PRELIMINARY DRAINAGE STUDY
(HYDROLOGY AND HYDRAULICS)
FOR
WESTPORT-PERRIS
(PRELIMINARY ENGINEERING)

CITY CASE #: DPR22-00021

Job Number 2202

May 27, 2022
Revised: November 10, 2022

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REVISION PAGE

November 10, 2022

This report presents revisions to the previous version of the preliminary drainage study, dated May 27, 2022. Based on the Conditions of Approval memorandum, dated September 29, 2022, received from the City of Perris Public Works Department, the preliminary grading plan was revised to reflects the requested information from Item #1 in the memorandum and eliminate the cul-de-sac that was previously proposed on Brennan Avenue. As such, this preliminary drainage study was revised to be consistent with the revised preliminary grading plan (revised in early November 2022).

1.0 INTRODUCTION

1.1 Project Location

This drainage study presents preliminary engineering hydrologic and hydraulic analyses for the proposed Westport-Perris project (herein referred to as "the project"). The project is located at the northeast corner of the intersection of Ramona Expressway and Brennan Avenue, in the City of Perris. There are existing developed industrial parcels to the north and east. Refer to Figure 1.0 for a Vicinity Map of the project. Applicable Assessor Parcel Numbers (APNs) are 302-260-078, 302-260-079, 302-260-080, and 302-260-081.

1.2 Project Description

The site is approximately 4.5 acres (parcel gross area) with a drainage management area of approximately 4.5 acres. The proposed warehouse building footprint is approximately 99,957 square feet (including 5,650 square feet office) and there will be a total of 44 parking spaces to be provided. The proposed impervious and pervious footprints within the drainage management area are approximately 171,198 square feet and 24,064 square feet, respectively. The project also includes frontage street improvements. In order to comply with the Riverside County drainage and water quality management requirements, the project also includes construction of permanent stormwater BMPs.

1.3 Drainage Characteristics

In the existing condition, the site is vacant (dirt open space) and contains very little vegetation. It appears the vegetation has been cleared over time. Runoff from the site generally drains in an easterly direction towards a privately-maintained open trapezoidal channel located to the east of the project (maintained by others). Offsite run-on is not expected. To the east of the aforementioned trapezoidal channel (running parallel to it) is an existing 54-inch reinforced concrete pipe (RCP) that in interim is maintained by the City of Perris and ultimately to be maintained by RCFC&WCD once the ultimate MDP Line E gets built out. This is shown on a storm drain plan titled, "Perris Valley MDP Lateral "E-4", Stage 1" (Project No. 4-0-0460; Drawing No. 4-1070; PM 36010). Separately, to the south of the project running parallel to Ramona Expressway, there is an existing

90-inch RCP (part of the MDP Line E) that in interim is maintained by the City of Perris and in the future to be maintained by RCFC one the Line E gets built out, based on a storm drain plan titled, "Perris Valley MDP Line E Stage 3" (Project No. 4-0-00488; Drawing No. 4-1117; PM 36512 / PM 36582; City File No. P8-1226). Lastly, to the north of the existing 90-inch RCP running parallel to Ramona Expressway is an existing 42-inch RCP that is maintained by the City of Perris in perpetuity, based on a storm drain plan titled, "Perris Valley MDP Line E Stage 2 Lateral E-4 Stage 1" (Project No. 4-0-0488 / 4-0-0460; Drawing No. 4-1070; PM 36010). The aforementioned three storm drain systems contribute to the downstream MDP Line E that is currently constructed to the intersection of Ramona Expressway and Indian Avenue. Relevant reference drawings (excerpts) are included in Appendix E of this report for reference purpose. From this point, runoff drains via surface flow in an easterly direction until it reaches the existing Perris Valley Storm Drain Channel.

In the post-project condition, the drainage characteristics will be maintained similar as compared to the pre-project condition. Runoff from the proposed on-site improvements will be directed to a proposed BMP (proprietary modular wetland system) located near the southeasterly corner of the project for storm water quality treatment to comply with the City and Santa Ana Region's Water Quality Management Plan (WQMP) requirements. As the three aforementioned existing storm drain systems are contributing to the same existing MDP Line E downstream, the project plans to connect the on-site flows to the existing 42-inch RCP in the project frontage along Ramona Expressway that is maintained by the City of Perris. From this point, runoff continues to drain to the same existing MDP Line E facility. Since runoff connects into an existing MDP Line E system that is designed to have capacity to accommodate the ultimate buildout condition peak flows from this area including the project, the flood control detention mitigation should not be necessary.

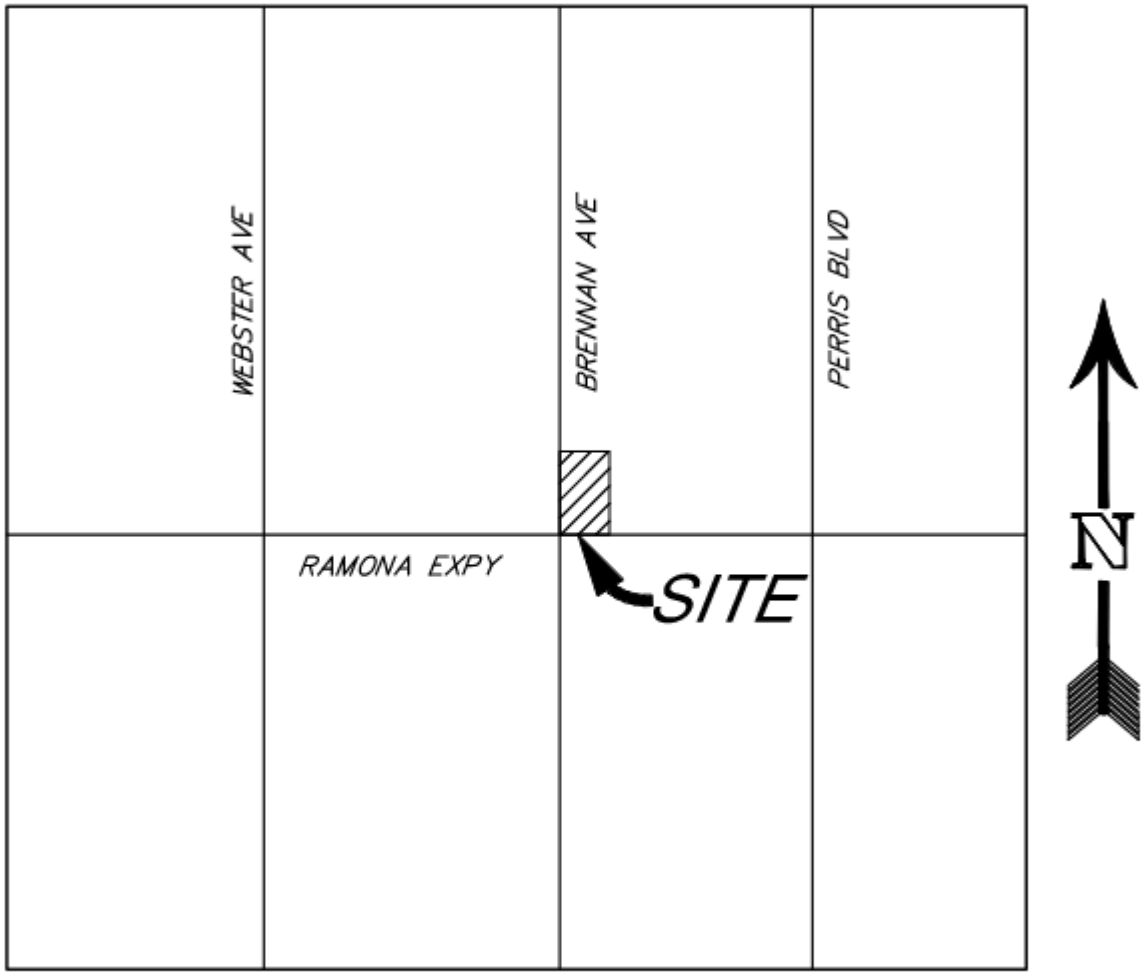
1.4 FEMA Flood Hazard Zone Information

The project is shown on the FEMA Flood Insurance Rate Map (FIRM) number 06065C1430H, effective August 18, 2014 and labeled as Zone X. No FEMA submittals are anticipated to be required for this project. For reference purpose, a copy of the FIRMette (reduced size) is included at the end of Appendix A.

1.6 Water Quality Management

In support of the preliminary site plan, a preliminary Water Quality Management Plan (WQMP) has been prepared for the project. The report is titled, "Preliminary Water Quality Management Plan for Westport-Perris," dated November 10, 2022, prepared by SDH & Associates, Inc. (Job Number 2202). The preliminary WQMP documents how the project addresses the requirements regarding permanent stormwater quality management, in accordance with the stormwater guidance document titled, "2010 Water Quality Management Plan for the Santa Ana Region of Riverside County."

Figure 1: Vicinity Map



2.0 HYDROLOGY

Preliminary hydrologic calculations were prepared in accordance with the Riverside County Flood Control and Water Conservation District - Hydrology Manual, dated April 1978 (manual) for preliminary on-site storm drain sizing purpose. The Advanced Engineering Software (AES) 2016 Rational Method Analysis (Version 23.0) program was used to perform the hydrologic analysis in this study.

The AES hydrologic model is developed by creating independent node-link models of each interior drainage basin and linking these sub-models together at confluence points. The program has the capability to perform calculations for 15 hydrologic processes. These processes are assigned code numbers that appear in the results. The code numbers and their significances are as follows:

Subarea Hydrologic Processes (Codes)

Code 1: Confluence analysis at a node
Code 2: Initial subarea analysis
Code 3: Pipe flow travel time (computer-estimated pipe sizes)
Code 4: Pipe flow travel time (user-specified pipe size)
Code 5: Trapezoidal channel travel time
Code 6: Street flow analysis through a subarea
Code 7: User-specified information at a node
Code 8: Addition of the subarea runoff to mainline
Code 9: V-Gutter flow through a subarea
Code 10: Copy main-stream data onto a memory bank
Code 11: Confluence a memory bank with the main-stream memory
Code 12: Clear a memory bank
Code 13: Clear the main-stream memory
Code 14: Copy a memory bank onto the main-stream memory
Code 15: Hydrologic data bank storage functions

In order to perform the hydrologic analysis; base information for the study area is required. This information includes the drainage facility locations and sizes, land uses, flow patterns, drainage basin boundaries, and topographic elevations. Compiled Hydrologic backup is included as Appendix A to this report.

Area

Drainage boundaries were delineated to distinguish areas with similar flow characteristics and hydrologic properties in order to determine peak flows at key points and facilitate hydraulic analyses. Drainage basin boundaries, flow patterns, and topographic elevations are shown on the hydrologic workmap for the site, included in Appendix B.

Time of Concentration/Intensity

The time of concentration was calculated using AES to determine the intensity for the 10-year and 100-year storm events. The 10-minute and 60-minute intensity values for the project were obtained from the Riverside County Hydrology Manual as input data into AES. An annotated chart has been included in Appendix A.

Runoff Coefficient

The runoff coefficients used for each minor basin were calculated by the AES software based on the user-entered information of the hydrologic soil group and the land use for each basin. The specified land use information in accordance with Plate D-5.6 of the Hydrology Manual was used by AES to estimate the runoff coefficient.

Hydrologic soil group data based on the Riverside County Hydrology Manual indicates the project primarily consists of Hydrologic Soil Group "B". For the purpose of hydrologic calculations for the proposed condition, Soil Group B has been applied. Supporting information is included with Appendix A of this report.

Topography

The onsite project specific topography consists of 1-foot contours on the NAVD-88 vertical datum, provided by Arrowhead Mapping Corp.

2.1 Hydrologic Results

The on-site hydrologic results at key points of interest for the project can be found in Tables 2.1. Table 2.1 shows the hydrologic results at the proposed on-site catch basin locations (major catch basin locations) and overall on-site peak flow rate at the project outlet point of interest. The detailed hydrologic calculation results are located in Appendix B of this report.

