAIN CONSTRUCTION NOTES:

(4) CONSTRUCT MANHOLE #3 PER R.C.F.C.&W.C.D. STD DWG. MH253
(5) CONSTRUCT 24" R.C.P, D-LOAD PER PLAN.
(8) CONSTRUCT 42" R.C.P, D-LOAD PER PLAN.
(12) CONSTRUCT MANHOLE #4 PER R.C.F.C.&W.C.O. STD DWG. MH254
(15) CONSTRUCT CONCRETE BULKHEAD PER R.C.F.C.&W.C.D. STD DWG. M816.
(17) SAWCUT AND REMOVE EXISTING A.C. PAVEMENT.
(18) UTILITY TRENCH AND SURFACE REPAIR PER CITY STANDARD ON SHT. NO. 18, MODIFIED TO ACCOMMODATE SLURRY BACKFILL WHERE BOX COVER IS LESS THAN 2.0'.
(21) CONSTRUCT 18" R.C.P, D-LOAD PER PLAN.
(1) (26) CONSTRUCT 6' X 4' PRE-CAST RCB APWA STD PLAN 390-0 OR APPROVED EQUAL. SEE JOINT SEALANT NOTE ON SHEET #1.
(29) PROTECT IN PLACE EXISTING UTILITIES.
(30) CONSTRUCT JUNCTION STRUCTURE NO. 1 PER R.C.F.C.&W.C.D. STD. DWG. JS226.
(34) RELOCATE EXISTING WATER LINE PER E.M.W.D. PLANS.
(40) RELOCATE EXISTING ELECTRICAL LINE.
(44) SAWCUT, REMOVE AND REPLACE A.C. PAVEMENT SURFACE REPAIR PER CITY STD. ON SHEET 18.
(46) SAWCUT, REMOVE AND REPLACE EXISTING 2'± WIDE CONCRETE GUTTER, LENGTH PER PLAN.
(47) SAWCUT, REMOVE AND REPLACE EXISTING CONCRETE CURB & GUTTER, LENGTH PER PLAN. SEE SEPARATE PAVING PLANS.
(48) EXISTING POWER POLE TO BE RELOCATED BY OTHERS.
(49) EXISTING FIRE HYDRANT TO BE RELOCATED BY OTHERS.
(1) (50) CONSTRUCT MANHOLE #1 PER R.C.F.C.&W.C.D. STD DWG. MH251

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

BENCH MARK
COUNTY OF RIVERSIDE BENCHMARK NO. "M-31"
COUNTY OF RIVERSIDE BENCHMARK - 3 1/4" ALUMINUM DISK MARKED M-31, LOCATED FLUSH AT THE SOUTH WEST CORNER OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB LOCATED AT THE CROSSING OF PERRIS BLVD. AND RIV. CO. FLOOD CONTROL CHANNEL (PERRIS LATERAL "A"). 43 FT. WEST OF CENTERLINE OF PERRIS BLVD. AND 6.5 FT. EAST OF CONCRETE BRIDGE BARRIER. (EDGE OF BRIDGE) MARKED R-102 D.M.R. IN TOP OF CONC. POST FLUSH W/ GROUND
ELEVATION = 1474.674' (NAVD 1929)

REF.	DESCRIPTION	ENGINEER APPR.	ENGINEER DATE	RCFC/ APPR.	RCFC/ DATE
2	CHANGED SLOPE TO 0.0015, ADDED MH, ADDED NEW 10"S, CHANGED 42" LAT TO 24" LAT. ADDED EX. UTILITIES, RELOCATE UTILITIES, REVISED SD	H.L.A.	2/29/16	DG	3/17/16
1	CHANGED CAST IN PLACE RCB TO PRE-CAST RCB PER APWA 390-0	H.L.A.	2/29/16	DG	3/17/16

DESIGNED BY:
DRAWN BY:
DATE DRAWN:

APPROVED BY:
Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173
Haidook I. Aghaian Date: 2/17/16
HAIDOOK I. AGHAIAN RCE NO. 43293

REGISTERED PROFESSIONAL ENGINEER HAIDOOK I. AGHAIAN R.C.E. NO. 43293 Exp. 3-31-16 CIVIL STATE OF CALIFORNIA

KH 2/17/16

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

CITY OF PERRIS
APPROVED BY:
CITY ENGINEER DATE: 2-9-16
RECOMMENDED DATE:

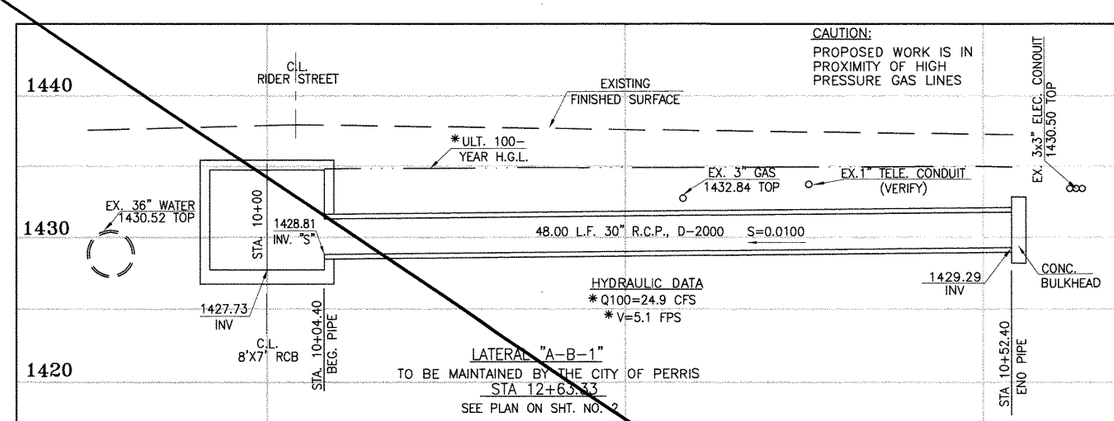
CITY OF PERRIS
FILE NO. P8-1013

PERRIS VALLEY MDP
LINE "A-B"
FROM STA. 54+40 TO STA. 58+36

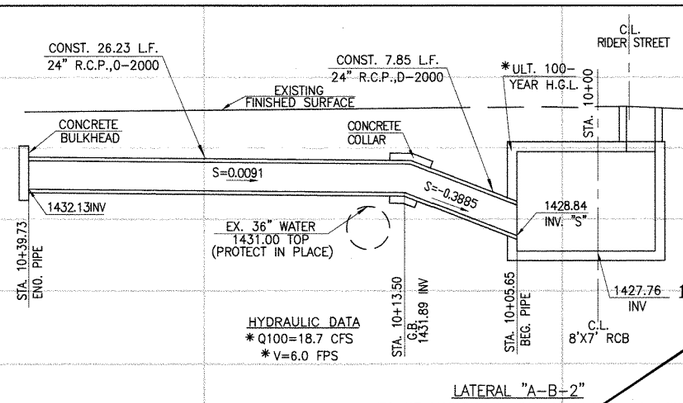
PROJECT NO. 4-0-00537
DRAWING NO. 4-1063
SHEET NO. 13A OF 18

Last Update: 1/29/16
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CAUTION:
PROPOSED WORK IS IN PROXIMITY OF HIGH PRESSURE GAS LINES

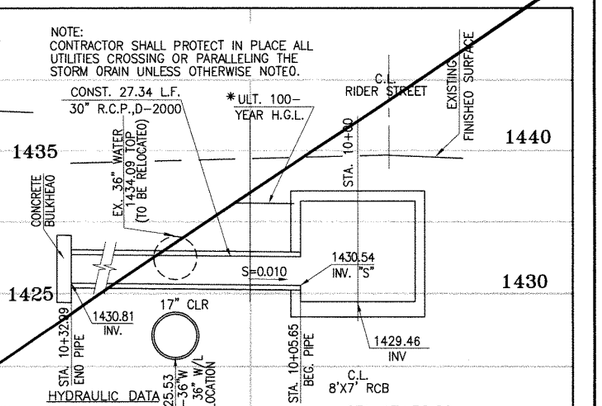


LATERAL "A-B-1"
TO BE MAINTAINED BY THE CITY OF PERRIS
STA 12+63.33
SEE PLAN ON SHT. NO. 2



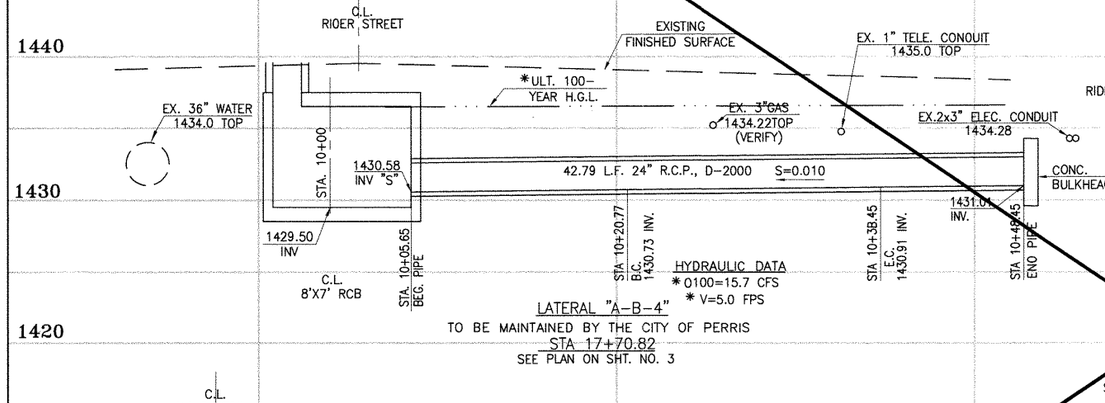
LATERAL "A-B-2"
TO BE MAINTAINED BY THE CITY OF PERRIS
STA 12+75.33
SEE PLAN ON SHT. NO. 2