Table 2.1 – On-site Hydrologic Data Summary at Key Locations (10-year & 100-year)

Key Drainage Node ID[3]	On-site Post-project[1]		
	Total Area (Acres)	Peak Flow Rate, Q_{10} (cfs)[2]	Peak Flow Rate, Q_{100} (cfs)[2]
110 (On-site Catch Basin - Surface)	0.5	1.0	1.4
115 (On-site Catch Basin - Surface)	1.8	4.2	6.0
125 (On-site Atrium Drain - Surface)	0.1	0.2	0.3
135 (On-site Flow to Swale - Surface)	0.7	1.1	1.6
140 (On-site Catch Basin - Surface)	2.1	3.4	4.8
180 (Drainage Outlet to Ramona Expressway)	**4.5**	**6.3**	**9.1**

Note:

1: Refer to Appendix A for supporting information.

2: "cfs"= cubic feet per second.

3: Refer to Appendix B for Drainage Study Map

3.0 HYDRAULICS

3.1 Hydraulic Methodology and Criteria

The 10-year, 1-hour proposed peak flow rates determined using the Modified Rational Method (AES Rational Method) outputs are used to determine preliminary sizes for the on-site storm drain system.

3.2 Inlet Sizing

Inlet design calculation specific to the proposed surface catch basin will be conducted during final engineering and calculation output will be incorporated in Appendix C. In the post-project condition, the on-site proposed private storm drain catch basins (inlets) will be designed to intercept, at a minimum, the 10-year, 1-hour peak flow rates.

3.3 Storm Drain Sizing

Preliminary storm drain sizing calculations were conducted in order to size the proposed on-site private storm drain pipes. The calculations were prepared using the 10-year, 1-hour peak flow rate output from the AES Rational Method and the Manning's equation along with a sizing bump-up factor (typically in the range of 15 to 30%) in an effort to account for potential hydraulic losses. Typically, this calculation approach is adequate for on-site private storm drain sizing. If necessary, a more detailed hydraulic calculation may be provided on a case-by-case basis during final engineering to validate the required storm drain sizes. A summary of relevant on-site storm drain sizing calculations is provided in Appendix D. Also, a normal depth calculation for the proposed vegetated swale (along the southerly edge of the project) has been performed to ensure that the treatment flow and the 100-year peak flow rate are conveyed. A supporting calculation is provided at the end of Appendix D.

4.0 FLOOD CONTROL ASSESSMENT

The project is expected to increase the peak flow rate as a result of the proposed improvements. However, as indicated in Section 1.0 of this report, runoff from the proposed project will be directly connecting into an existing 42-inch RCP in project frontage along Ramona Expressway, which then drains to an existing MDP Line E facility downstream. Since the on-site runoff connects into an existing MDP Line E system that is anticipated to have capacity to accommodate the ultimate buildout condition peak flows from this area including the project, the flood control detention mitigation should not be necessary. Additionally, the project is also exempted from the hydrologic condition of concern (HCOC) requirements since the project is situated within the Riverside County WAP HCOC Exemption area approved on April 20, 2017.

5.0 CONCLUSION

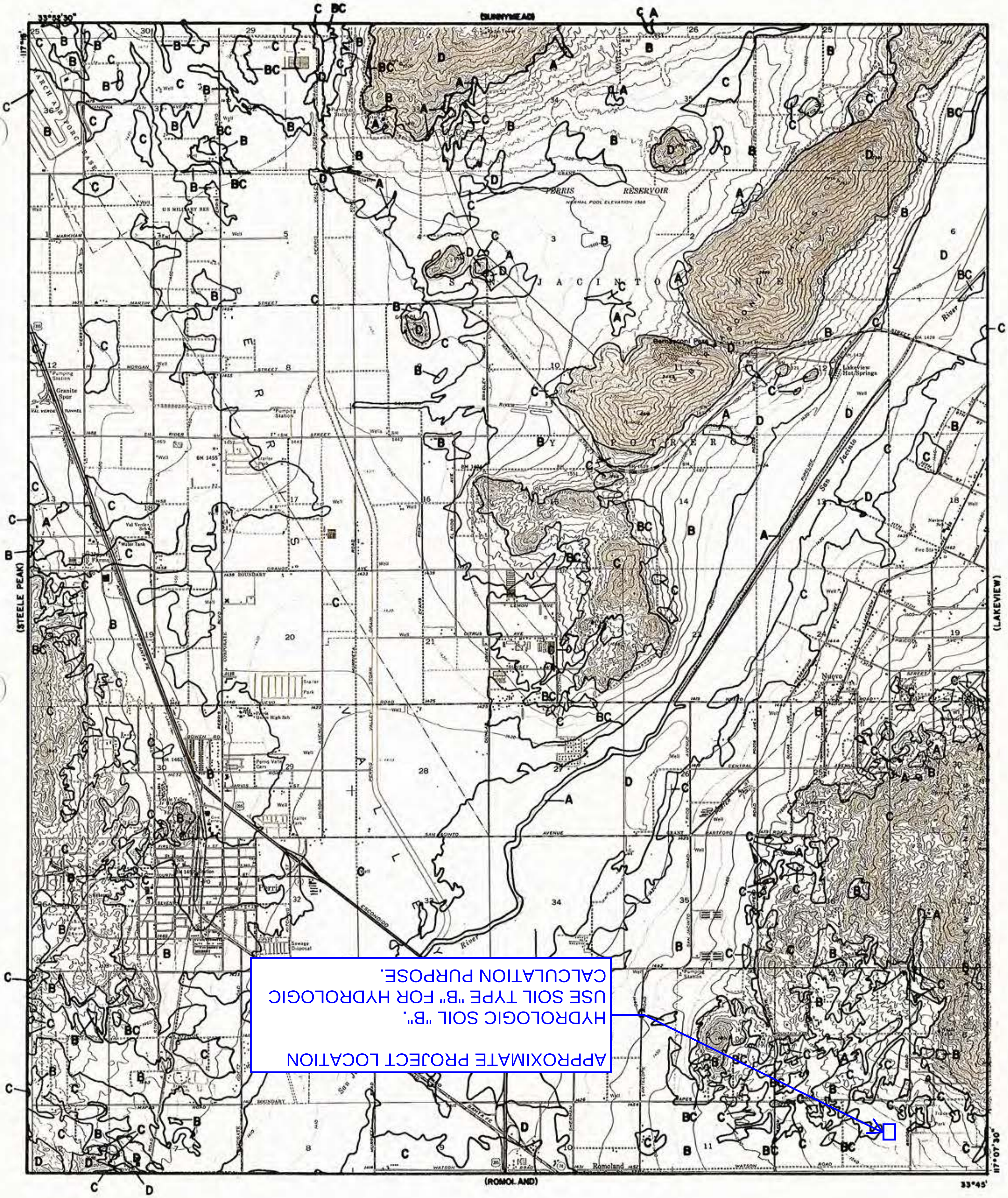
This drainage study presents preliminary hydrologic and hydraulic analyses for the proposed Westport-Perris project. Hydrologic calculations were computed in accordance with the Riverside County Flood Control and Water Conservation District - Hydrology Manual, dated April 1978 (manual). The Advanced Engineering Software (AES) 2016 Rational Method Analysis (Version 23.0) program was used for the rational method modeling in this study. The peak discharge rates for the 10-year and 100-year storm events with 1-hour storm frequency have been determined for the project. The relevant peak flow rates were used to determine the preliminary onsite storm drain sizes. As mentioned in Section 4.0, since the on-site runoff connects into an existing MDP Line E system that is anticipated to have capacity to accommodate the ultimate buildout condition peak flows from this area including the project, the flood control detention mitigation should not be necessary. The on-site runoff will be treated via a proposed permanent storm water quality BMP prior to discharging into the offsite existing storm drain system along Ramona Expressway. During the final design stage, an encroachment permit is expected to be processed with the City of Perris for the on-site storm drain connection into the existing 42-inch RCP. In summary, no adverse impacts are anticipated to the downstream drainage facilities as a result of this project.

Appendix A

Hydrologic Backup Information

Includes:

1. Web Soil Survey Hydrologic Soil Group
2. NOAA Atlas 14 Annotated Rainfall Intensity Chart
3. FEMA FIRMette



LEGEND

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

RCFC & WCD
Hydrology Manual

0 FEET 5000

HYDROLOGIC SOILS GROUP MAP FOR PERRIS

SUPPORTING MATERIALS - HYDROLOGIC SOILS GROUP

PLATE C-1.30

RAINFALL INTENSITY—INCHES PER HOUR

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

STANDARD
INTENSITY-DURATION
CURVES DATA

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations (BFEs) shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 11. The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242** or visit its website at http://www.ngs.noaa.gov/.

Base map information shown on this FIRM was derived from multiple sources including the Riverside County, CA effective database, and the National Geodetic Survey. Base map imagery for Riverside County, CA is a mosaic of the NAIP 2009 images, 1 meter resolution.

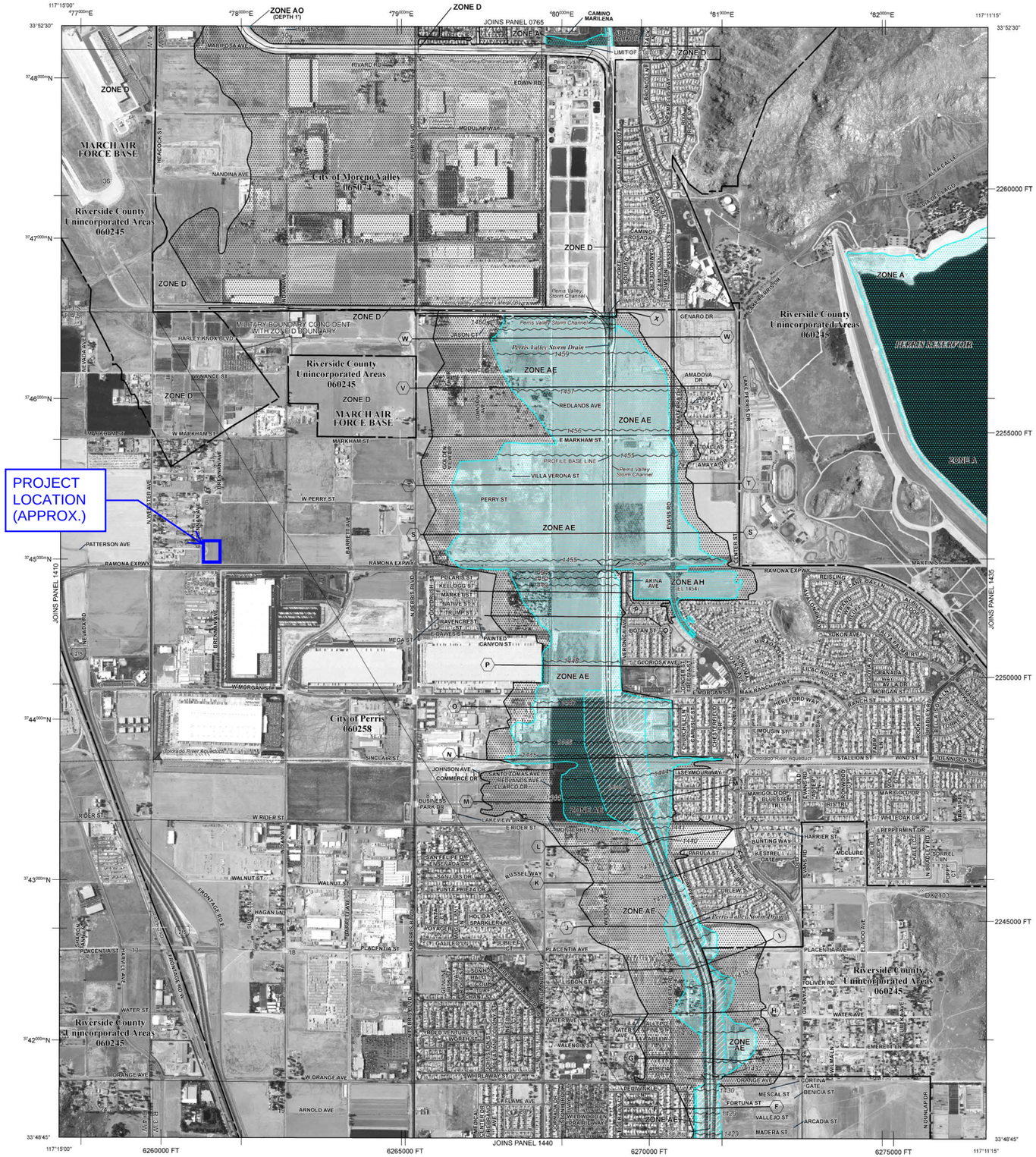
The **"profile base lines"** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the "profile base line", in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Map Service Center website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information eXchange.

NOTE:
THE PROJECT IS SITUATED WITHIN FEMA ZONE X; THEREFORE, NO PROCESSING SHOULD BE REQUIRED THROUGH FEMA.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Areas to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

- A–A — Cross section line
- 23–23 — Transect line
- 97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
- 4675000mE — 1000-meter Universal Transverse Mercator grid ticks, zone 11
- 6000000 FT — 5000-foot grid values: California State Plane coordinate system, Zone VI (FIPSZONE = 406), Lambert projection
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories List on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
August 28, 2008

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
August 18, 2014: for a description of revisions, see Notice to Users page in the Flood Insurance Study report.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'

500 0 500 1,000 1,500 2,000 FEET
300 0 300 600 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1430H

FIRM

FLOOD INSURANCE RATE MAP
RIVERSIDE COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 1430 OF 3805
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MORENO VALLEY, CITY OF	065074	1430	H
PERRIS, CITY OF	060258	1430	H
RIVERSIDE COUNTY, UNINCORPORATED AREAS	060245	1430	H

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06065C1430H

MAP REVISED
AUGUST 18, 2014

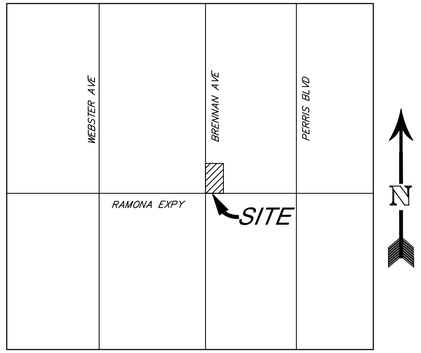
Federal Emergency Management Agency

Appendix B

Modified Rational Method Results

Includes:

1. On-site Post-project Drainage Study Map
2. On-site Post-project AES Rational Method Output (10-year & 100-year)



VICINITY MAP
NOT TO SCALE

NOTES:

1. THIS DRAINAGE STUDY MAP IS PREPARED IN SUPPORT OF THE ON-SITE PRELIMINARY HYDROLOGIC CALCULATIONS AND STORM DRAIN SIZING.
2. IN THE EXISTING CONDITION, THE SITE IS VACANT (DIRT OPEN SPACE) AND CONTAINS VERY LITTLE VEGETATION. IT APPEARS THE VEGETATION HAS BEEN CLEARED OVER TIME. RUNOFF FROM THE SITE GENERALLY DRAINS IN AN EASTERLY DIRECTION TOWARDS A PRIVATELY-MAINTAINED OPEN TRAPEZOIDAL CHANNEL LOCATED TO THE EAST OF THE PROJECT (MAINTAINED BY OTHERS). OFFSITE RUN-ON IS NOT EXPECTED, TO THE EAST OF THE AFOREMENTIONED TRAPEZOIDAL CHANNEL (RUNNING PARALLEL TO IT) IS AN EXISTING 54-INCH REINFORCED CONCRETE PIPE (RCP) THAT IN INTERIM IS MAINTAINED BY THE CITY OF PERRIS AND ULTIMATELY TO BE MAINTAINED BY RCFC&WCD ONCE THE ULTIMATE MDP LINE E GETS BUILT OUT. SEPARATELY, TO THE SOUTH OF THE PROJECT RUNNING PARALLEL TO RAMONA EXPRESSWAY, THERE IS AN EXISTING 90-INCH RCP (PART OF THE MDP LINE E) THAT IN INTERIM IS MAINTAINED BY THE CITY OF PERRIS AND IN THE FUTURE TO BE MAINTAINED BY RCFC ONE THE LINE E GETS BUILT OUT, BASED ON A STORM DRAIN PLAN TITLED, "PERRIS VALLEY MDP LINE E STAGE 3" (PROJECT NO. 4-0-00488; DRAWING NO. 4-1117; PM 36512 / PM 36582; CITY FILE NO. P8-1226). LASTLY, TO THE NORTH OF THE EXISTING 90-INCH RCP RUNNING PARALLEL TO RAMONA EXPRESSWAY IS AN EXISTING 42-INCH RCP THAT IS MAINTAINED BY THE CITY OF PERRIS IN PERPETUITY, BASED ON A STORM DRAIN PLAN TITLED, "PERRIS VALLEY MDP LINE E STAGE 2 LATERAL E-4 STAGE 1" (PROJECT NO. 4-0-0488 / 4-0-0460; DRAWING NO. 4-1070; PM 36010). THE AFOREMENTIONED THREE STORM DRAIN SYSTEMS CONTRIBUTE TO THE DOWNSTREAM MDP LINE E THAT IS CURRENTLY CONSTRUCTED TO THE INTERSECTION OF RAMONA EXPRESSWAY AND INDIAN AVENUE. FROM THIS POINT, RUNOFF DRAINS VIA SURFACE FLOW IN AN EASTERLY DIRECTION UNTIL IT REACHES THE EXISTING PERRIS VALLEY STORM DRAIN CHANNEL.
3. IN THE POST-PROJECT CONDITION, THE DRAINAGE CHARACTERISTICS WILL BE MAINTAINED SIMILAR AS COMPARED TO THE PRE-PROJECT CONDITION. RUNOFF FROM THE PROPOSED ON-SITE IMPROVEMENTS WILL BE DIRECTED TO A PROPOSED BMP (PROPRIETARY MODULAR WETLAND SYSTEM) LOCATED NEAR THE SOUTHEASTERLY CORNER OF THE PROJECT AND A VEGETATED SWALE ALONG THE SOUTHERLY EDGE OF THE PROJECT FOR STORM WATER QUALITY TREATMENT TO COMPLY WITH THE CITY AND SANTA ANA REGION'S WATER QUALITY MANAGEMENT PLAN (WQMP) REQUIREMENTS. AS THE THREE AFOREMENTIONED EXISTING STORM DRAIN SYSTEMS ARE CONTRIBUTING TO THE SAME EXISTING MDP LINE E DOWNSTREAM, THE PROJECT PLANS TO CONNECT THE ON-SITE FLOWS TO THE EXISTING 42-INCH RCP IN THE PROJECT FRONTAGE ALONG RAMONA EXPRESSWAY THAT IS UNDERSTOOD TO BE MAINTAINED BY THE CITY OF PERRIS. FROM THIS POINT, RUNOFF CONTINUES TO DRAIN TO THE SAME EXISTING MDP LINE E FACILITY.
4. RUNOFF FROM THE PROPOSED PROJECT WILL BE DIRECTLY CONNECTING INTO AN EXISTING 42-INCH RCP IN PROJECT FRONTAGE ALONG RAMONA EXPRESSWAY, WHICH THEN DRAINS TO AN EXISTING MDP LINE E FACILITY DOWNSTREAM. SINCE THE ON-SITE RUNOFF CONNECTS INTO AN EXISTING MDP LINE E SYSTEM THAT IS DESIGNED TO HAVE CAPACITY TO ACCOMMODATE THE ULTIMATE BUILDOUT CONDITION PEAK FLOWS FROM THIS AREA INCLUDING THE PROJECT, THE FLOOD CONTROL DETENTION MITIGATION SHOULD NOT BE NECESSARY.
5. THE SITE IS SITUATED ON HYDROLOGIC SOIL GROUP B BASED ON THE RCFC&WCD'S HYDROLOGY MANUAL AND WEB SOIL SURVEY (ONLINE RESOURCE). FOR THE PURPOSE OF HYDROLOGIC CALCULATION SOIL GROUP B WAS APPLIED IN THE CALCULATION. HOWEVER, BASED ON THE GEOTECHNICAL INVESTIGATION AND INFILTRATION TESTING, INFILTRATION FOR THE SITE WAS DETERMINED TO BE RELATIVELY VERY LOW AND INFILTRATION TYPE BMP WAS NOT DEEMED FEASIBLE.

LEGEND

- TRACT BOUNDARY
- MAJOR DRAINAGE BOUNDARY
- SUB BASIN BOUNDARY
- DRAINAGE FLOW PATH
- DRAINAGE ACREAGE (X.X AC.)
- BASIN NODE ID (XXX)
- DISCHARGE LOCATION
- PROPOSED STORM DRAIN

302-260-077
COMMERCIAL

302-260-054
RESIDENTIAL

℄ BRENNAN AVE.

℄ RAMONA EXPRESSWAY

302-050-035
INDUSTRIAL

NOT A PART OF THE PROJECT

EX. PRIVATE TRAP CHANNEL

BASIN 100

BASIN 100 OUTLET
A=4.5 ACRES
Q10=6.3 CFS
Q100=9.1 CFS

0 15 30 60 90 120
SCALE 1"=30'

DRAINAGE STUDY MAP
FOR
WESTPORT-PERRIS
(POST-PROJECT)
CITY CASE #: DPR22-00021
JN 2202 REVISED: 11/10/2022

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                    (RCFC&WCD)  1978 HYDROLOGY MANUAL
         (c) Copyright 1982-2016 Advanced Engineering Software (aes)
                    (Rational Tabling Version 23.0)
                Release Date: 07/01/2016  License ID 1717

                          Analysis prepared by:

                          SDH & ASSOCIATES, INC.
                           27363 VIA INDUSTRIA
                            TEMECULA, CA 92590
                              (951) 683-3691

 ************************* DESCRIPTION OF STUDY *************************
* WESTPORT-PERRIS (JN 2202)                                             *
* ON-SITE POST-PROJECT - 10-YEAR, 1-HOUR STORM EVENT                    *
* BASIN 100                                                             *
 *************************************************************************

  FILE NAME: WP1HP10.RAT
  TIME/DATE OF STUDY: 17:30 11/08/2022
-------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
-------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  1.880
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.780
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.690
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.120
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4909883
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4890234
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   10.00   1-HOUR INTENSITY(INCH/HOUR) =   0.788
  SLOPE OF INTENSITY DURATION CURVE = 0.4910
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0160

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
```

```
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    110.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   355.00
  UPSTREAM ELEVATION(FEET) =     71.86
  DOWNSTREAM ELEVATION(FEET) =     67.06
  ELEVATION DIFFERENCE(FEET) =      4.80
  TC = 0.303*[(  355.00**3)/(     4.80)]**.2 =    7.507
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.186
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8708
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      0.95
  TOTAL AREA(ACRES) =      0.50   TOTAL RUNOFF(CFS) =      0.95

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    120.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    64.06  DOWNSTREAM(FEET) =    63.51
  FLOW LENGTH(FEET) =   190.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   5.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.48
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.95
  PIPE TRAVEL TIME(MIN.) =   1.28    Tc(MIN.) =    8.78
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    120.00 =     545.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.78
  RAINFALL INTENSITY(INCH/HR) =   2.02
  TOTAL STREAM AREA(ACRES) =     0.50
```

```
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.95

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    115.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   146.00
  UPSTREAM ELEVATION(FEET) =     68.89
  DOWNSTREAM ELEVATION(FEET) =     66.03
  ELEVATION DIFFERENCE(FEET) =      2.86
  TC = 0.303*[(  146.00**3)/(     2.86)]**.2 =    4.886
  COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.669
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8746
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      1.87
  TOTAL AREA(ACRES) =      0.80   TOTAL RUNOFF(CFS) =      1.87

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    115.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.669
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8746
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    0.50   SUBAREA RUNOFF(CFS) =    1.17
  TOTAL AREA(ACRES) =        1.3   TOTAL RUNOFF(CFS) =       3.03
  TC(MIN.) =    5.00