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

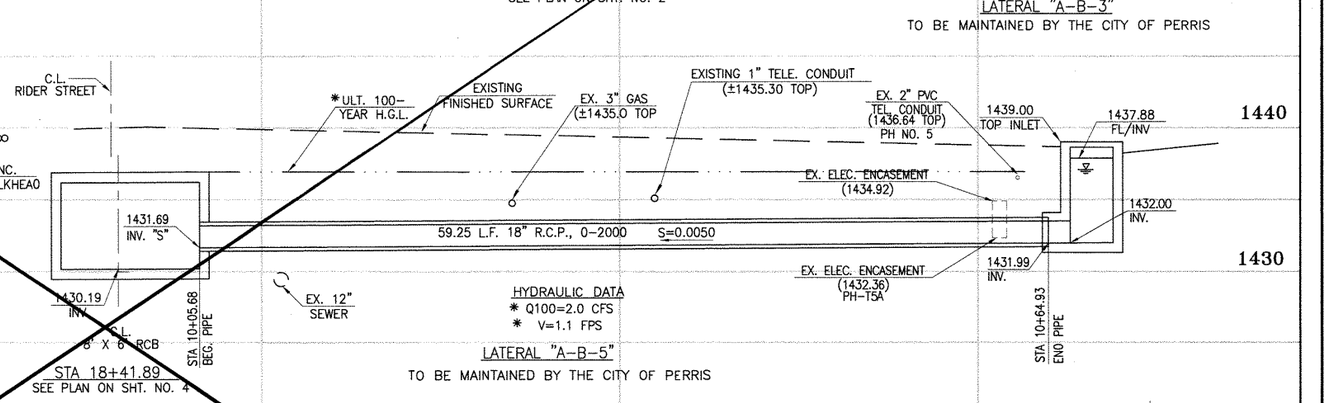


STA 17+58.82
SEE PLAN ON SHT. NO. 3

LATERAL "A-B-3"
TO BE MAINTAINED BY THE CITY OF PERRIS

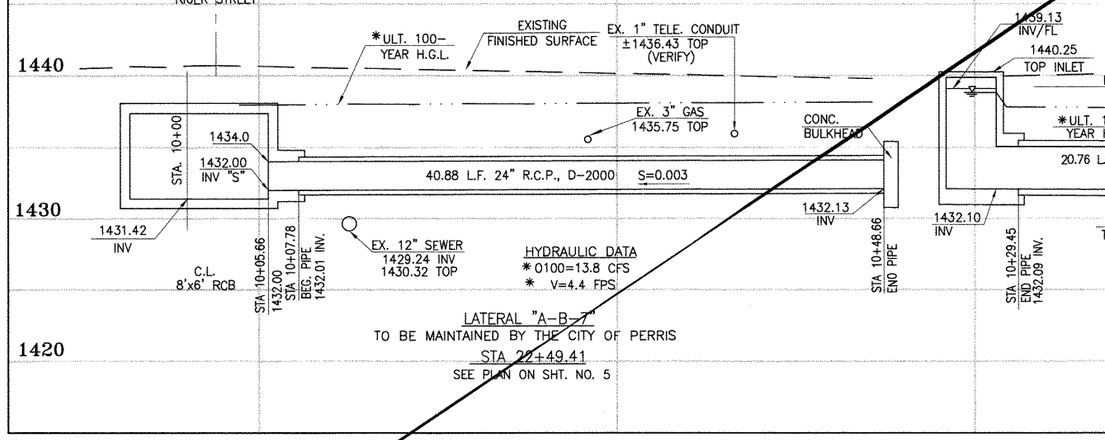


LATERAL "A-B-4"
TO BE MAINTAINED BY THE CITY OF PERRIS
STA 17+70.82
SEE PLAN ON SHT. NO. 3

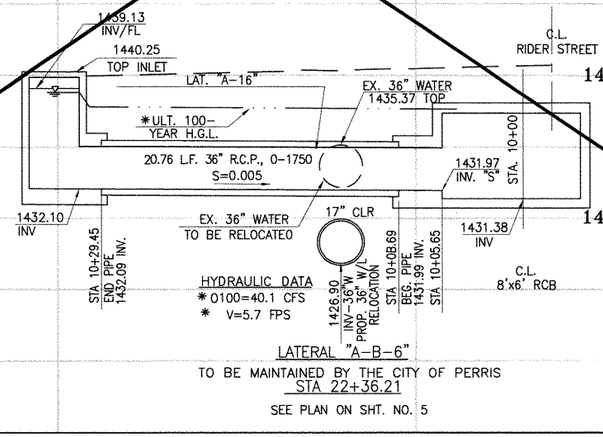


STA 18+41.89
SEE PLAN ON SHT. NO. 4

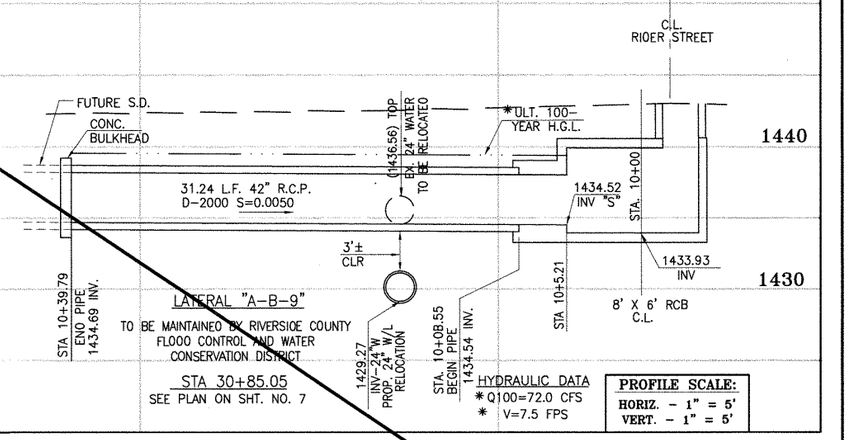
LATERAL "A-B-5"
TO BE MAINTAINED BY THE CITY OF PERRIS



LATERAL "A-B-7"
TO BE MAINTAINED BY THE CITY OF PERRIS
STA 22+49.41
SEE PLAN ON SHT. NO. 5



LATERAL "A-B-6"
TO BE MAINTAINED BY THE CITY OF PERRIS
STA 22+36.21
SEE PLAN ON SHT. NO. 5



LATERAL "A-B-9"
TO BE MAINTAINED BY RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
STA 30+85.05
SEE PLAN ON SHT. NO. 7

PROFILE SCALE:
HORIZ. - 1" = 5'
VERT. - 1" = 5'

CAUTION:
PROPOSED WORK IS IN PROXIMITY OF HIGH PRESSURE GAS LINES

* THE ULTIMATE H.G.L. IS BASED ON THE ADOPTED MDP WATER SURFACE ELEVATION OF 1433 IN THE PERRIS VALLEY STORM CHANNEL (PVSC) AT RIDER STREET, AND ASSUMES THAT FULL CHANNEL IMPROVEMENTS HAVE BEEN CONSTRUCTED PER THE ADOPTED MDP. FOR ALL WATER SURFACE ELEVATIONS BETWEEN 1433 AND THE 100-YEAR FLOOD ELEVATION FOR PVSC (1437.5), LINE "A-B" WILL NOT HAVE CAPACITY FOR LOCAL 100-YEAR FLOWS.

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

BENCH MARK
COUNTY OF RIVERSIDE BENCHMARK NO. 24-31
COUNTY OF RIVERSIDE BENCHMARK - 3" 1/4" ALUMINUM DISK MARKED 4-31, LOCATED FLUSH AT THE SOUTH WEST CORNER OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB LOCATED AT THE CROSSING OF PERRIS BLVD. AND RIV. CO. FLOOD CONTROL CHANNEL (PERRIS LATERAL "A"), 43 FT. WEST OF CENTERLINE OF PERRIS BLVD. AND 4.5 FT. EAST OF CONCRETE BRIDGE BARRIER (EDGE OF BRIDGE) MARKED B 102 D.M.R. IN TOP OF CONC. POST FLUSH W/ GROUND
ELEVATION = 1474.674' (NAVD 1929)

REF.	DESCRIPTION	APPR.	DATE	APPR.	DATE
	REVISIONS	ENGINEER		RCFC/	
	SUPERSEDED BY SHEET 14A	H.A.	2/22/16	OK	2/25/16

DESIGNED BY: BW
DRAWN BY: ET
DATE DRAWN:

APPROVED BY:
Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173
Haidook I. Aghaian Date: 11/18/14
HAIDOOK I. AGHAIAN RCE NO. 43293

REGISTERED PROFESSIONAL ENGINEER HAIDOOK L. AGHAIAN R.C.E. NO. 43293 Exp. 3-31-16 CIVIL STATE OF CALIFORNIA

KH 4/10/14

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: DATE: 1/20/2015
APPROVED BY: DATE: 1/20/2015

CITY OF PERRIS
APPROVED BY:
CITY ENGINEER DATE: 12-15-14
RECOMMENDED DATE:

PERRIS VALLEY MDP LINE "A-B"

CITY OF PERRIS
FILE NO. P8-1013
PROJECT NO. 4-0-00537
DRAWING NO. 4-1063
SHEET NO. 14 OF 18

Last Update: 11/18/14
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CAUTION:
PROPOSED WORK IS IN PROXIMITY OF HIGH PRESSURE GAS LINES

C.L. RIDER STREET

EXISTING FINISHED SURFACE

*ULT. 100-YEAR H.G.L.

EX. 3" GAS 1432.84 TOP

EX.1" TELE. CONDUIT (VERIFY)

EX. 3x3" ELEC. CONDUIT 1430.50 TOP

STA. 10+00

1428.81 INV. "S"

48.00 L.F. 30" R.C.P., 0-2000 S=0.0100

1427.73 INV

EX. 36" WATER 1430.52 TOP

C.L. 8'X7' RCB

STA. 10+04.40 BEG. PIPE

1429.29 INV

CONC. BULKHEAD

STA 10+52.40 END PIPE

HYDRAULIC DATA
*Q100=24.9 CFS
*V=5.1 FPS

LATERAL "A-B-1"
TO BE MAINTAINED BY THE CITY OF PERRIS
STA 12+63.33
SEE PLAN ON SHT. NO. 2

CONST. 26.23 L.F. 24" R.C.P.,0-2000

2 CONST. 7.85 L.F. 24" R.C.P.,D-2000

EXISTING FINISHED SURFACE

CONCRETE BULKHEAD

CONST. COF PER EMWD SPECS.

CONCRETE COLLAR

S=0.0050

S=-0.436

1432.39INV

1432.27 INV-24"

PH-1
EX. 36" WATER 1431.47 TOP

STA. 10+39.73 END. PIPE

STA. 10+13.80 G.B. 1432.26 INV

STA. 10+05.65 BEG. PIPE

1428.84 INV. "S"

1427.76 INV

C.L. 8'X7' RCB

*ULT. 100-YEAR H.G.L.

HYDRAULIC DATA
*Q100=18.7 CFS
*V=6.0 FPS

LATERAL "A-B-2"
TO BE MAINTAINED BY THE CITY OF PERRIS
STA 12+75.33
SEE PLAN ON SHT. NO. 2

PROTECT IN PLACE EXISTING UTILITY LINE. FIELD VERIFY INVERT ELEVATIONS INFORM ENGINEER FOR ANY ELEVATION DISCREPANCIES PRIOR TO CONSTRUCTION

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

C.L. RIDER STREET

CONST. 2 L.F. 30" R.C.P.,0-2000

*ULT. 100-YEAR H.G.L.

EXISTING FINISHED SURFACE

EX. 36" WATER 1434.09 TOP (TO BE RELOCATED) BY OTHERS

CONCRETE BULKHEAD

STA. 10+00

2"

S=0.010

17" CLR

1430.54 INV. "S"

1430.81 INV.

1429.53 INV-36" W/ PUT. 36" W/ RELOCATION

STA. 10+32.99 END PIPE

STA. 10+05.65 BEG. PIPE

C.L. 8'X7' RCB

HYDRAULIC DATA
*Q100=24.8 CFS
*V=5.1 FPS
FUT. LATERAL BY OTHERS

LATERAL "A-B-3"
TO BE MAINTAINED BY THE CITY OF PERRIS
STA 17+58.82
SEE PLAN ON SHT. NO. 3

C.L. RIDER STREET

PH-2 EX. ELECT. 1433.66 BOT

EXISTING SURFACE

PH-3 EX. 1" TELE CONDUIT 1432.07 BOT PROTECT IN PLACE

ULT. 100-YEAR H.G.L.*

EX. 3" GAS 1434.22 TOP (VERIFY)

PH-4 EX. 2x3" ELECT. 1432.07 BOT

1.9'± CLR.

2.19'± CLR.

3.07'± CLR.

0.24'± CLR.

STA. 10+00

1430.00 INV "S"

S=0.003

42.79 L.F. 18" R.C.P., 0-2000

S=0.003

EX. 36" WATER 1434.0 TOP

1429.78 INV

C.L. TS NO.2

STA. 10+05.66 BEG. PIPE

STA 10+20.77 B.C. 1430.05 INV.

STA 10+38.45 E.C. 1430.10 INV.

STA 10+48.45 END PIPE 1430.13 INV.

CONC. BULKHEAD

HYDRAULIC DATA
*Q100=15.7 CFS
*V=8.9 FPS

LATERAL "A-B-4"
TO BE MAINTAINED BY THE CITY OF PERRIS
STA 17+70.62
SEE PLAN ON SHT. NO. 3

1431.69 INV. "S"

1430.19 INV

C.L. 8' X 6' RCB

STA 10+05.68 BEG. PIPE

STA 18+41.89
SEE PLAN ON SHT. NO. 4

*ULT. 100-YEAR H.G.L.

EXISTING FINISHED SURFACE

EX. 3" GAS (+1435.0 TOP

EXISTING 1" TELE. CONDUIT (±1435.30 TOP)

2 RELOCATE EX. 2" TEL (1436.64 TOP)

RELOCATE EX. 2" TEL (1436.34 TOP)

1439.00 TOP INLET

113.59 L.F. 18" R.C.P. 0-2000

4.31 L.F. 18" R.C.P., 0-2000

S=0.0050

S=-0.100

1437.88 FL/INV

1.0'± CLR.

1.5'± CLR.

1.0'± CLR.

1436.29 INV.

41.35 L.F. 18" R.C.P., 0-2000 S=0.0050

1.5'± CLR.

EX. 12" SEWER

HYDRAULIC DATA
* Q100=2.0 CFS
* V=1.1 FPS

STA 18+41.88
SEE PLAN ON SHT. NO. 4

LATERAL "A-B-5"
TO BE MAINTAINED BY THE CITY OF PERRIS

STA. 10+47.03 G.B. 1431.90 INV. CONC. COLLAR

STA 10+51.34 G.B. 1436.21 INV. CONC. COLLAR

2" TEL. NEW LOCATION 1434.09 TOP

PH-5 EX. ELECT. ENCASEMENT

2" TEL. NEW LOCATION 1435.00 TOP

STA 10+64.93 END PIPE 1436.28 INV.

C.L. RIDER STREET

*ULT. 100-YEAR H.G.L.

EXISTING FINISHED SURFACE

PH-9 (1436.35TOP) EX. 2"C COMM

EX. 1" TELE. CONDUIT ±1436.43 TOP (VERIFY)

STA. 10+00

1434.0

1432.00 INV "S"

40.88 L.F. 24" R.C.P., 0-2000 S=0.003

1431.42 INV

EX. 3" GAS 1435.75 TOP

CONC. BULKHEAD

1432.13 INV

EX. 12" SEWER 1429.24 INV 1430.32 TOP

C.L. 8'x6' RCB

STA. 10+05.66 BEG. PIPE

1432.00 INV

STA. 10+07.78 BEG. PIPE 1432.01 INV.