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    115.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.669
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8746
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    0.50   SUBAREA RUNOFF(CFS) =    1.17
  TOTAL AREA(ACRES) =        1.8   TOTAL RUNOFF(CFS) =       4.20
  TC(MIN.) =    5.00

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    120.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    63.53  DOWNSTREAM(FEET) =    63.51
  FLOW LENGTH(FEET) =     8.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.38
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.20
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    5.04
  LONGEST FLOWPATH FROM NODE    111.00 TO NODE    120.00 =     154.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.04
  RAINFALL INTENSITY(INCH/HR) =   2.66
  TOTAL STREAM AREA(ACRES) =     1.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.20

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        0.95     8.78        2.024          0.50
      2        4.20     5.04        2.658          1.80

 **********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ***************************************************************************

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        4.75     5.04       2.658
      2        4.15     8.78       2.024

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       4.75   Tc(MIN.) =    5.04
  TOTAL AREA(ACRES) =        2.3
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    120.00 =     545.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    130.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    63.51  DOWNSTREAM(FEET) =    63.39
  FLOW LENGTH(FEET) =    62.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.06
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.75
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =    5.38
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    130.00 =     607.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.38
  RAINFALL INTENSITY(INCH/HR) =   2.57
  TOTAL STREAM AREA(ACRES) =     2.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.75

****************************************************************************
  FLOW PROCESS FROM NODE    121.00 TO NODE    122.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS APARTMENT
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    33.00
  UPSTREAM ELEVATION(FEET) =     68.70
  DOWNSTREAM ELEVATION(FEET) =     67.27
  ELEVATION DIFFERENCE(FEET) =      1.43
  TC = 0.323*[(   33.00**3)/(     1.43)]**.2 =    2.448
  COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.669
  APARTMENT DEVELOPMENT RUNOFF COEFFICIENT = .8493
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      0.11
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.11

****************************************************************************
```

```
  FLOW PROCESS FROM NODE    122.00 TO NODE    125.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     67.27  DOWNSTREAM(FEET) =     66.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   102.00   CHANNEL SLOPE =  0.0075
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.233
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8713
  SOIL CLASSIFICATION IS "B"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.16
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.78
  AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   2.19
  Tc(MIN.) =    7.19
  SUBAREA AREA(ACRES) =     0.05       SUBAREA RUNOFF(CFS) =    0.10
  TOTAL AREA(ACRES) =        0.1         PEAK FLOW RATE(CFS) =       0.21

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.10   FLOW VELOCITY(FEET/SEC.) =   0.84
  LONGEST FLOWPATH FROM NODE    121.00 TO NODE    125.00 =     135.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    130.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    64.50  DOWNSTREAM(FEET) =    63.39
  FLOW LENGTH(FEET) =    36.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   1.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.81
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.21
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =    7.35
  LONGEST FLOWPATH FROM NODE    121.00 TO NODE    130.00 =     171.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.35
  RAINFALL INTENSITY(INCH/HR) =   2.21
  TOTAL STREAM AREA(ACRES) =     0.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.21
```

```
 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        4.75     5.38        2.575          2.30
     2        0.21     7.35        2.209          0.10

 ********************************WARNING*********************************
 IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
 ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
 WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ************************************************************************

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1        4.90     5.38       2.575
     2        4.28     7.35       2.209

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       4.90   Tc(MIN.) =    5.38
 TOTAL AREA(ACRES) =        2.4
 LONGEST FLOWPATH FROM NODE    101.00 TO NODE    130.00 =     607.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    130.00 TO NODE    150.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    63.39  DOWNSTREAM(FEET) =    59.40
 FLOW LENGTH(FEET) =    86.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.42
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       4.90
 PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    5.51
 LONGEST FLOWPATH FROM NODE    101.00 TO NODE    150.00 =     693.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    5.51
```

```
  RAINFALL INTENSITY(INCH/HR) =   2.54
  TOTAL STREAM AREA(ACRES) =     2.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.90

****************************************************************************
  FLOW PROCESS FROM NODE    131.00 TO NODE    135.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   494.00
  UPSTREAM ELEVATION(FEET) =     71.86
  DOWNSTREAM ELEVATION(FEET) =     69.12
  ELEVATION DIFFERENCE(FEET) =      2.74
  TC = 0.303*[(  494.00**3)/(     2.74)]**.2 =   10.239
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.877
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8678
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      1.14
  TOTAL AREA(ACRES) =      0.70   TOTAL RUNOFF(CFS) =      1.14

****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    135.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.877
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8678
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    0.60   SUBAREA RUNOFF(CFS) =    0.98
  TOTAL AREA(ACRES) =        1.3   TOTAL RUNOFF(CFS) =       2.12
  TC(MIN.) =   10.24

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    138.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     68.80  DOWNSTREAM(FEET) =     68.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =    45.00   CHANNEL SLOPE =  0.0022
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.819
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8671
  SOIL CLASSIFICATION IS "B"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.20
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.10
```

```
  AVERAGE FLOW DEPTH(FEET) =   0.50   TRAVEL TIME(MIN.) =   0.68
  Tc(MIN.) =   10.92
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.16
  TOTAL AREA(ACRES) =        1.4         PEAK FLOW RATE(CFS) =       2.27

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.51   FLOW VELOCITY(FEET/SEC.) =   1.12
  LONGEST FLOWPATH FROM NODE    131.00 TO NODE    138.00 =     539.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    137.00 TO NODE    138.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.819
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8671
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    0.60   SUBAREA RUNOFF(CFS) =    0.95
  TOTAL AREA(ACRES) =        2.0   TOTAL RUNOFF(CFS) =       3.22
  TC(MIN.) =   10.92

****************************************************************************
  FLOW PROCESS FROM NODE    138.00 TO NODE    140.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     68.70  DOWNSTREAM(FEET) =     67.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   238.00   CHANNEL SLOPE =  0.0071
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.669
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8653
  SOIL CLASSIFICATION IS "B"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.29
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.90
  AVERAGE FLOW DEPTH(FEET) =   0.45   TRAVEL TIME(MIN.) =   2.09
  Tc(MIN.) =   13.01
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.14
  TOTAL AREA(ACRES) =        2.1         PEAK FLOW RATE(CFS) =       3.37

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.46   FLOW VELOCITY(FEET/SEC.) =   1.90
  LONGEST FLOWPATH FROM NODE    131.00 TO NODE    140.00 =     777.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    150.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
```

```
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    64.50  DOWNSTREAM(FEET) =    59.40
  FLOW LENGTH(FEET) =    36.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.91
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.37
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   13.06
  LONGEST FLOWPATH FROM NODE    131.00 TO NODE    150.00 =     813.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.06
  RAINFALL INTENSITY(INCH/HR) =   1.67
  TOTAL STREAM AREA(ACRES) =     2.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.37

  ** CONFLUENCE DATA **
  STREAM     RUNOFF        Tc       INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        4.90     5.51        2.543          2.40
      2        3.37    13.06        1.666          2.10

 **********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ***************************************************************************

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc       INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        6.32     5.51       2.543
      2        6.58    13.06       1.666

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       6.32   Tc(MIN.) =    5.51
  TOTAL AREA(ACRES) =        4.5
  LONGEST FLOWPATH FROM NODE    131.00 TO NODE    150.00 =     813.00 FEET.

****************************************************************************
```

```
  FLOW PROCESS FROM NODE    150.00 TO NODE    180.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    59.40  DOWNSTREAM(FEET) =    58.65
  FLOW LENGTH(FEET) =    24.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   6.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.48
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.32
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    5.56
  LONGEST FLOWPATH FROM NODE    131.00 TO NODE    180.00 =     837.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        4.5  TC(MIN.) =      5.56
  PEAK FLOW RATE(CFS)   =       6.32
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
       RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                  (RCFC&WCD)  1978 HYDROLOGY MANUAL
        (c) Copyright 1982-2016 Advanced Engineering Software (aes)
                  (Rational Tabling Version 23.0)
              Release Date: 07/01/2016  License ID 1717

                        Analysis prepared by:

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                         27363 VIA INDUSTRIA
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 ************************* DESCRIPTION OF STUDY *************************
* WESTPORT-PERRIS (JN 2202)                                             *
* ON-SITE POST-PROJECT - 100-YEAR, 1-HOUR STORM EVENT                   *
* BASIN 100                                                             *
 *************************************************************************

  FILE NAME: WP1HP00.RAT
  TIME/DATE OF STUDY: 17:28 11/08/2022
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  1.880
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.780
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.690
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.120
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4909883
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4890234
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.120
  SLOPE OF INTENSITY DURATION CURVE = 0.4890
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0160

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
```

```
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    110.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   355.00
  UPSTREAM ELEVATION(FEET) =     71.86
  DOWNSTREAM ELEVATION(FEET) =     67.06
  ELEVATION DIFFERENCE(FEET) =      4.80
  TC = 0.303*[(  355.00**3)/(     4.80)]**.2 =    7.507
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.095
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8772
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      1.36
  TOTAL AREA(ACRES) =      0.50   TOTAL RUNOFF(CFS) =      1.36

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    120.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    64.06  DOWNSTREAM(FEET) =    63.51
  FLOW LENGTH(FEET) =   190.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.70
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.36
  PIPE TRAVEL TIME(MIN.) =   1.17    Tc(MIN.) =    8.68
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    120.00 =     545.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.68
  RAINFALL INTENSITY(INCH/HR) =   2.88
  TOTAL STREAM AREA(ACRES) =     0.50
```

```
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.36

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    115.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   146.00
  UPSTREAM ELEVATION(FEET) =     68.89
  DOWNSTREAM ELEVATION(FEET) =     66.03
  ELEVATION DIFFERENCE(FEET) =      2.86
  TC = 0.303*[(  146.00**3)/(     2.86)]**.2 =    4.886
  COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.775
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8805
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      2.66
  TOTAL AREA(ACRES) =      0.80   TOTAL RUNOFF(CFS) =      2.66

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    115.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.775
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8805
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    0.50   SUBAREA RUNOFF(CFS) =    1.66
  TOTAL AREA(ACRES) =        1.3   TOTAL RUNOFF(CFS) =       4.32
  TC(MIN.) =    5.00

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    115.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.775
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8805
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    0.50   SUBAREA RUNOFF(CFS) =    1.66
  TOTAL AREA(ACRES) =        1.8   TOTAL RUNOFF(CFS) =       5.98
  TC(MIN.) =    5.00

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    120.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    63.53  DOWNSTREAM(FEET) =    63.51
  FLOW LENGTH(FEET) =     8.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.48
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.98
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    5.04
  LONGEST FLOWPATH FROM NODE    111.00 TO NODE    120.00 =     154.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.04
  RAINFALL INTENSITY(INCH/HR) =   3.76
  TOTAL STREAM AREA(ACRES) =     1.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.98

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        1.36     8.68        2.883          0.50
      2        5.98     5.04        3.761          1.80

 ********************************WARNING*********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ************************************************************************

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        6.77     5.04       3.761
      2        5.94     8.68       2.883

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       6.77   Tc(MIN.) =    5.04
  TOTAL AREA(ACRES) =        2.3
```

```
 LONGEST FLOWPATH FROM NODE    101.00 TO NODE    120.00 =     545.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    120.00 TO NODE    130.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    63.51  DOWNSTREAM(FEET) =    63.39
 FLOW LENGTH(FEET) =    62.00   MANNING'S N =  0.012
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.06
 (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
  AT DEPTH = 0.82 * DIAMETER)
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       6.77
 PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =    5.38
 LONGEST FLOWPATH FROM NODE    101.00 TO NODE    130.00 =     607.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    5.38
 RAINFALL INTENSITY(INCH/HR) =   3.64
 TOTAL STREAM AREA(ACRES) =     2.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.77