STA. 10+48.66 END PIPE

HYDRAULIC DATA
*Q100=13.8 CFS
* V=4.4 FPS

LATERAL "A-B-7"
TO BE MAINTAINED BY CITY OF PERRIS
STA 22+49.41
SEE PLAN ON SHT. NO. 5

1439.13 INV/FL

1440.25 TOP INLET

CONC. BULKHEAD

LAT. "A-16"

EX. 36" WATER 1435.37 TOP

C.L. RIDER STREET

*ULT. 100-YEAR H.G.L.

20.76 L.F. 36" R.C.P., 0-1750 S=0.005

17" CLR

1431.97 INV. "S"

STA. 10+00

1432.10 INV

EX. 36" WATER TO BE RELOCATED BY OTHERS

FUT. LATERAL BY OTHERS

1431.38 INV

C.L. 8'x6' RCB

STA 10+29.45 END PIPE 1432.09 INV.

STA 10+08.69 BEG. PIPE 1431.99 INV.

STA 10+05.65

1426.90 INV-36" W/ FUT. 36" RELOCATION

HYDRAULIC DATA
*Q100=40.1 CFS
* V=5.7 FPS

LATERAL "A-B-6"
TO BE MAINTAINED BY THE CITY OF PERRIS
STA 22+36.21
SEE PLAN ON SHT. NO. 5

PH-15 (1439.57) EX. 2-2"C

2 PH-14 PROTECT IN PLACE (1437.75 TOP) (1435.59 BOT)

*ULT. 100-YEAR H.G.L.

S=0.0040

6"± CLR

31.24 L.F. 2-24" R.C.P. 0-2000

CONST. COF PER EMWD SPECS.

1.6'± CLR

S=-0.537

1434.52 INV "S"

STA. 10+00

STA. 10+37.42 CONC. BULKHEAD 1438.50 INV.

1433.93 INV

C.L. TS NO.2

(1436.56) TOP EX. 24" WATER

STA 10+12.43 G.B.-CONC. COLLAR 1438.40 INV.

STA 10+08.55 BEGIN PIPE 1435.32 INV.

STA 10+05.21

HYDRAULIC DATA
* Q100=36.0 CFS/PIPE
* V=11.5 FPS

LATERAL "A-B-9"
TO BE MAINTAINED BY CITY OF PERRIS
STA 30+85.05
SEE PLAN ON SHT. NO. 7

PROFILE SCALE:
HORIZ. - 1" = 5'
VERT. - 1" = 5'

* THE ULTIMATE H.G.L. IS BASED ON THE AOOPTEO MOP WATER SURFACE ELEVATION OF 1433 IN THE PERRIS VALLEY STORM CHANNEL (PVSC) AT RIDER STREET, ANO ASSUMES THAT FULL CHANNEL IMPROVEMENTS HAVE BEEN CONSTRUCTEO PER THE AOOPTED MDP. FOR ALL WATER SURFACE ELEVATIONS BETWEEN 1433 ANO THE 100-YEAR FLOOO ELEVATION FOR PVSC (1437.5), LINE "A-B" WILL NOT HAVE CAPACITY FOR LOCAL 100-YEAR FLOWS.

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

CAUTION:
PROPOSED WORK IS IN PROXIMITY OF HIGH PRESSURE GAS LINES

BENCH MARK
COUNTY OF RIVERSIDE BENCHMARK NO. "M-31"
COUNTY OF RIVERSIDE BENCHMARK - 3 1/4" ALUMINUM DISK MARKED M-31, LOCATED FLUSH AT THE SOUTH WEST CORNER OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB LOCATED AT THE CROSSING OF PERRIS BLVD. AND RIV. CO. FLOOD CONTROL CHANNEL (PERRIS LATERAL "A"). 43 FT. WEST OF CENTERLINE OF PERRIS BLVD. AND 4.5 FT. EAST OF CONCRETE BRIDGE BARRIER. (EDGE OF BRIDGE) MARKED R-102 D.W.R. IN TOP OF CONC. POST FLUSH W/ GROUND
ELEVATION = 1474.874' (NAVD 1929)

REF.	DESCRIPTION	ENGINEER APPR.	ENGINEER DATE	RCFC/ APPR.	RCFC/ DATE
2	CHANGED SLOPE TO 0.0015, ADDED MH, ADDED NEW 10"S, CHANGED 42" LAT TO 24" LAT. ADDED EX. UTILITIES, RELOCATE UTILITIES, REVISED SD	H.I.A.	2/25/16	DJS	2/25/16
1	CHANGED CAST IN PLACE RCB TO PRE-CAST RCB PER APWA 390-0	H.I.A.	2/25/16	DJS	2/25/16

DESIGNED BY:
DRAWN BY:
DATE DRAWN:

APPROVED BY:
Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173
HAIDOOK I. AGHAIAN Date: 2/1/16
RCE NO. 43293

REGISTERED PROFESSIONAL ENGINEER HAIDOOK I. AGHAIAN R.C.E. NO. 43293 Exp. 3-31-16 CIVIL STATE OF CALIFORNIA

KTH 2/17/16

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

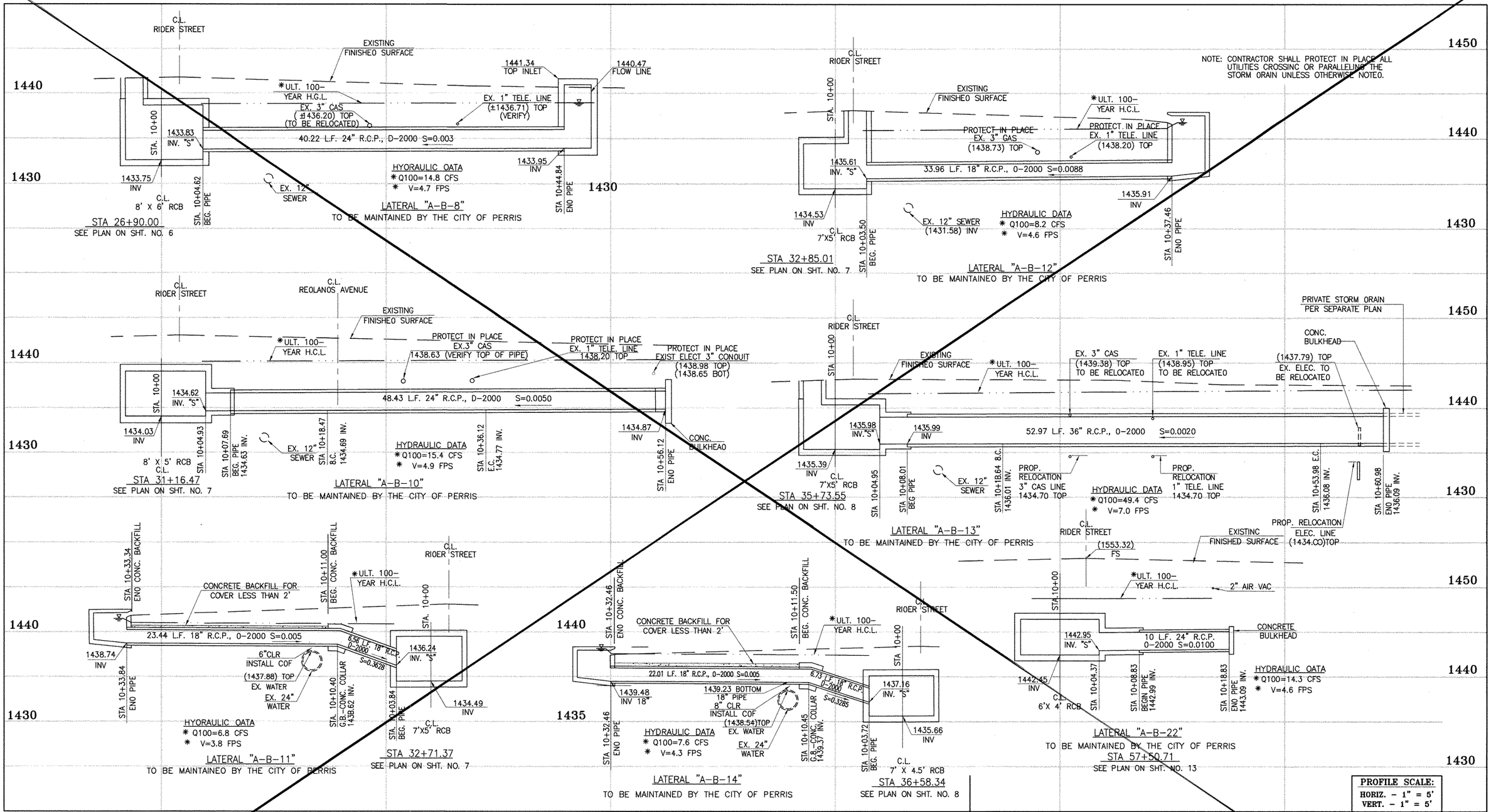
CITY OF PERRIS
APPROVED BY:
CITY ENGINEER DATE: 2-9-16
RECOMMENDED DATE:

CITY OF PERRIS
FILE NO. P8-1013

PERRIS VALLEY MDP
LINE "A-B"

PROJECT NO. 4-0-00537
DRAWING NO. 4-1063
SHEET NO. 14A OF 18

Last Update:1/29/16
O:\2700-2799\2702\2702F\2702SD14.dwg



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

CAUTION:
PROPOSED WORK IS IN PROXIMITY OF HIGH PRESSURE GAS LINES

* THE ULTIMATE H.C.L. IS BASEO ON THE AOOPTEO M0P WATER SURFACE ELEVATION OF 1433 IN THE PERRIS VALLEY STORM CHANNEL (PVSC) AT RIOER STREET, ANO ASSUMES THAT FULL CHANNEL IMPROVEMENTS HAVE BEEN CONSTRUCTEO PER THE AOOPTEO MOP. FOR ALL WATER SURFACE ELEVATIONS BETWEEN 1433 ANO THE 100-YEAR FLOOO ELEVATION FOR PVSC (1437.5), LINE "A-B" WILL NOT HAVE CAPACITY FOR LOCAL 100-YEAR FLOWS.

KFH 4/10/14

BENCH MARK
COUNTY OF RIVERSIDE BENCHMARK NO. "M-31"
COUNTY OF RIVERSIDE BENCHMARK, 3 1/4" ALUMINUM DISK MARKED M-31, LOCATED FLUSH AT THE SOUTH WEST CORNER OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB LOCATED AT THE CROSSING OF PERRIS BLVD. AND IRV. CO. FLOOD CONTROL CHANNEL (PERRIS LATERAL "A"), 43 FT. WEST OF CENTERLINE OF PERRIS BLVD. AND 4.5 FT. EAST OF CONCRETE BRIDGE BARRIER. (EDGE OF BRIDGE) MARKED B-102 D.W.R. IN TOP OF CONC. POST FLUSH W/ GROUND
ELEVATION = 1474.674' (NAVD 1929)

REF.	DESCRIPTION	APPR.	DATE	APPR.	DATE
	REVISIONS	ENGINEER		RCFC/	
	SUPERSEDED BY SHEET 15A	H.I.A.	2/25/16	???	?/?/16

DESIGNED BY: BW
DRAWN BY: ET
DATE DRAWN:

APPROVED BY:
Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173
HAIDOOK I. AGHAIAN Date: 11/18/14
HAIDOOK I. AGHAIAN RCE NO. 43293