****************************************************************************
 FLOW PROCESS FROM NODE    121.00 TO NODE    122.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
        ASSUMED INITIAL SUBAREA UNIFORM
        DEVELOPMENT IS APARTMENT
 TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    33.00
 UPSTREAM ELEVATION(FEET) =     68.70
 DOWNSTREAM ELEVATION(FEET) =     67.27
 ELEVATION DIFFERENCE(FEET) =      1.43
 TC = 0.323*[(   33.00**3)/(     1.43)]**.2 =    2.448
 COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.775
 APARTMENT DEVELOPMENT RUNOFF COEFFICIENT = .8609
 SOIL CLASSIFICATION IS "B"
 SUBAREA RUNOFF(CFS) =      0.16
 TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.16
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    125.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     67.27  DOWNSTREAM(FEET) =     66.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   102.00   CHANNEL SLOPE =  0.0075
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.214
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8779
  SOIL CLASSIFICATION IS "B"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.23
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.87
  AVERAGE FLOW DEPTH(FEET) =   0.11   TRAVEL TIME(MIN.) =   1.95
  Tc(MIN.) =    6.95
  SUBAREA AREA(ACRES) =     0.05       SUBAREA RUNOFF(CFS) =    0.14
  TOTAL AREA(ACRES) =        0.1         PEAK FLOW RATE(CFS) =       0.30

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   0.95
  LONGEST FLOWPATH FROM NODE    121.00 TO NODE    125.00 =     135.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    130.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    64.50  DOWNSTREAM(FEET) =    63.39
  FLOW LENGTH(FEET) =    36.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   1.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.23
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.30
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    7.09
  LONGEST FLOWPATH FROM NODE    121.00 TO NODE    130.00 =     171.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.09
  RAINFALL INTENSITY(INCH/HR) =   3.18
```

```
 TOTAL STREAM AREA(ACRES) =     0.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.30

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        6.77     5.38        3.644          2.30
     2        0.30     7.09        3.182          0.10

 ********************************WARNING*********************************
 IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
 ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
 WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ************************************************************************

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1        7.00     5.38       3.644
     2        6.22     7.09       3.182

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       7.00   Tc(MIN.) =    5.38
 TOTAL AREA(ACRES) =        2.4
 LONGEST FLOWPATH FROM NODE    101.00 TO NODE    130.00 =     607.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    130.00 TO NODE    150.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    63.39  DOWNSTREAM(FEET) =    59.40
 FLOW LENGTH(FEET) =    86.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.50
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       7.00
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =    5.50
 LONGEST FLOWPATH FROM NODE    101.00 TO NODE    150.00 =     693.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
```

```
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.50
  RAINFALL INTENSITY(INCH/HR) =   3.60
  TOTAL STREAM AREA(ACRES) =     2.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.00

****************************************************************************
  FLOW PROCESS FROM NODE    131.00 TO NODE    135.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   494.00
  UPSTREAM ELEVATION(FEET) =     71.86
  DOWNSTREAM ELEVATION(FEET) =     69.12
  ELEVATION DIFFERENCE(FEET) =      2.74
  TC = 0.303*[(  494.00**3)/(     2.74)]**.2 =   10.239
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.659
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8746
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      1.63
  TOTAL AREA(ACRES) =      0.70   TOTAL RUNOFF(CFS) =      1.63

****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    135.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.659
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8746
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    0.60   SUBAREA RUNOFF(CFS) =    1.40
  TOTAL AREA(ACRES) =        1.3   TOTAL RUNOFF(CFS) =       3.02
  TC(MIN.) =   10.24

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    138.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     68.80  DOWNSTREAM(FEET) =     68.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =    45.00   CHANNEL SLOPE =  0.0022
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.584
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8740
  SOIL CLASSIFICATION IS "B"
```

```
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.14
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.21
  AVERAGE FLOW DEPTH(FEET) =   0.59   TRAVEL TIME(MIN.) =   0.62
  Tc(MIN.) =   10.86
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.23
  TOTAL AREA(ACRES) =        1.4         PEAK FLOW RATE(CFS) =       3.25

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.60   FLOW VELOCITY(FEET/SEC.) =   1.23
  LONGEST FLOWPATH FROM NODE    131.00 TO NODE    138.00 =     539.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    137.00 TO NODE    138.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.584
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8740
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    0.60   SUBAREA RUNOFF(CFS) =    1.36
  TOTAL AREA(ACRES) =        2.0   TOTAL RUNOFF(CFS) =       4.60
  TC(MIN.) =   10.86

****************************************************************************
  FLOW PROCESS FROM NODE    138.00 TO NODE    140.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     68.70  DOWNSTREAM(FEET) =     67.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   238.00   CHANNEL SLOPE =  0.0071
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.386
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8725
  SOIL CLASSIFICATION IS "B"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.71
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.07
  AVERAGE FLOW DEPTH(FEET) =   0.54   TRAVEL TIME(MIN.) =   1.92
  Tc(MIN.) =   12.78
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.21
  TOTAL AREA(ACRES) =        2.1         PEAK FLOW RATE(CFS) =       4.81

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.55   FLOW VELOCITY(FEET/SEC.) =   2.10
  LONGEST FLOWPATH FROM NODE    131.00 TO NODE    140.00 =     777.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    150.00 IS CODE =  41
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    64.50  DOWNSTREAM(FEET) =    59.40
  FLOW LENGTH(FEET) =    36.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.44
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.81
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   12.81
  LONGEST FLOWPATH FROM NODE    131.00 TO NODE    150.00 =     813.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.81
  RAINFALL INTENSITY(INCH/HR) =   2.38
  TOTAL STREAM AREA(ACRES) =     2.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.81

  ** CONFLUENCE DATA **
  STREAM     RUNOFF        Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        7.00     5.50        3.603          2.40
      2        4.81    12.81        2.383          2.10

 ********************************WARNING***********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 **************************************************************************

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        9.07     5.50       3.603
      2        9.44    12.81       2.383

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       9.07   Tc(MIN.) =    5.50
  TOTAL AREA(ACRES) =        4.5
  LONGEST FLOWPATH FROM NODE    131.00 TO NODE    150.00 =     813.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    180.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    59.40  DOWNSTREAM(FEET) =    58.65
  FLOW LENGTH(FEET) =    24.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   7.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.50
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.07
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    5.54
  LONGEST FLOWPATH FROM NODE    131.00 TO NODE    180.00 =     837.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        4.5  TC(MIN.) =      5.54
  PEAK FLOW RATE(CFS)   =       9.07
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Appendix C

Preliminary Inlet Sizing

Note: Detailed onsite inlet calculations will be conducted during final engineering at the time of the final drainage study and will be incorporated in this Appendix.

Appendix D

Preliminary Storm Drain / Vegetated Swale Sizing

Includes:

1. On-site preliminary storm drain sizing
2. Proposed vegetated swale sizing calculation

Westport-Perris
Job # 2202
Revised: 11/15/2022

Preliminary Storm Drain Size

The purpose of this table is to provide an estimated preliminary pipe sizes to convey the anticipated 10-year peak flow rates with a preliminary sizing bump-up factor to account for potential head losses through the pipe.

Manning's n: 0.012 HDPE or equivalent

Preliminary Sizing Bump-up (%): 30

			Preliminary Sizes per Various Slopes						
		Slope at:	0.2%		0.5%		1.0%		
Node ID's:	**Q_{10} (cfs[1])**	**Q_{100} with Sizing Factor (cfs[1])**	**Minimum Pipe Size[2] (feet)**	**Suggested Pipe Size (inches)**	**Minimum Pipe Size[2] (feet)**	**Suggested Pipe Size (inches)**	**Minimum Pipe Size [2] (feet)**	**Suggested Pipe Size (inches)**	**PRELIMINARY RECOMMENDATIONS[3]**
110 - 120	1.0	1.3	0.90	12"	0.76	10"	0.66	8"	**Use 12" HDPE @ 0.2% MIN.**
115 - 120	4.2	5.5	1.54	24"	1.30	18"	1.14	18"	**Use 18" HDPE @ 0.2% MIN.**
120 - 130	4.8	6.2	1.62	24"	1.36	18"	1.20	18"	**Use 24" HDPE @ 0.2% MIN.**
125 - 130	0.2	0.3	0.49	6"	0.41	6"	0.36	6"	**Use 8" HDPE @ 0.2% MIN.**
130 - 150	4.9	6.4	1.63	24"	1.37	18"	1.21	18"	**Use 24" HDPE @ 0.2% MIN.**
140 - 150	3.4	4.4	1.42	18"	1.20	18"	1.05	18"	**Use 18" HDPE @ 0.2% MIN.**
150 - 180 (Outlet)	6.3	8.2	1.79	24"	1.51	18"	1.32	18"	**Use 24" HDPE @ 0.2% MIN.**

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Nov 9 2022

Proposed Vegetated Swale - DMA 1B (Node 135 to Node 140)

Trapezoidal

Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 1.25
Invert Elev (ft)	= 67.00
Slope (%)	= 0.60
N-Value	= 0.060

Calculations

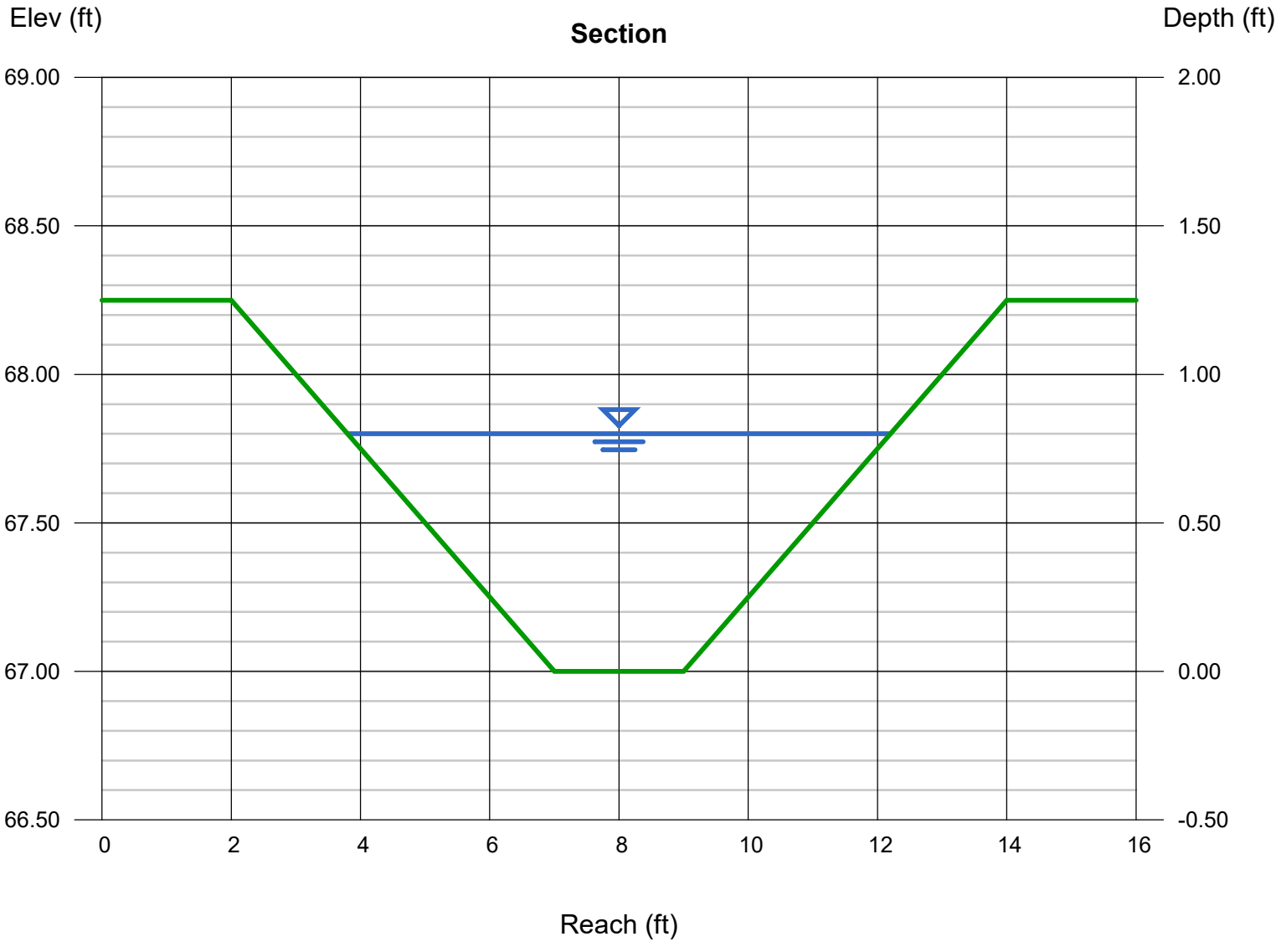
Compute by:	Known Q
Known Q (cfs)	= 4.80

100-year peak flow = 4.8 cfs.