REGISTERED PROFESSIONAL ENGINEER HAIDOOK I. AGHAIAN R.C.E. NO. 43293 Exp. 3-31-16 CIVIL STATE OF CALIFORNIA

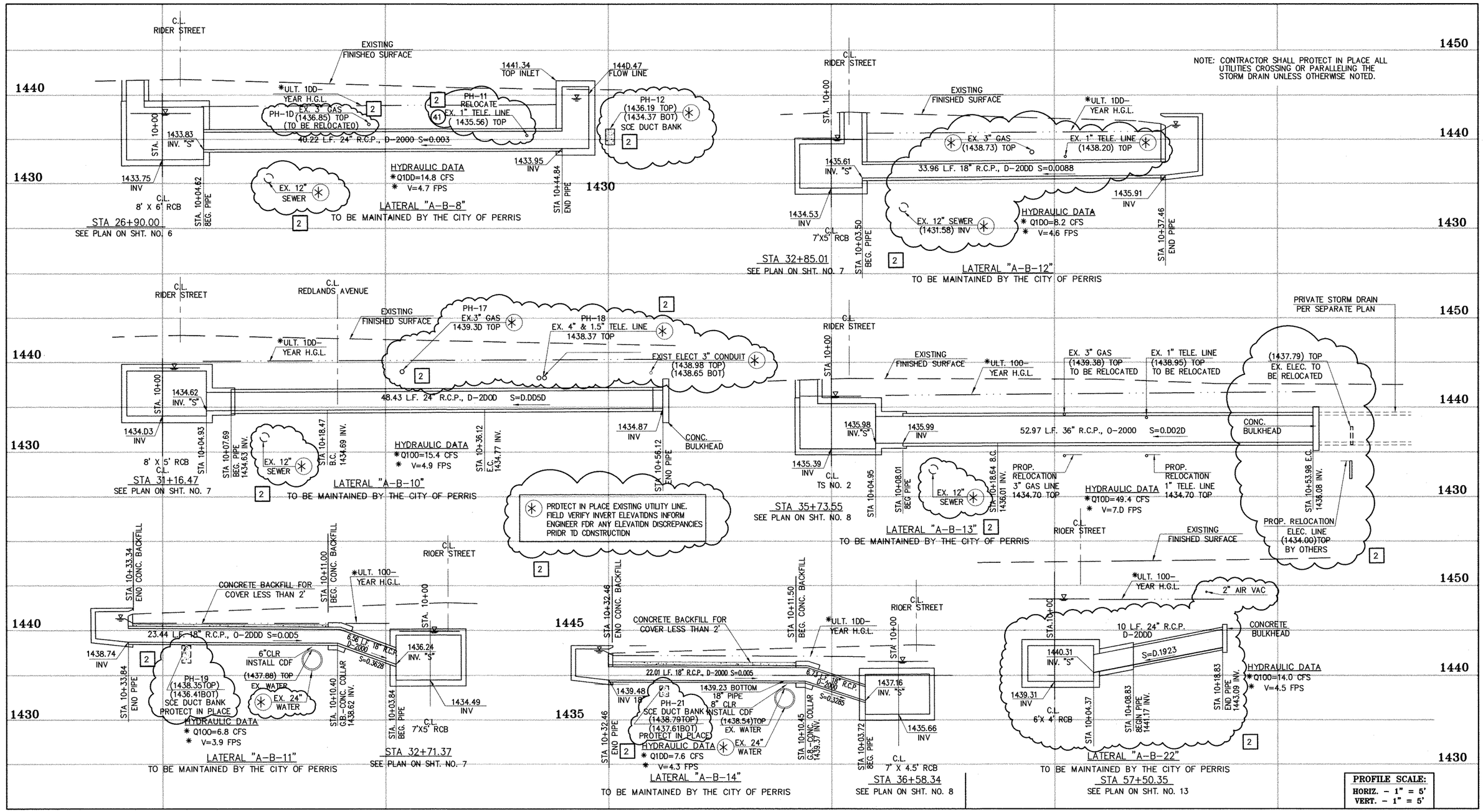
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: DATE: 11/19/2015
APPROVED BY: Mark A. Wills DATE: 1/20/2015

CITY OF PERRIS
APPROVED BY: CITY ENGINEER 12-15-14 DATE:
RECOMMENDED DATE:

PERRIS VALLEY MDP LINE "A-B"

CITY OF PERRIS FILE NO. P8-1013
PROJECT NO. 4-0-00537
DRAWING NO. 4-1063
SHEET NO. 15 OF 18

Last Update: 11/18/14
O:\2700-2799\2702\2702F\2702SD15.dwg



Don't Dig...Until You Call U.S.A. Toll Free 1-8D0-227-2600

for the location of buried utility lines.

Don't disrupt vital services.

TWO WORKING DAYS BEFORE YOU DIG

CAUTION:

PROPOSED WORK IS IN PROXIMITY OF HIGH PRESSURE GAS LINES

* THE ULTIMATE H.G.L. IS BASED ON THE ADOPTED MDP WATER SURFACE ELEVATION OF 1433 IN THE PERRIS VALLEY STORM CHANNEL (PVSC) AT RIDER STREET, AND ASSUMES THAT FULL CHANNEL IMPROVEMENTS HAVE BEEN CONSTRUCTED PER THE ADOPTED MDP. FOR ALL WATER SURFACE ELEVATIONS BETWEEN 1433 AND THE 100-YEAR FLOOD ELEVATION FOR PVSC (1437.5), LINE "A-B" WILL NOT HAVE CAPACITY FOR LOCAL 100-YEAR FLOWS.

BENCH MARK

COUNTY OF RIVERSIDE BENCHMARK NO. "M-31"

COUNTY OF RIVERSIDE BENCHMARK - 3 1/4" ALUMINUM DISK MARKED M-31, LOCATED FLUSH AT THE SOUTH WEST CORNER OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB LOCATED AT THE CROSSING OF PERRIS BLVD. AND RIV. CO. FLOOD CONTROL CHANNEL (PERRIS LATERAL "A"), 43 FT. WEST OF CENTERLINE OF PERRIS BLVD. AND 4.5 FT. EAST OF CONCRETE BRIDGE BARRIER. (EDGE OF BRIDGE) MARKED R-102 D.M.R. IN TOP OF CONC. POST FLUSH W/ GROUND

ELEVATION = 1474.074' (NAVD 1929)

REF.	DESCRIPTION	ENGINEER APPR.	ENGINEER DATE	RCFC/ APPR.	RCFC/ DATE
2	CHANGED SLOPE TO 0.0015, ADDED MH, ADDED NEW 10"S, CHANGED 42" LAT TO 24" LAT	H.I.A.	2/25/16	N/A	2/25/16
1	ADDED EX. UTILITIES, RELOCATE UTILITIES, REVISED SD	H. I.A	2/25/16	N/A	2/25/16
	CHANGED CAST IN PLACE RCB TO PRE-CAST RCB PER APWA 300-0	H. I.A	2/25/16	N/A	2/25/16

DESIGNED BY:

DRAWN BY:

DATE DRAWN:

APPROVED BY:

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

HAIDOOK I. AGHAIAN Date: 2/1/16
RCE NO. 43293

REGISTERED PROFESSIONAL ENGINEER HAIDOOK I. AGHAIAN R.C.E. NO. 43293 Exp. 3-31-16 CIVIL STATE OF CALIFORNIA

KEH 2/17/16

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

CITY OF PERRIS
APPROVED BY:
CITY ENGINEER DATE: 2-5-16
RECOMMENDED DATE:

PERRIS VALLEY MDP LINE "A-B"

CITY OF PERRIS FILE NO. P8-1013

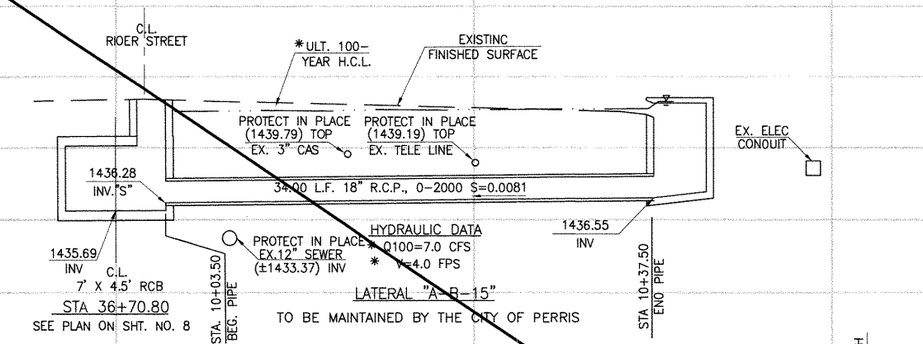
PROJECT NO. 4-0-00537

DRAWING NO. 4-1063

SHEET NO. 15A OF 18

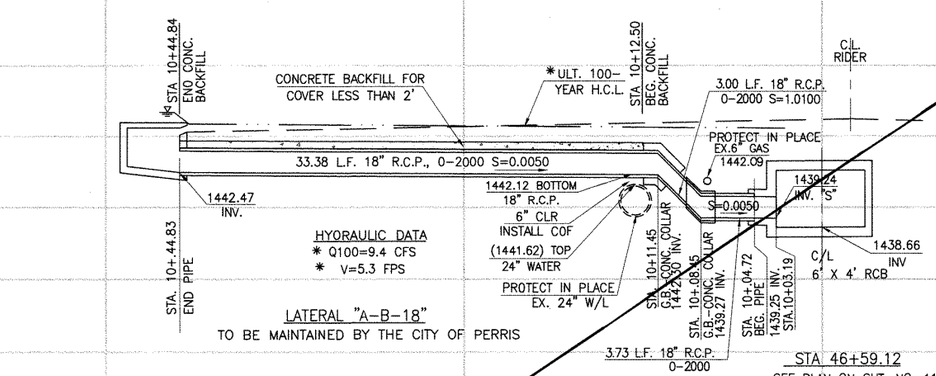
Last Update:1/29/16
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NOTE: CONTRACTOR SHALL PROTECT IN PLACE ALL UTILITIES CROSSINC OR PARALLELINC THE STORM ORAIN UNLESS OTHERWISE NOTEO.



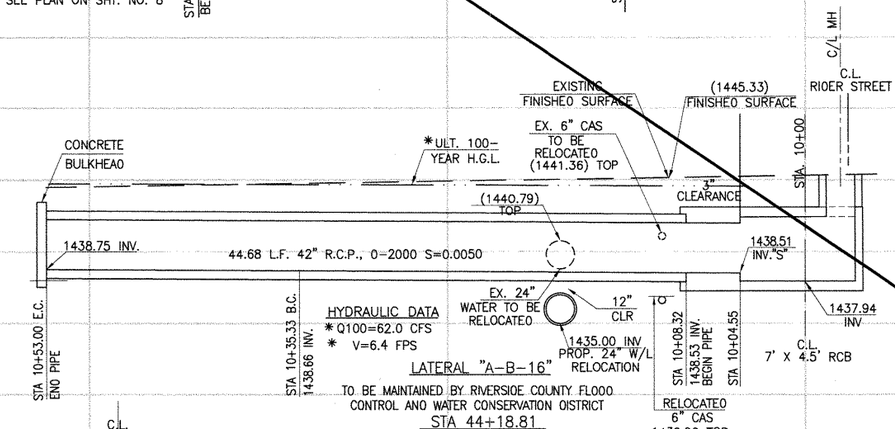
STA 36+70.80
SEE PLAN ON SHT. NO. 8

LATERAL "A-B-15"
TO BE MAINTAINED BY THE CITY OF PERRIS



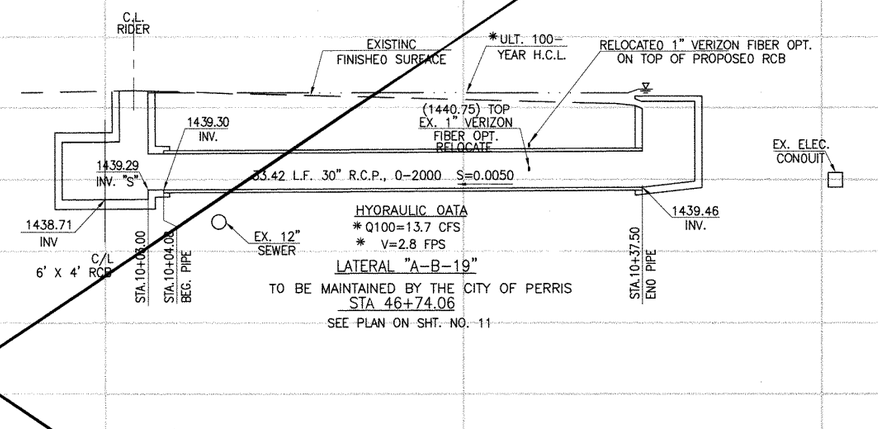
LATERAL "A-B-18"
TO BE MAINTAINED BY THE CITY OF PERRIS

STA 46+59.12
SEE PLAN ON SHT. NO. 11



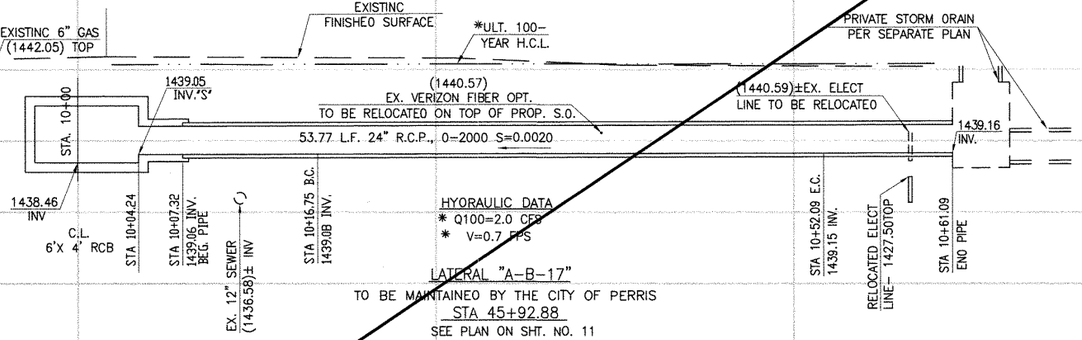
LATERAL "A-B-16"
TO BE MAINTAINED BY RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

STA 44+18.81
SEE PLAN ON SHT. NO. 10



LATERAL "A-B-19"
TO BE MAINTAINED BY THE CITY OF PERRIS

STA 46+74.06
SEE PLAN ON SHT. NO. 11



HYDRAULIC DATA
* Q100=2.0 CFS
* V=0.7 FPS

LATERAL "A-B-17"
TO BE MAINTAINED BY THE CITY OF PERRIS

STA 45+92.88
SEE PLAN ON SHT. NO. 11

1450
1440

PROFILE SCALE:
HORIZ. - 1" = 5'
VERT. - 1" = 5'