Highlighted

Depth (ft)	= 0.80
Q (cfs)	= 4.800
Area (sqft)	= 4.16
Velocity (ft/s)	= 1.15
Wetted Perim (ft)	= 8.60
Crit Depth, Yc (ft)	= 0.43
Top Width (ft)	= 8.40
EGL (ft)	= 0.82

Normal depth = 0.8' < 1.25'. OK.



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Nov 7 2022

Proposed Vegetated Swale - DMA 1B (Node 135 to Node 140)

Trapezoidal

Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 1.25
Invert Elev (ft)	= 67.00
Slope (%)	= 0.60
N-Value	= 0.250

Calculations

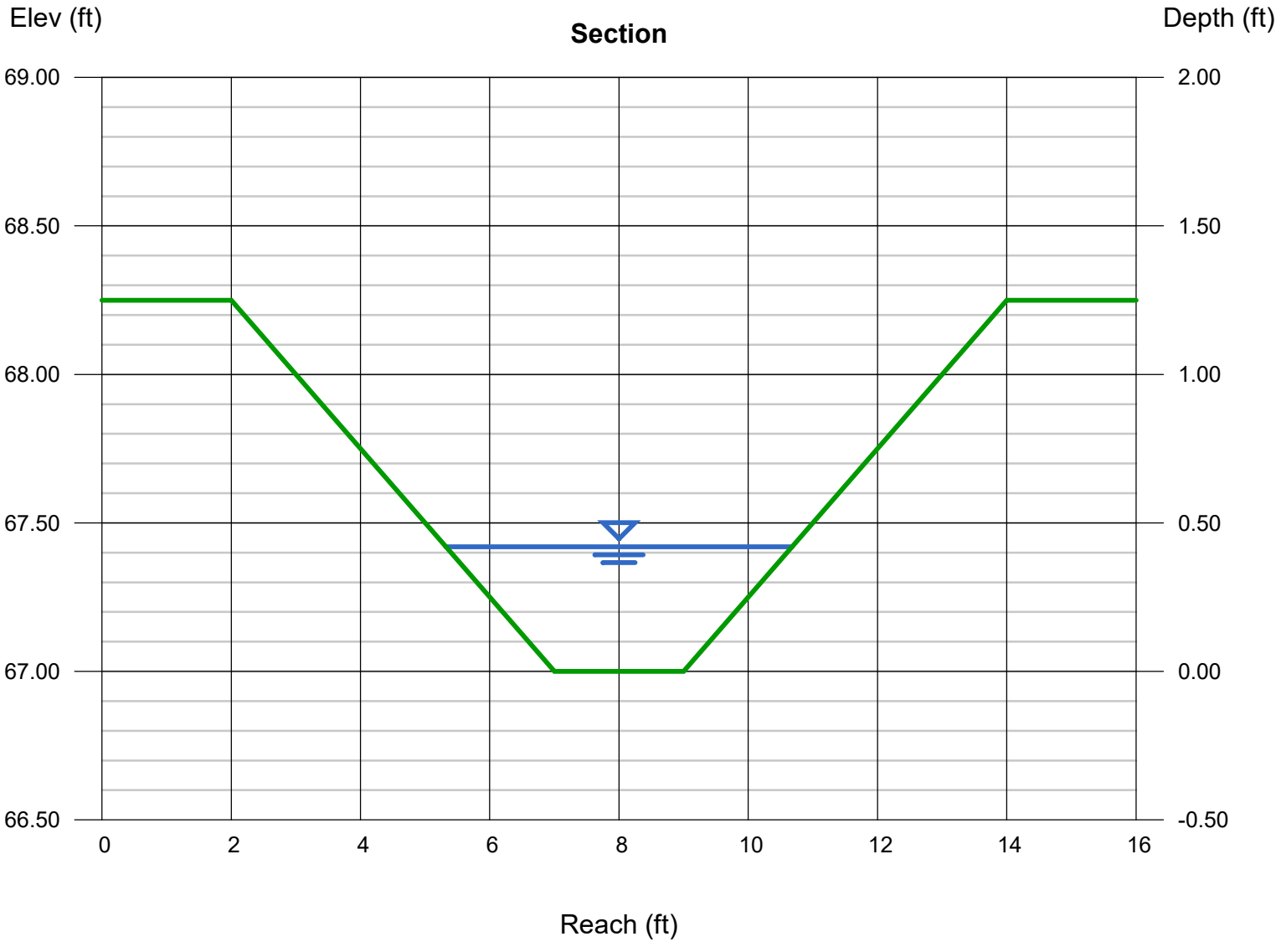
Compute by:	Known Q
Known Q (cfs)	= 0.30

w/ Water Quality Flow Rate of ~0.3 cfs.

Highlighted

Depth (ft)	= 0.42
Q (cfs)	= 0.300
Area (sqft)	= 1.55
Velocity (ft/s)	= 0.19
Wetted Perim (ft)	= 5.46
Crit Depth, Yc (ft)	= 0.09
Top Width (ft)	= 5.36
EGL (ft)	= 0.42

To meet a 10-minute residence time, the proposed vegetated swale would need to be a minimum of 108', based on L=(0.19 ft/sec)*(10 min)*(60 sec/min)=114'. The proposed swale will have approximately 233 feet. Therefore, OK.



Appendix E

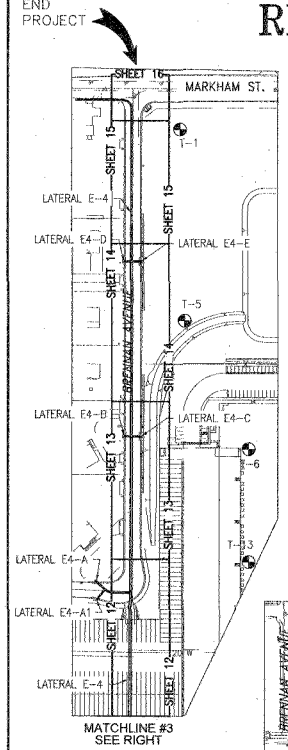
Reference Materials – Relevant Plans (Excerpts)

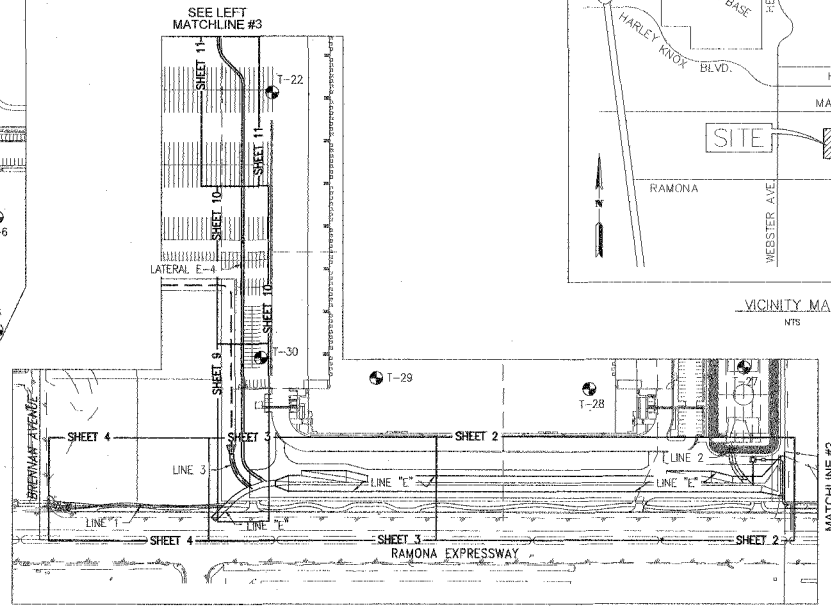
Includes:

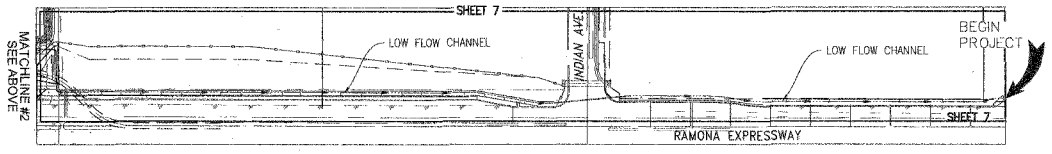
1. A markup exhibit (sketch) showing existing storm drain systems surrounding the project
2. "Perris Valley MDP Line E Stage 2 Lateral E-4 Stage 1" (Project No. 4-0-0488 / 4-0-0460; Drawing No. 4-1070; PM 36010)
3. "Perris Valley MDP Line E Stage 3" (Project No. 4-0-00488; Drawing No. 4-1117; PM 36512 / PM 36582; City File No. P8-1226).

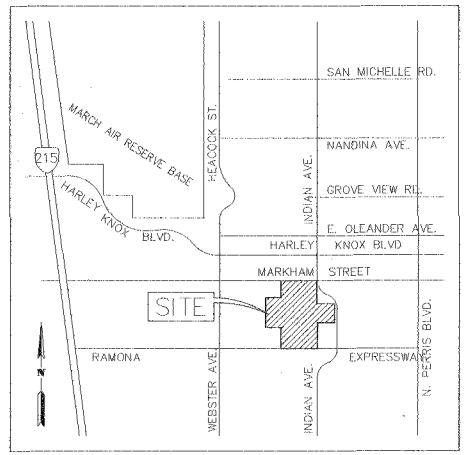

Perris Valley
MDP Line E-4
54"RCP
Private Trap.
Channel
Datum Shift: 2.63
City of Perris
Line 1
42" RCP
Perris Valley
MDP Line E
90" RCP
Brennan Ave
Carl's Jr
Ramona Expy
Google Earth
1985
Imagery Date: 8/5/2021 33°50'43.24" N 117°14'21.88" W elev 1470 ft eye alt 2249 ft

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT









VICINITY MAP
NTS

INDEX MAP
NTS

RECORD DRAWINGS
APPROVED BY:
DATE: 4/5/17

GENERAL NOTES

1. THE CONTRACTOR SHALL CONSTRUCT THE FLOOD CONTROL IMPROVEMENTS SHOWN ON THE DRAWINGS IN CONFORMANCE WITH THE REQUIREMENTS OF THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT'S M.O.U. STANDARD SPECIFICATIONS DATED JUNE 24, 2008, AND RCFC&WCD STANDARD MANUAL. FOR THE LATEST DRAWINGS OF THE STANDARD MANUAL, PLEASE REFER TO THE "PUBLICATIONS AND RECORDS" PAGE FOUND ON THE DISTRICT'S WEBSITE.
2. (IF) AN ENCROACHMENT PERMIT IS REQUIRED FROM RIVERSIDE COUNTY FLOOD CONTROL. CONTACT ED LOTZ AT 951/955-1266. AFTER THE PERMIT IS ISSUED THE DISTRICT MUST BE NOTIFIED ONE WEEK PRIOR TO CONSTRUCTION.
3. CONSTRUCTION INSPECTION WILL BE PERFORMED BY RIVERSIDE COUNTY FLOOD CONTROL. CONTACT KENT ALLEN AT 951/955-1288. THE DISTRICT MUST BE NOTIFIED TWENTY DAYS (20) PRIOR TO CONSTRUCTION.
4. ALL STATIONING REFERS TO CENTERLINE OF CONSTRUCTION UNLESS OTHERWISE NOTED.
5. STATIONING FOR LATERALS AND CONNECTOR PIPE REFER TO THE CENTERLINE INTERSECTION STATIONS.
6. FORTY-EIGHT HOURS BEFORE EXCAVATION, CALL UNDERGROUND SERVICE ALERT 1-800-227-2600.
7. ALL ELEVATIONS SHOWN ARE IN FEET AND DECIMALS THEREOF BASED ON THE NATIONAL GEODETIC VERTICAL DATUM (NGVD 29).
8. ALL COORDINATES ARE SHOWN IN FEET AND DECIMALS THEREOF BASED ON THE NORTH AMERICAN DATUM (NAD 83), CALIFORNIA COORDINATE SYSTEM (CCS), ZONE 6 AND EPOCH 1991.35.
9. ALL CROSS SECTIONS ARE TAKEN LOOKING DOWNSTREAM.
10. ELEVATIONS OF UTILITIES ARE APPROXIMATE UNLESS OTHERWISE NOTED.
11. UNLESS OTHERWISWE SPECIFIED, MINIMUM STREET RECONSTRUCTION SHALL BE 4" TYPE "B" HOT MIX ASPHALT OVER 6" CLASS 2 AGGREGATE BASE OR AS SPECIFIED BY THE ENGINEER.
12. OPENINGS RESULTING FROM THE CUTTING OR PARTIAL REMOVAL OF EXISTING CULVERTS, PIPES OR SIMILAR STRUCTURES TO BE ABANDONED SHALL BE SEALED WITH 6" OF CLASS "B" CONCRETE.
13. PIPE CONNECTED TO THE MAINLINE PIPE SHALL CONFORM TO JUNCTION STRUCTURE NO. 4 (JS 229) UNLESS OTHERWISE NOTED.
14. PIPE BEDDING SHALL CONFORM TO RCFC&WCD STD. DWG. 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 EXTENDING 4 INCHES MINIMUM AND 12 INCHES MAXIMUM ABOVE THE TOP OF THE PIPE.
15. T-1 INDICATES SOIL BORING LOCATIONS BASED ON THE SOILS REPORT DATED OCTOBER 20, 2006. 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 LOCATED SO THAT LOCAL DEPRESSION SHALL BEGIN AT EXISTING CURB RETURN JOINT, UNLESS OTHERWISE SPECIFIED.
18. ALL CURBS, GUTTERS, SIDEWALKS, DRIVEWAYS AND OTHER EXISTING IMPROVEMENTS TO BE RECONSTRUCTED IN KIND AND AT THE SAME ELEVATION AND LOCATION AS THE EXISTING IMPROVEMENTS UNLESS OTHERWISE NOTED.
19. STANDARD DRAWINGS CALLED FOR ON THE PLAN AND PROFILE SHALL CONFORM TO DISTRICT STANDARD DRAWINGS UNLESS NOTED OTHERWISE.
20. THE CONTRACTOR IS REQUIRED TO CALL ALL UTILITY AGENCIES REGARDING TEMPORARY SHORING AND SUPPORT REQUIREMENTS FOR THE VARIOUS UTILITY LINES SHOWN ON THESE PLANS.
21. DURING ROUGH GRADING OPERATIONS AND PRIOR TO CONSTRUCTION OF PERMANENT DRAINAGE STRUCTURES, TEMPORARY DRAINAGE CONTROL SHOULD BE PROVIDED TO PREVENT PONDING WATER AND DAMAGE TO ADJACENT PROPERTIES.
22. APPROVAL OF THESE PLANS BY THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT DOES NOT RELIEVE THE DEVELOPER'S ENGINEER OF RESPONSIBILITY FOR THE ENGINEERING DESIGN. IF FIELD CHANGES ARE REQUIRED, IT WILL BE THE RESPONSIBILITY OF THE DESIGN ENGINEER TO MAKE THE NECESSARY CORRECTIONS.
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 COATING ON THE INSIDE OF ALL REINFORCED CONCRETE PIPES AND BOX CULVERT MUST BE INCREASED TO PROVIDE 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 DESIGN VELOCITIES EXCEED 20 FEET PER SECOND. THE CONCRETE DESIGN STRENGTH IN THESE REACHES SHALL BE F'C=5,000 PSI FOR VELOCITIES EXCEEDING 20 FEET PER SECOND AND F'C=6,000 PSI FOR VELOCITIES EXCEEDING 30 FEET PER SECOND.
25. CONSTRUCTION JOINT FOR CALTRANS STANDARD REINFORCED CONCRETE BOX SHALL BE ACCORDING TO RCFC&WCD STANDARD DRAWING NO. BX 401.

L.D 2/9/15

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

CB	110	CONCRETE DROP INLET
JS	226	JUNCTION STRUCTURE NO. 1
JS	227	JUNCTION STRUCTURE NO. 2
MH	251	MANHOLE NO. 1
MH	252	MANHOLE NO. 2
MH	253	MANHOLE NO. 3
MH	254	MANHOLE NO. 4
TS	301	TRANSITION STRUCTURE NO. 1
TS	303	TRANSITION STRUCTURE NO. 3
CH	326	TRAPEZOIDAL CHANNEL STRUCUTRAL DETAILS
CH	330	MAINTENANCE RAMP FOR TRAPEZOIDAL CHANNEL
M	801	CHAIN LINK FENCE DETAILS
M	803	CONCRETE COLLAR
M	816	CONCRETE BULKHEAD

CALTRANS STD. DRAWINGS

D	80	REINFORCED CONCRETE BOX
D	81	DOUBLE REINFORCED CONCRETE BOX
D	84	BOX CULVERT HEADWALL AND WINGWALLS
D	85	BOX CULVERT HEADWALL AND WINGWALLS
D	86A	BOX CULVERT HEADWALLS, ENDWALLS, AND WARPED WINGWALLS
B	3-1A	RETAINING WALL TYPE 1

SHEET INDEX

PM 36010

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

PREPARED BY:
ALBERT A. WEBB ASSOCIATES
ENGINEERING CONSULTANTS
3788 McCRAY STREET
RIVERSIDE, CA. 92506
PH. (951) 686-1070
FAX (951) 788-1256
JASON K. ADDERY, RCE No. C71508 — DATE: 11/15/14

CITY OF PERRIS
APPROVED BY:
CITY ENGINEER — DATE: 1/23/15

BENCH MARK
RIV. COUNTY BM #M-31: 3 1/4" ALUM. DISK LOCATED FLUSH AT THE SWC OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB AT CROSSING OF PERRIS BLVD & RIV. CO. FLOOD CONTROL CHANNEL ELEV. 1474.674', NGVD 1929 DATUM

REVISIONS

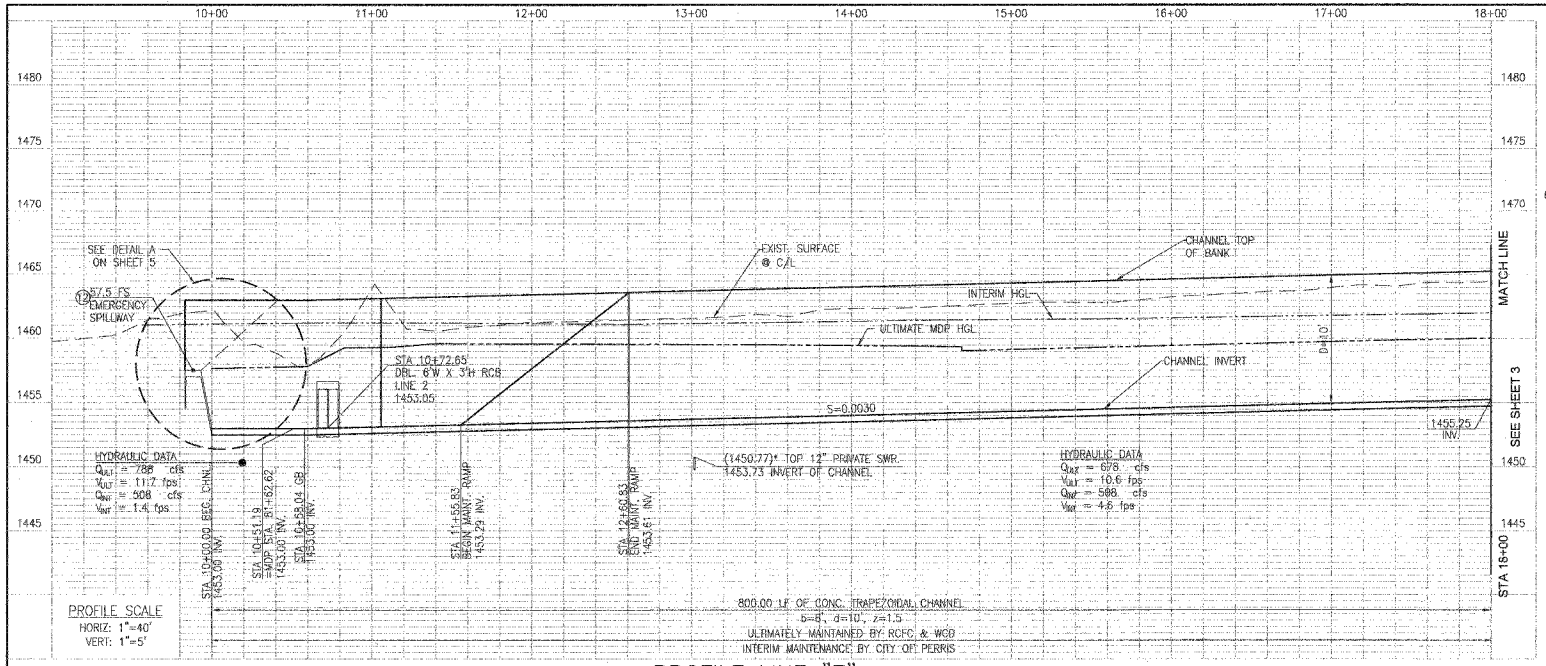
REF.	DESCRIPTION	APPR.	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: PLANNING ENGINEER — DATE: 2/5/2015
APPROVED BY: CHIEF ENGINEER — DATE: 2/9/15

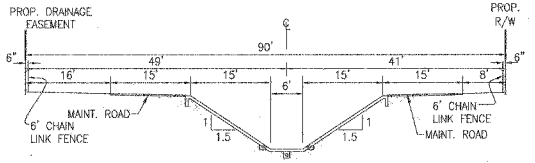
PERRIS VALLEY MDP
LINE "E", STAGE 2
LATERAL "E-4", STAGE1
TITLE SHEET

PROJECT NO. 4-0-0468 4-0-0460
DRAWING NO. 4-1070
SHEET NO. 1 OF 20

G:\2011\11-0112\DWG & PROJDESIGN\11-0112-C-SDLINE E SHEETS.DWG 11/13/2014 8:26:28 PM



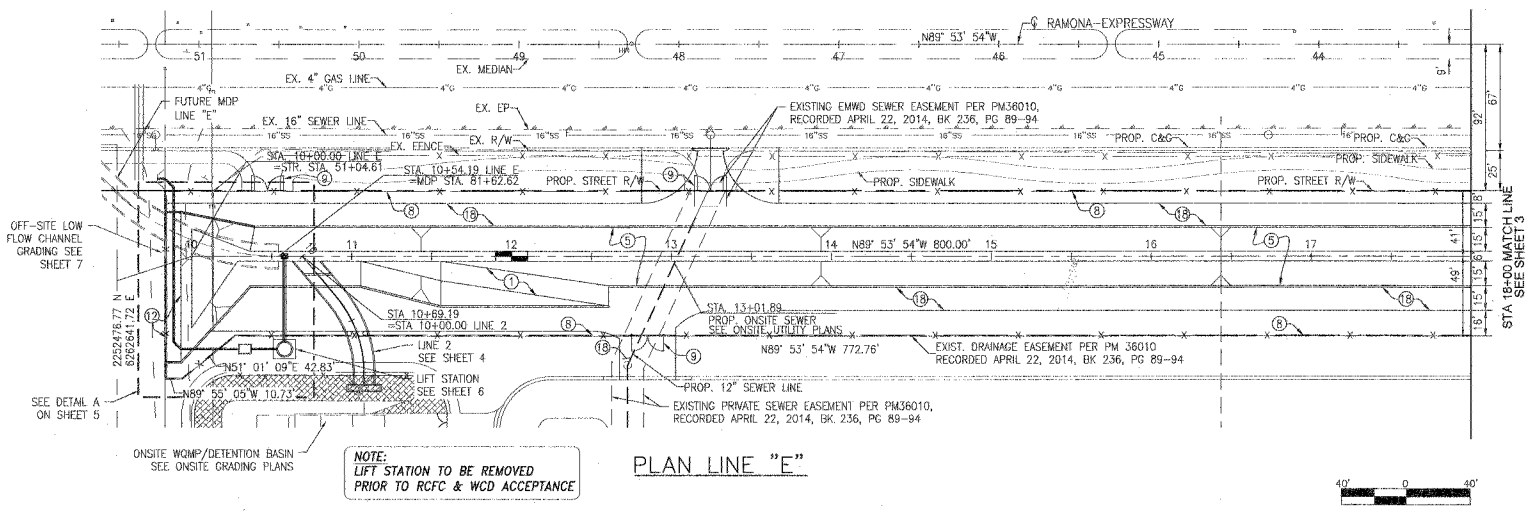
PROFILE LINE "E"



SECTION AT STA.12+00

TYPICAL FROM STA. 10+41.29 TO STA. 21+55.14
NOT TO SCALE

ALL X-SECTIONS TAKEN LOOKING DOWN STREAM



NOTE:
LIFT STATION TO BE REMOVED PRIOR TO RCFC & WCD ACCEPTANCE

PLAN LINE "E"

NOTES

(1) CONSTRUCT MAINTENANCE RAMP PER RCFC&WCD STD. DWG CH330. SEE DETAILS ON SHEET 5.