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1-800-227-2600
for the location of buried utility lines.
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TWO WORKING DAYS BEFORE YOU DIG

CAUTION:
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BENCH MARK
COUNTY OF RIVERSIDE BENCHMARK NO. "M-31"
COUNTY OF RIVERSIDE BENCHMARK "3 1/4" ALUMINUM DISK MARKED M-31, LOCATED FLUSH AT THE SOUTH WEST CORNER OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB LOCATED AT THE CROSSING OF PERRIS BLVD. AND RIV. CO. FLOOD CONTROL CHANNEL (PERRIS LATERAL 7J) 43 FT. WEST OF CENTERLINE OF PERRIS BLVD. AND 4.5 FT. EAST OF CONCRETE BRIDGE BARRIER. (EDGE OF BRIDGE) MARKED PUNCH D.M.R. IN TOP OF CONC. POST FLUSH W/ GROUND
ELEVATION = 1474.874' (NAVD 1929)

REF.	REVISIONS	ENGINEER APPR.	ENGINEER DATE	RCFC/ APPR.	RCFC/ DATE
	SUPERSEDED BY SHEET 16A	H.I.A.	2/25/14	9/16	3/25/14

DESIGNED BY: BW
DRAWN BY: ET
DATE DRAWN:

APPROVED BY:
Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173
HAIDOOK I. AGHAIAN Date: 11/18/14
RCE NO. 43293

REGISTERED PROFESSIONAL ENGINEER HAIDOOK I. AGHAIAN R.C.E. NO. 43293 Exp. 3-31-16 CIVIL STATE OF CALIFORNIA

KPH 4/10/14

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: DATE: 1/14/2015
APPROVED BY: DATE: 1/20/2015

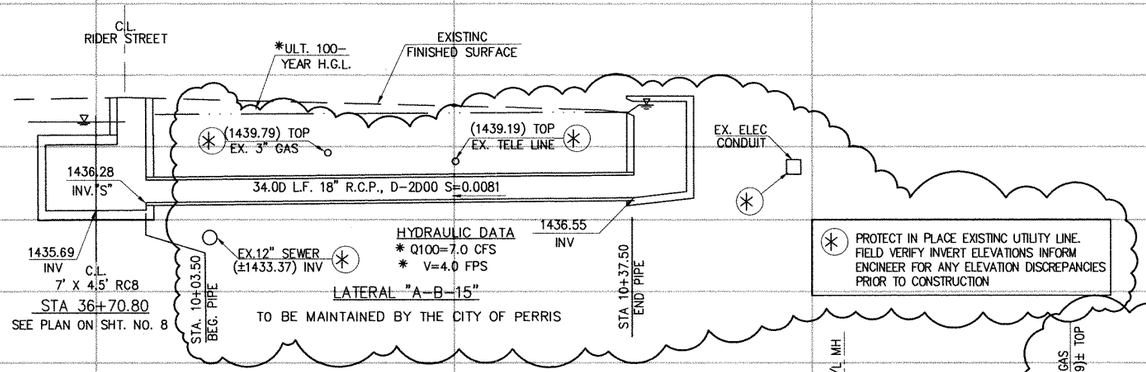
CITY OF PERRIS
APPROVED BY:
CITY ENGINEER DATE: 12-15-14
RECOMMENDED DATE:

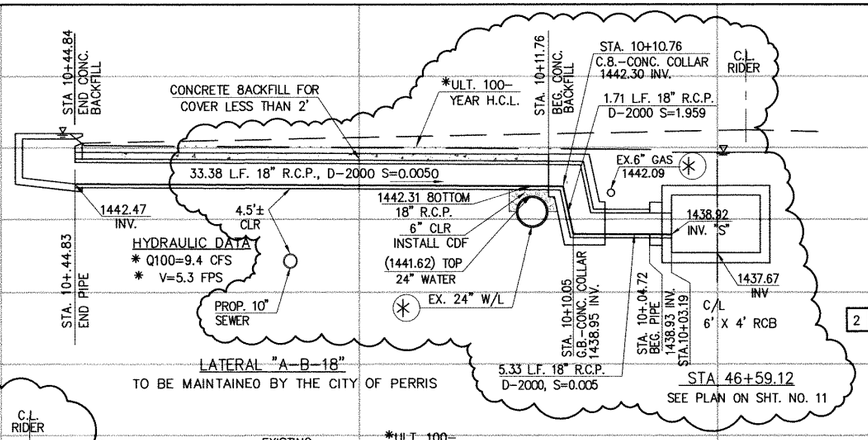
PERRIS VALLEY MDP LINE "A-B"

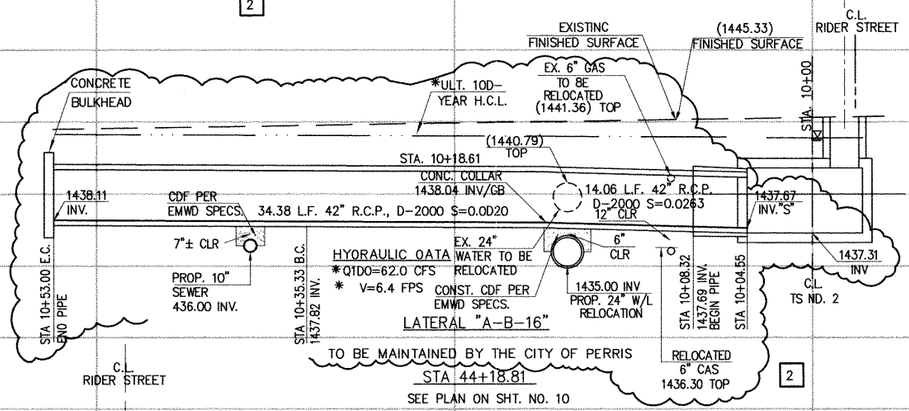
CITY OF PERRIS
FILE NO. P8-1013
PROJECT NO. 4-0-00537
DRAWING NO. 4-1063
SHEET NO. 16 OF 18

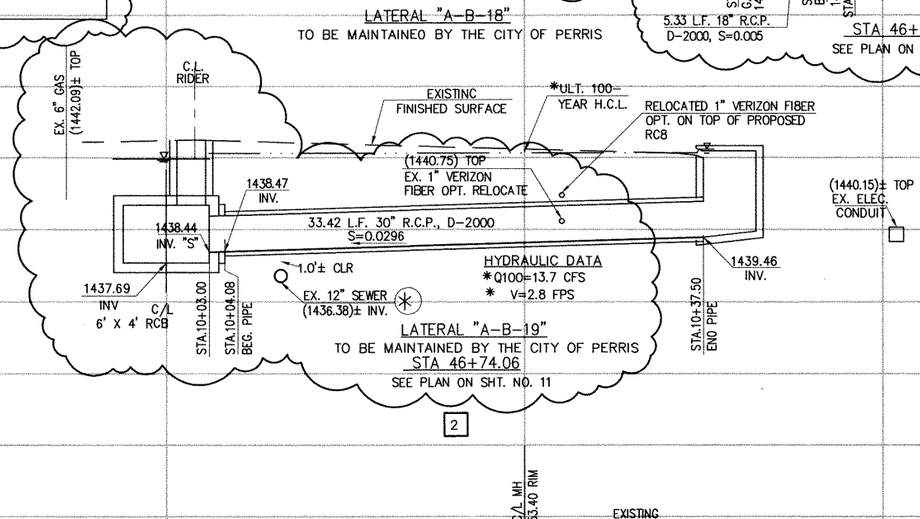
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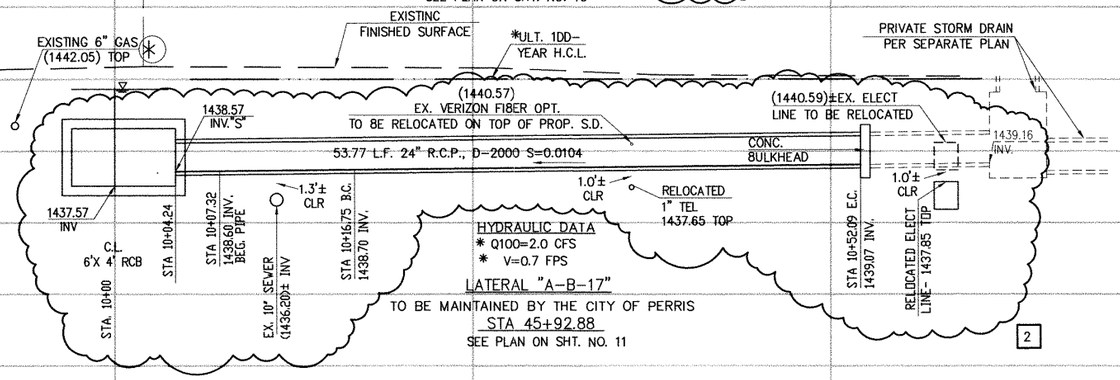
NOTE: CONTRACTOR SHALL PROTECT IN PLACE ALL UTILITIES CROSSING OR PARALLELINC THE STORM DRAIN UNLESS OTHERWISE NOTED.

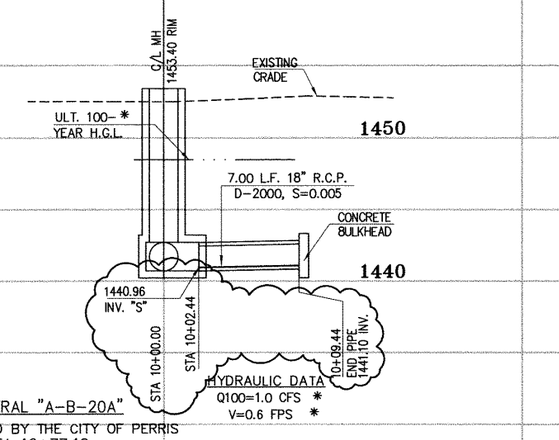












1445 1435 1450 1440

PROFILE SCALE:
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VERT. - 1" = 5'

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BENCH MARK
COUNTY OF RIVERSIDE BENCHMARK NO. "A-31"
COUNTY OF RIVERSIDE BENCHMARK - 3 1/4" ALUMINUM DISK MARKED A-31, LOCATED FLUSH AT THE SOUTH WEST CORNER OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB LOCATED AT THE CROSSING OF PERRIS BLVD. AND RIV. CO. FLOOD CONTROL CHANNEL (PERRIS LATERAL "A"), 43 FT. WEST OF CENTERLINE OF PERRIS BLVD. AND 4.5 FT. EAST OF CONCRETE BRIDGE BARRIER. (EDGE OF BRIDGE) MARKED R-102 D.M.R. IN TOP OF CONC. POST FLUSH W/ GROUND
ELEVATION = 1474.674' (NAVD 1929)

REF.	DESCRIPTION	ENGINEER APPR.	ENGINEER DATE	RCFC/ APPR.	RCFC/ DATE
2	CHANGED SLOPE TO 0.0015, ADDED MH, ADDED NEW 10"S, CHANGED 42" LAT TO 24" LAT	H.L.A.	2/29/16	26	3/25/16
1	ADDED EX. UTILITIES, RELOCATE UTILITIES, REVISED SD	H.L.A.	2/29/16	26	3/25/16
	CHANGED CAST IN PLACE RCB TO PRE-CAST RCB PER APWA 300-0				

DESIGNED BY:
DRAWN BY:
DATE DRAWN:

APPROVED BY:
Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173
Haidook I. Aghaian Date: 2/1/16
HAIDOOK I. AGHAIAN RCE NO. 43293

REGISTERED PROFESSIONAL ENGINEER HAIDOOK I. AGHAIAN R.C.E. NO. 43293 Exp. 3-31-16 CIVIL STATE OF CALIFORNIA

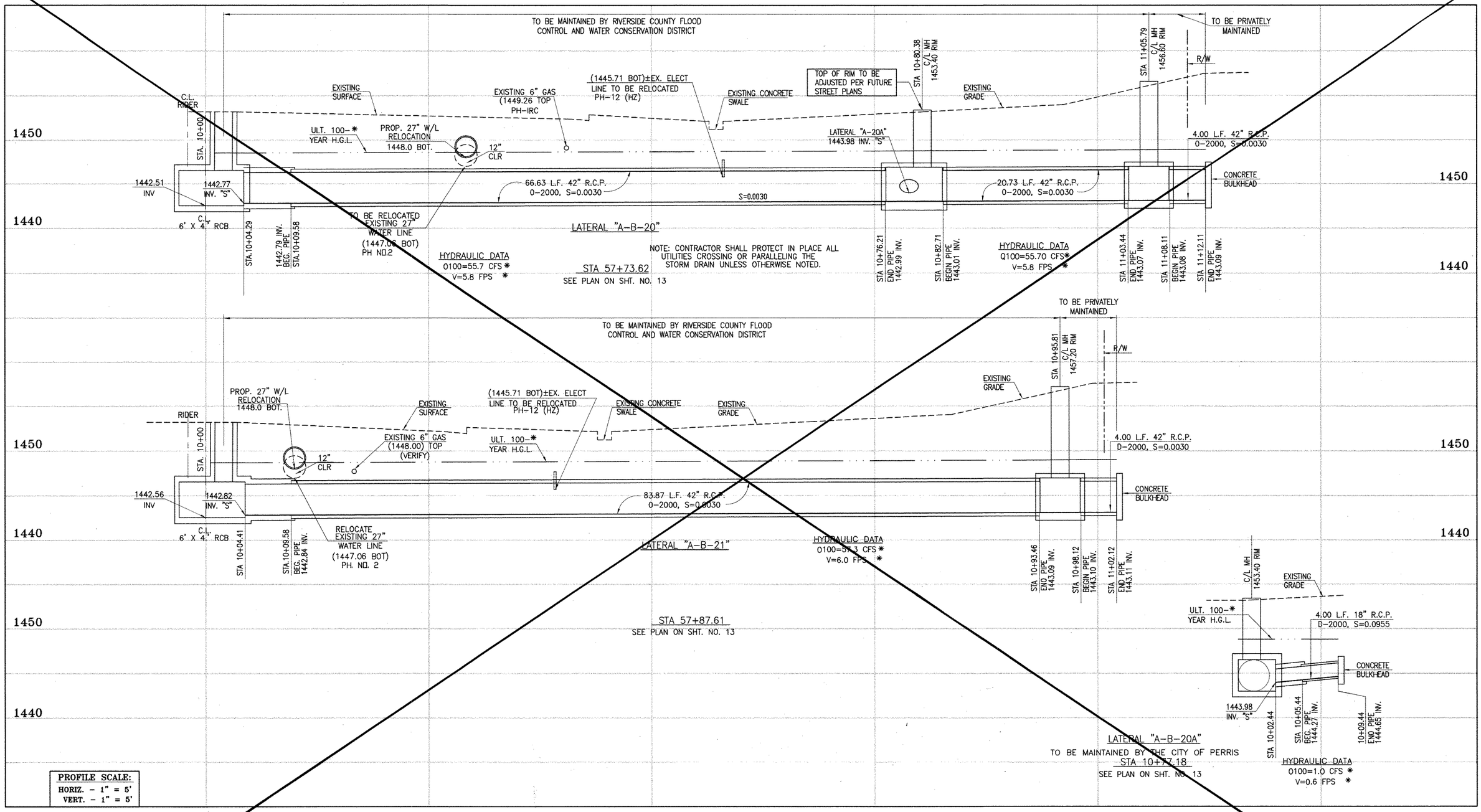
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: DATE:
APPROVED BY: DATE:

CITY OF PERRIS
APPROVED BY:
CITY ENGINEER DATE: 2-9-16
RECOMMENDED DATE:

PERRIS VALLEY MDP LINE "A-B"

CITY OF PERRIS FILE NO. P8-1013
PROJECT NO. 4-0-00537
DRAWING NO. 4-1063
SHEET NO. 16A OF 18

Last Update: 1/29/16
O:\2700-2799\2702\2702F\2702SD16.dwg



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MARKED BY NO2 D.N.R. IN TOP OF CONC. POST FLUSH W/ GROUND
ELEVATION = 1474.674' (NAVD 1929)

REF.	REVISIONS	ENGINEER	DATE	RCFC/	DATE
	SUPERSEDED BY SHEET 17A	H.I.A.	2/25/14	DKS	2/27/14

DESIGNED BY: BW
DRAWN BY: ET
DATE DRAWN:

APPROVED BY:
Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173
HAIDOOK I. AGHAIAN Date: 11/18/14 RCE NO. 43293

REGISTERED PROFESSIONAL ENGINEER HAIDOOK I. AGHAIAN R.C.E. NO. 43293 Exp. 3-31-16 CIVIL STATE OF CALIFORNIA

KFH 4/10/14

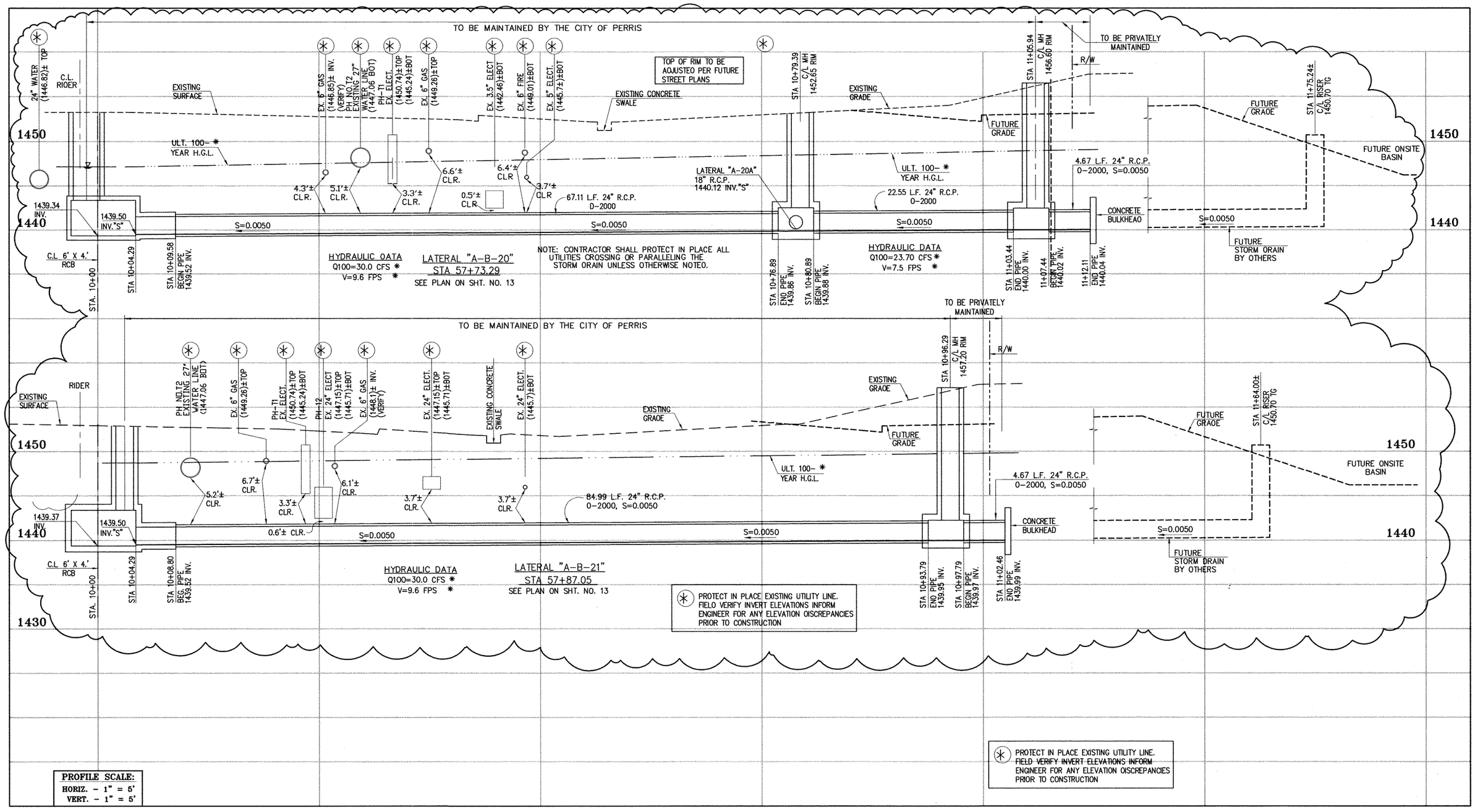
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: DATE: 1/20/2015
APPROVED BY: DATE: 1/20/2015

CITY OF PERRIS
APPROVED BY:
CITY ENGINEER DATE: 12-15-14
RECOMMENDED DATE:

PERRIS VALLEY MDP LINE "A-B"

CITY OF PERRIS
FILE NO. P8-1013
PROJECT NO. 4-0-00537
DRAWING NO. 4-1063
SHEET NO. 17 OF 18

Last Update: 11/18/14
O:\2700-2799\2702\27027F\2702SD17.dwg



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

TWO WORKING DAYS BEFORE YOU DIG

CAUTION:
PROPOSED WORK IS IN PROXIMITY OF HIGH PRESSURE GAS LINES

* THE ULTIMATE H.G.L. IS BASED ON THE AOOPTED MDP WATER SURFACE ELEVATION OF 1433 IN THE PERRIS VALLEY STORM CHANNEL (PVSC) AT RIOER STREET, ANO ASSUMES THAT FULL CHANNEL IMPROVEMENTS HAVE BEEN CONSTRUCTEO PER THE AOOPTEO MOP. FOR ALL WATER SURFACE ELEVATIONS BETWEEN 1433 ANO THE 100-YEAR FLOOO ELEVATION FOR PVSC (1437.5), LINE "A-B" WILL NOT HAVE CAPACITY FOR LOCAL 100-YEAR FLOWS.

BENCH MARK

COUNTY OF RIVERSIDE BENCHMARK NO. "M-31"

COUNTY OF RIVERSIDE BENCHMARK - 3 1/4" ALUMINUM DISK MARKED M-31, LOCATED FLUSH AT THE SOUTH WEST CORNER OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB LOCATED AT THE CROSSING OF PERRIS BLVD. AND RIV. CO. FLOOD CONTROL CHANNEL (PERRIS LATERAL "A"). 43 FT. WEST OF CENTERLINE OF PERRIS BLVD. AND 4.5 FT. EAST OF CONCRETE BRIDGE BARRIER. (EDGE OF BRIDGE) MARKED R-102 D.W.R. IN TOP OF CONC. POST FLUSH W/ GROUND

ELEVATION = 1474.874' (NAVD 1928)

REF.	DESCRIPTION	ENGINEER APPR.	ENGINEER DATE	RCFC/ APPR.	RCFC/ DATE
2	CHANGED SLOPE TO 0.0015, ADDED MH, ADDED NEW 10"S, CHANGED 42" LAT TO 24" LAT. ADDED EX. UTILITIES, RELOCATE UTILITIES, REVISED SD	H.I.A.	2/26/16	DG	2/25/16
1	CHANGED CAST IN PLACE RCB TO PRE-CAST RCB PER APWA 390-0	H.I.A.	2/25/16	DG	2/25/16

DESIGNED BY:
DRAWN BY:
DATE DRAWN:

APPROVED BY:
Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173
HAIDOOK I. AGHAIAN
Date: 2/1/16
RCE NO. 43293

REGISTERED PROFESSIONAL ENGINEER HAIDOOK I. AGHAIAN R.C.E. NO. 43293 Exp. 3-31-16 CIVIL STATE OF CALIFORNIA

KFH 2/17/16

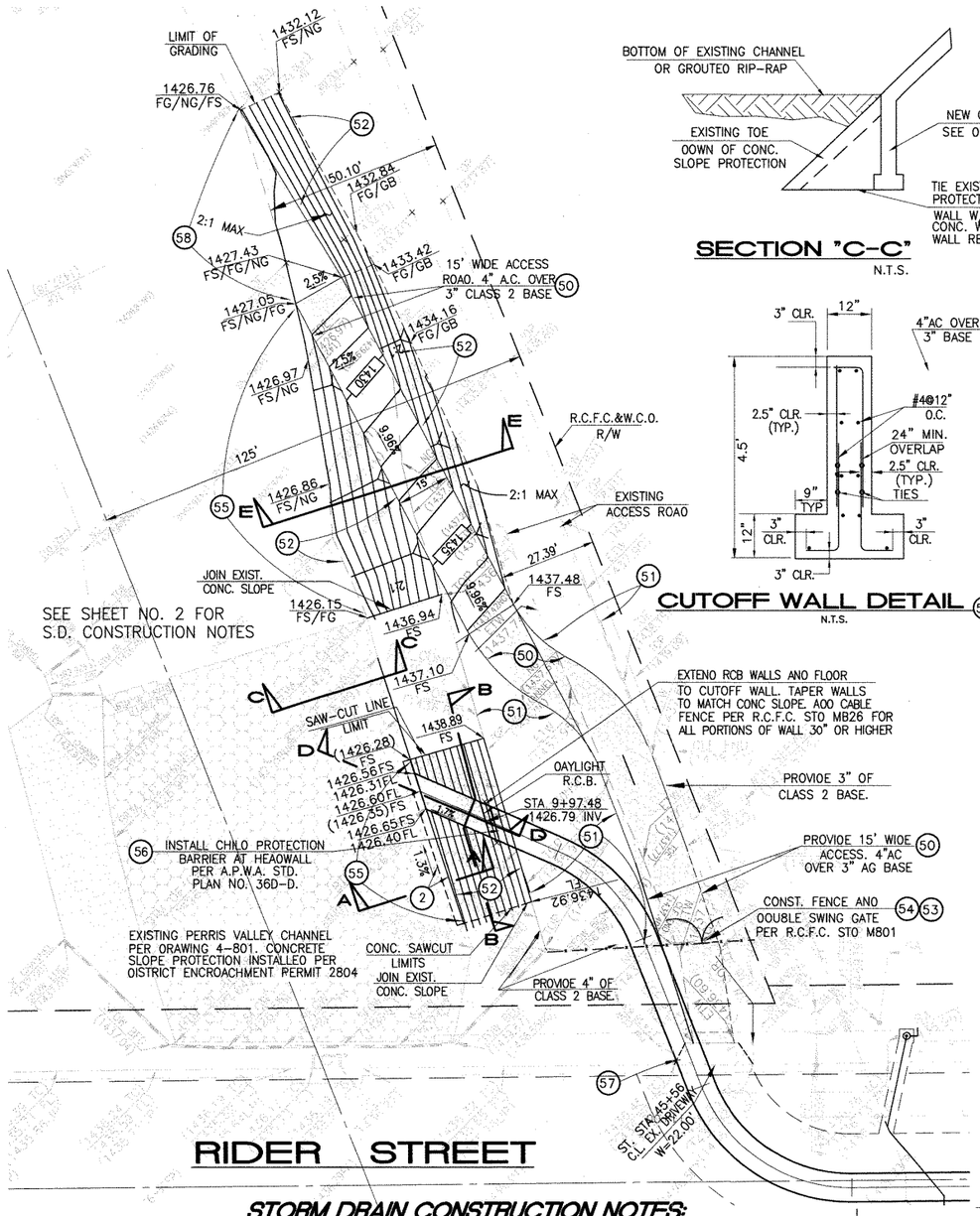
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: DATE:
APPROVED BY: DATE:

CITY OF PERRIS
APPROVED BY:
CITY ENGINEER 2-5-16 DATE:
RECOMMENDED DATE:

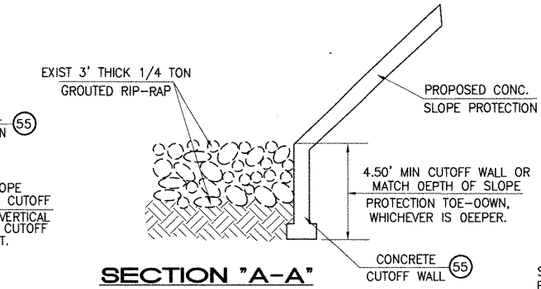
PERRIS VALLEY MDP LINE "A-B"

CITY OF PERRIS FILE NO. P8-1013
PROJECT NO. 4-0-00537
DRAWING NO. 4-1063
SHEET NO. 17A OF 18

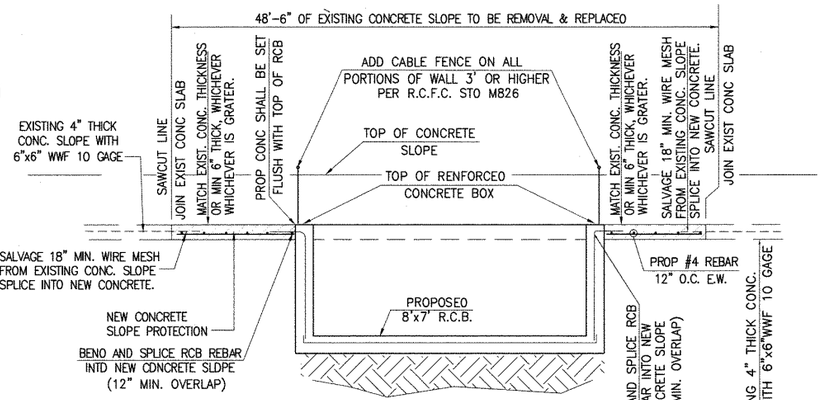
Last Update:1/29/16
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SECTION "C-C"
N.T.S.

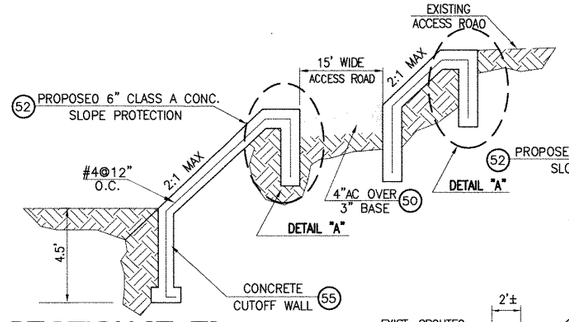


SECTION "A-A"
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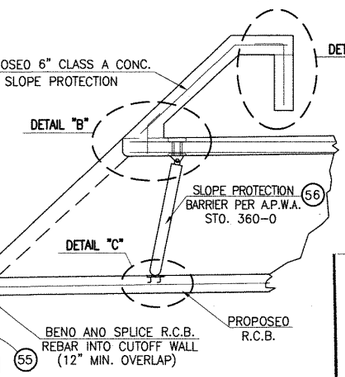


SECTION "B-B"
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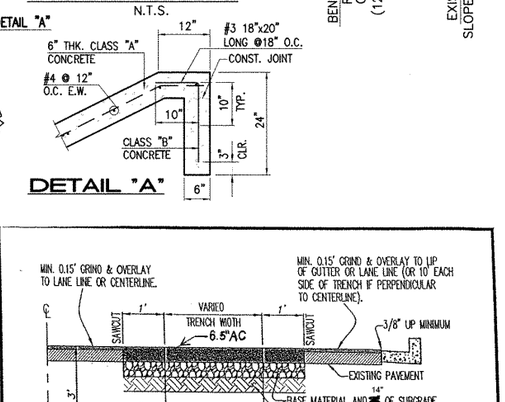
CUTOFF WALL DETAIL
58
N.T.S.



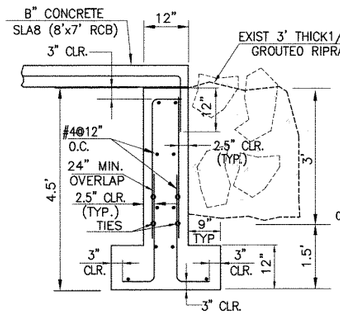
SECTION "E-E"
N.T.S.



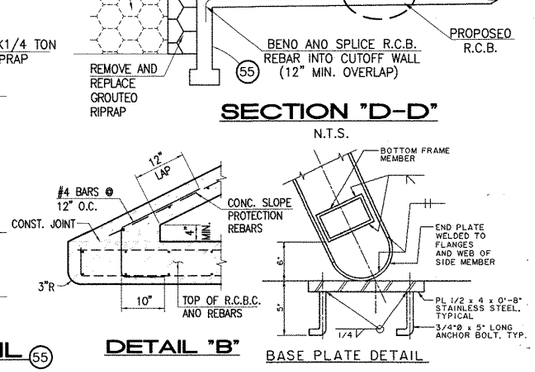
SECTION "D-D"
N.T.S.



DETAIL "A"



CUTOFF WALL DETAIL
55
N.T.S.

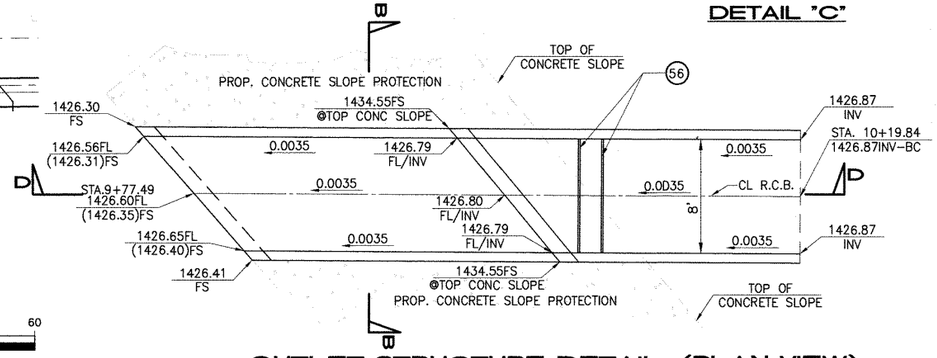


DETAIL "B"

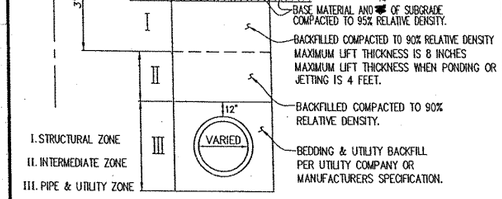
BASE PLATE DETAIL

SLOPE PROTECTION BARRIER
A.P.W.A. STD. 36D-D

DETAIL "C"



OUTLET STRUCTURE DETAIL (PLAN VIEW)
KEH 4/10/14
N.T.S.



NOTES:

1. STREET STRUCTURAL SECTION TO BE AS FOLLOWS:
   A.C. SURFACING = MATCH EXISTING THICKNESS + ONE INCH.
   BASE = MATCH EXISTING THICKNESS (MUST USE CLASS II BASE)
   ~~IF NO CASE SHALL THE STRUCTURAL SECTION SHALL BE LESS THAN 3" OVER 6" CLASS II BASE.~~ CITY MAY ALSO SPECIFY STRUCTURAL SECTION FOR ROADWAY IN CERTAIN SITUATIONS.
2. WHEN A FIRM FOUNDATION IS NOT ENCOUNTERED DUE TO SOFT, SPONGY OR OTHER UNSUITABLE MATERIAL, SUCH MATERIAL SHALL BE REMOVED TO THE LIMITS DIRECTED BY THE INSPECTOR, AND THE RESULTING EXCAVATION BACKFILLED WITH CLASS II BASE.
3. CONTRACTOR TO PROVIDE INSPECTOR COPY OF COMPACTION REPORTS PRIOR TO PAVING.

CITY OF PERRIS
CITY STANDARD
UTILITY TRENCH SURFACE REPAIR
SCALE: NONE
APPROVED BY:
CITY ENGINEER: DATE: 7-12-06
STD. NO. N/A

TRENCH AND SURFACE REPAIR DETAIL
18

STORM DRAIN CONSTRUCTION NOTES:

(2) REMOVE ANO REPLACE APPROXIMATELY 2' WIOE 1/4 TON GROUTEO RIPRAP, MATCH EXISTING THICKNESS.
(50) CONSTRUCT 4" AC OVER 3" AGGREGATE 8ASE, CLASS 2.
(51) INSTALL 3" AGGREGATE BASE, CLASS 2.
(52) CONSTRUCT 6" THK. CONCRETE SLOPE PROTECTION PER OETAIL ON THIS SHEET.
(53) CONSTRUCT FENCE ANO OOUI8LE SWING GATE PER R.C.F.O. STO. M801.
(54) REMOVE EXISTING FENCE ANO GATE.
(55) CONSTRUCT CUTOFF WALL PER OETAIL ON THIS SHEET.
(56) INSTALL SLOPE PROTECTION BARRIER PER APWA STO. PLAN 360.
(57) RECONSTRUCT EXISTING ORIVEWAY APPROACH.
(58) CONSTRUCT CUTOFF WALL PER OETAIL ON THIS SHEET.

0 10 20 40 60
SCALE:1"=20'

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for the location of buried utility lines.
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BENCH MARK
COUNTY OF RIVERSIDE BENCHMARK NO. "M-31"
COUNTY OF RIVERSIDE BENCHMARK - 3 1/4" ALUMINUM DISK MARKED M-31, LOCATED FLUSH AT THE SOUTH WEST CORNER OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB LOCATED AT THE CROSSING OF PERRIS BLVD. AND RIV. CO. FLOOD CONTROL CHANNEL (PERRIS LATERAL "A"), 43 FT. WEST OF CENTERLINE OF PERRIS BLVD. AND 4.5 FT. EAST OF CONCRETE BRIDGE BARRIER (EDGE OF BRIDGE) MARKED R-103 D.M.R. IN TOP OF CONC. POST FLUSH W/ GROUND
ELEVATION = 1474.674' (NAVD 1929)

REF.	REVISIONS	APPR.	DATE	APPR.	DATE

ENGINEER | RCFC/

DESIGNED BY: SW
DRAWN BY: ET
DATE DRAWN:

APPROVED BY:
Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173
HAIDOOK I. AGHAIAN Date: 11/18/14
RCE NO. 43293

REGISTERED PROFESSIONAL ENGINEER HAIDOOK I. AGHAIAN R.C.E. NO. 43293 Exp. 3-31-16 CIVIL STATE OF CALIFORNIA

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION OISTRICT
RECOMMENDED FOR APPROVAL BY: DATE: 4/20/15
APPROVED BY: DATE: 1/22/2015

CITY OF PERRIS
APPROVED BY:
CITY ENGINEER DATE: 12-15-14
RECOMMENDED DATE:

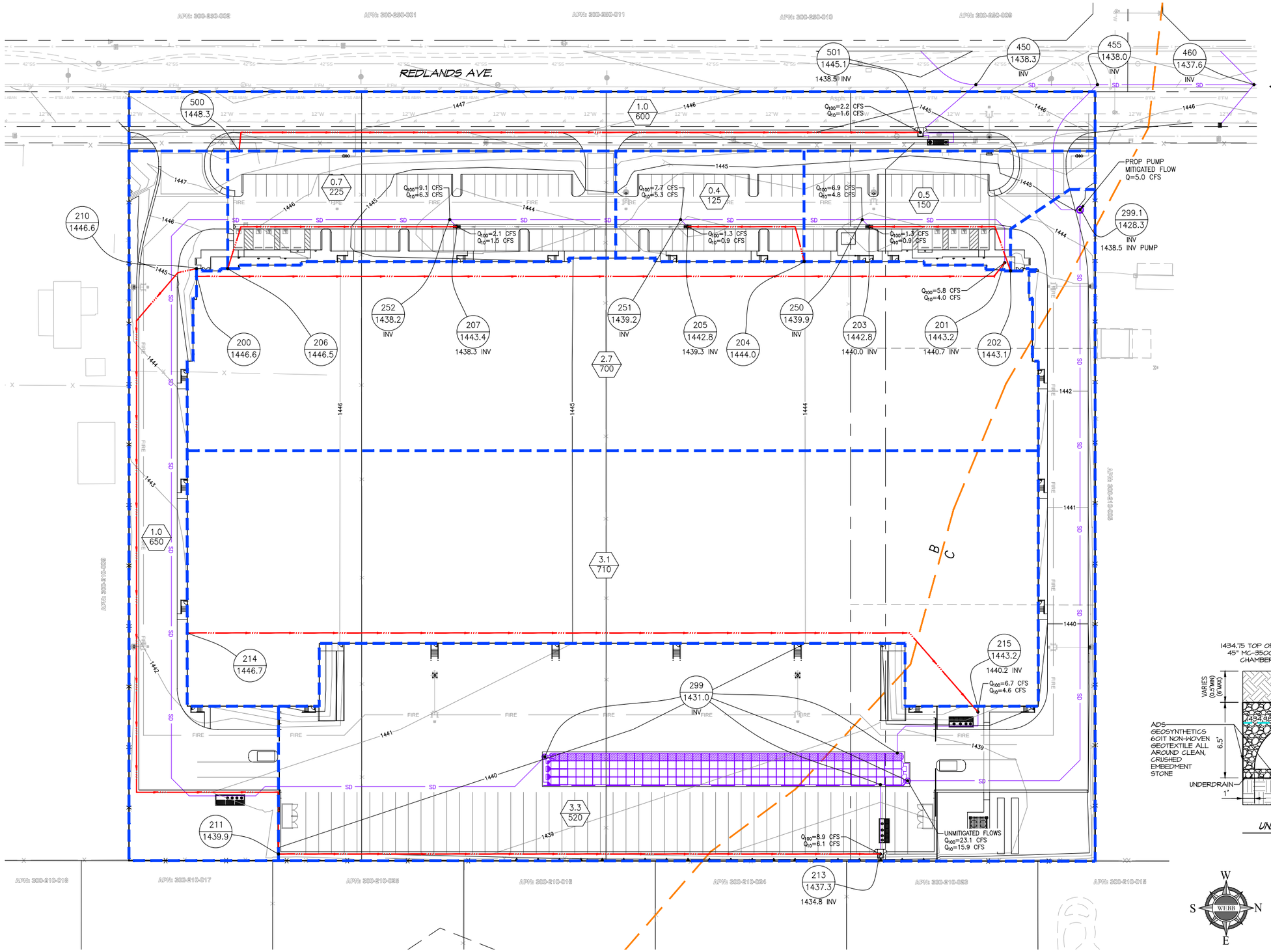
PERRIS VALLEY MDP
LINE "A-B"
DETAILS

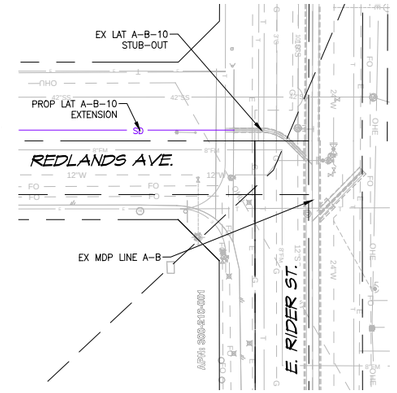
CITY OF PERRIS
FILE NO. P8-1013
PROJECT NO. 4-0-00537
DRAWING NO. 4-1063
SHEET NO. 18 OF 18

Last Update:11/18/14
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REDLANDS EAST HYDROLOGY MAPS

PRELIMINARY HYDROLOGY MAP
REDLANDS EAST





NOTES

– NODES 450, 455, AND 460 ARE SHOWN FOR REFERENCE. RATIONAL METHOD CALCULATIONS COMBINING THE FLOW RATES OF THE REDLANDS EAST AND REDLANDS WEST PROJECTS CAN BE FOUND IN THE RATIONAL METHOD HYDROLOGY.

– PEAK MITIGATED FLOW RATES HAVE BEEN CALCULATED ONLY FOR THE 100–YEAR STORM EVENT. PEAK MITIGATED FLOW RATES FOR THE 10–YEAR STORM EVENT WILL BE CONSIDERABLY LOWER THAN THE 100–YEAR PEAK MITIGATED FLOW RATES. MAP FOR THE REDLANDS WEST PROJECT.

– UNDERGROUND CHAMBERS ARE PROPOSED WITH A PROPOSED PUMP IN ORDER TO CONVEY A MAXIMUM OF 5.0 CFS TOWARDS THE PROP LAT A–B–10 ALONG REDLANDS AVENUE.

LEGEND

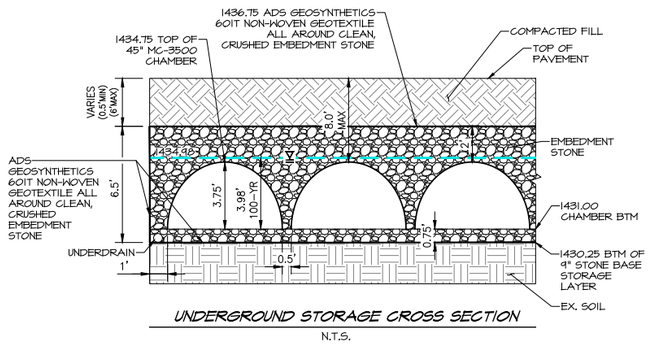
NODE / ELEV – NODE NUMBER / ELEVATION (FT)

AC / FT – AREA (AC) / LENGTH (FT)

– DRAINAGE AREA BOUNDARY (PROPOSED)

– FLOWLINE (PROPOSED)

– NRCS SOIL BOUNDARY



UNDERGROUND STORAGE CROSS SECTION

N.T.S.

1" = 40'

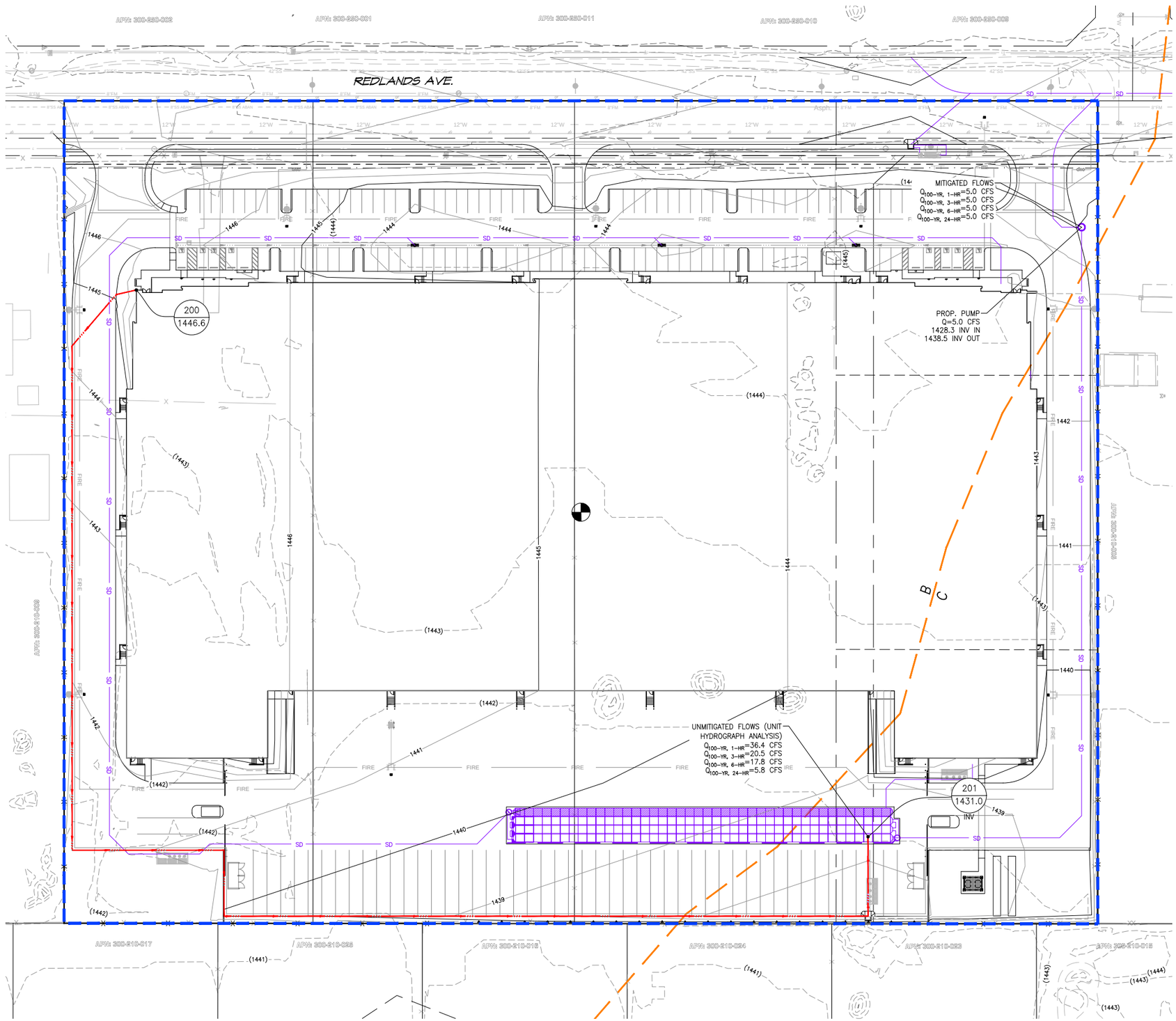
40 0 40 80 120

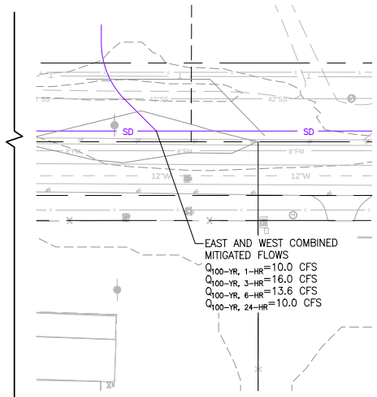
CITY OF PERRIS, CALIFORNIA
REDLANDS EAST
DEVELOPED RATIONAL METHOD
HYDROLOGY MAP

SCALE:	1"=40'	ALBERT A. WEBB ASSOCIATES	W.O. 20–0181
DATE:	11/9/2020	ENGINEERING CONSULTANTS 3788 McCRAY STREET RIVERSIDE, CA. 92506 PH. (951) 686–1070 FAX (951) 788–1256	SHEET 1 OF 1 SHEETS
DESIGNED:	AYS		
CHECKED:	JRG		
PLN CK REF:			DWG. NO.
F.B.			

H:\2020\20–0181\DRAINAGE\PHYD\DWG FOLDER\20–0181–C–RATIONAL METHOD MAPS.DWG 5/13/2021 5:32:45 PM

PRELIMINARY UNIT HYDROGRAPH MAP
REDLANDS EAST





PROPOSED	
TOTAL AREA	12.6 AC
L_T	1235 Ft
L_{CA}	300 Ft
ΔH	15.6 Ft

LEGEND

- NODE / ELEV – NODE NUMBER / ELEVATION (FT)
- AC / FT – AREA (AC) / LENGTH (FT)
- DRAINAGE AREA BOUNDARY (PROPOSED)
- FLOWLINE (PROPOSED)
- NRCS SOIL BOUNDARY

W S N E

1" = 40'

40 0 40 80 120

CITY OF PERRIS, CALIFORNIA
REDLANDS EAST

DEVELOPED CONDITION
UNIT HYDROGRAPH EXHIBIT

SCALE:	1"=40'	W.O.	20-0181
DATE:	11/9/2020	SHEET	1
DESIGNED:	AYS	OF	1 SHEETS
CHECKED:	JRG	DWG. NO.	
PLN CK REF:			
F.B.			

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

H:\2020\20-0181\DRAINAGE\PHYD\DWG FOLDER\20-0181-C-UH MAPS.DWG 5/13/2021 5:29:13 PM