(5) CONSTRUCT CONCRETE TRAPEZOIDAL CHANNEL PER RCFC&WCD STD. DWG CH326; SIZE PER PLAN.

(8) CONSTRUCT 6' HIGH CHAIN LINK FENCE PER RCFC & WCD STD. DWG. M801.

(9) CONSTRUCT 20' DOUBLE DRIVE GATE PER RCFC & WCD STD. DWG. M801.

(12) CONSTRUCT EMERGENCY SPILLWAY PER DETAILS "A" ON SHEET 5.

(18) INSTALL 3" CLASS 2 AGGREGATE BASE MAINTENANCE ROAD PER RCFC&WCD STD. DWG CH326.

RECORD DRAWINGS
APPROVED BY:
DATE: 4/5/17
LD 2/4/15

PM 36010

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ENGINEERING CONSULTANTS
3788 McCRAY STREET
RIVERSIDE, CA. 92506
PH. (951) 686-1070
FAX (951) 788-1256
JASON C. ARDERY, RCE No. C71508
11/5/14
DATE

CITY OF PERRIS
APPROVED BY:
CITY ENGINEER
1/23/15
DATE

BENCH MARK
RIV. COUNTY BM #M-31: 3 1/4" ALUM. DISK LOCATED FLUSH AT THE SWC OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB AT CROSSING OF PERRIS BLVD & RIV. CO. FLOOD CONTROL CHANNEL. ELEV. 1474.674', NGVD 1929 DATUM

REVISIONS			
REF.	DESCRIPTION	APPR.	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY:
DATE: 1/5/2015
APPROVED BY:
DATE: 2/5/2015

PERRIS VALLEY MDP
LINE "E", STAGE 2
STA. 10+00.00 TO 18+00.00

PROJECT NO. 4-0-0488
DRAWING NO. 4-1070
SHEET NO. 2 OF 20

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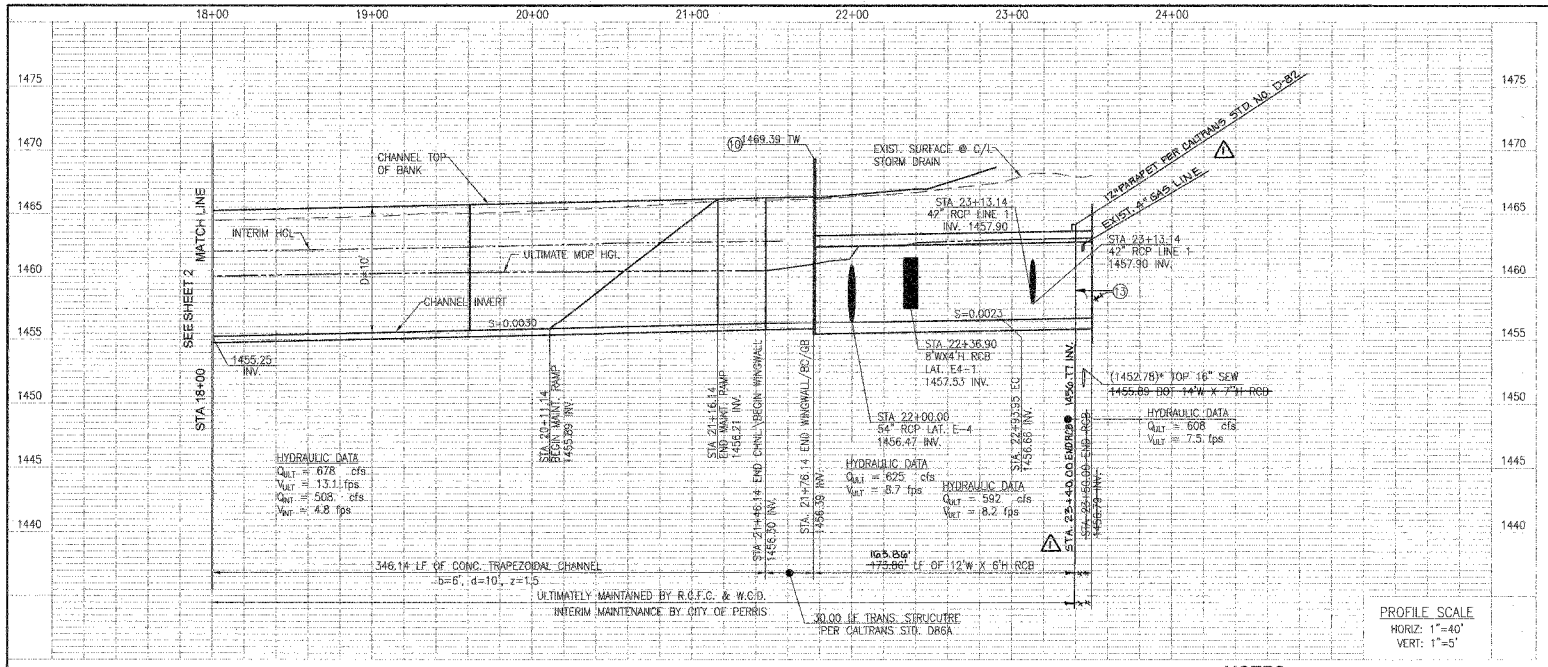
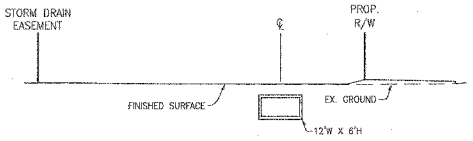


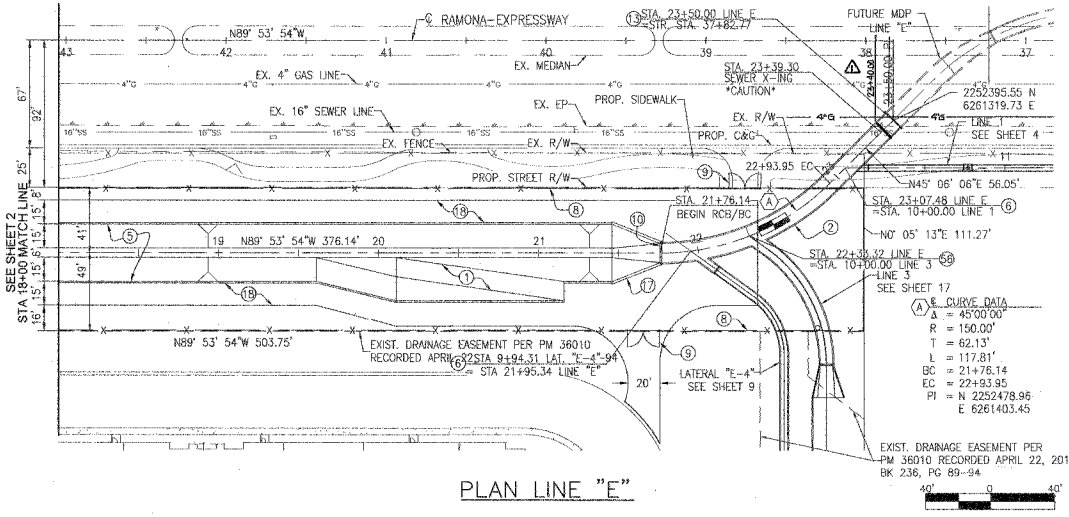


SECTION AT STA.22+50

TYPICAL FROM STA. 21+76.14 TO STA. 23+50.00
NOT TO SCALE

ALL X-SECTIONS TAKEN LOOKING DOWN STREAM

PROFILE LINE "E"



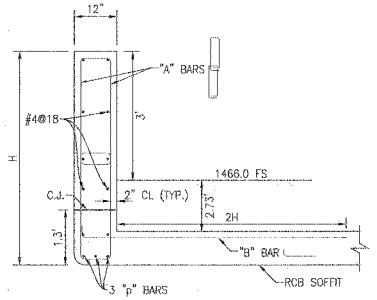
PLAN LINE "E"

NOTES

1. CONSTRUCT MAINTENANCE RAMP PER RCFC&WCD STD. DWG CH330.
2. CONSTRUCT 12'W x 6'H REINFORCED CONCRETE BOX PER CALTRANS STD. PLAN D80.
5. CONSTRUCT CONCRETE TRAPEZOIDAL CHANNEL PER RCFC&WCD STD. DWG CH326; SIZE PER PLAN.
6. CONSTRUCT JUNCTION STRUCTURE NO.1 PER RCFC & WCD STD. DWG. NO. JS226 AND DETAILS ON SHEET 20 FOR LATERAL "E-4".
8. CONSTRUCT 6' HIGH CHAIN LINK FENCE PER RCFC & WCD STD. DWG. M801.
9. CONSTRUCT 20' DOUBLE DRIVE GATE PER RCFC & WCD STD. DWG. M801.
10. CONSTRUCT PARAPET WALL PER DETAIL SHOWN HEREON.
13. CONSTRUCT CONCRETE BULKHEAD PER RCFC & WCD STD. DWG. NO. M816.
17. CONSTRUCT BOX CULVERT WARPED WINGWALLS PER CALTRANS STD. DWG. NO. D86A.
18. INSTALL 3" CLASS 2 AGGREGATE BASE MAINTENANCE ROAD PER RCFC&WCD STD. DWG CH326.
56. CONSTRUCT BOX TO BOX JUNCTION PER DETAILS ON SHEET 17.

JUNCTION STRUCTURE #1
LINE E-4
A = 45°00'00"
B = 54"
C = 14.73'
ELEV. S = 1456.47
ELEV. R = 1456.48

JUNCTION STRUCTURE #1
LINE 1
A = 45°00'00"
B = 42"
C = 14.81'
ELEV. S = 1457.95
ELEV. R = 1458.00



PARAPET WALL DETAIL
NTS

STATION	"A" BAR	"B" BAR	"p" BAR	H	SPAN
21+76.14	#5 @ 12	#5 @ 12	#8	7'	12'

RECORD DRAWINGS
APPROVED BY:
DATE: 4/5/17
LD 2/4/15

PM 36010

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

PREPARED BY: ALBERT A. WEBB ASSOCIATES — ENGINEERING CONSULTANTS, 3788 McCRAY STREET, RIVERSIDE CA. 92506, PH. (951) 686-1070, FAX (951) 788-1256
JASON E. ARBERRY RCE No. C71508 DATE: 11/5/14

CITY OF PERRIS APPROVED BY:
CITY ENGINEER DATE: 1/23/15

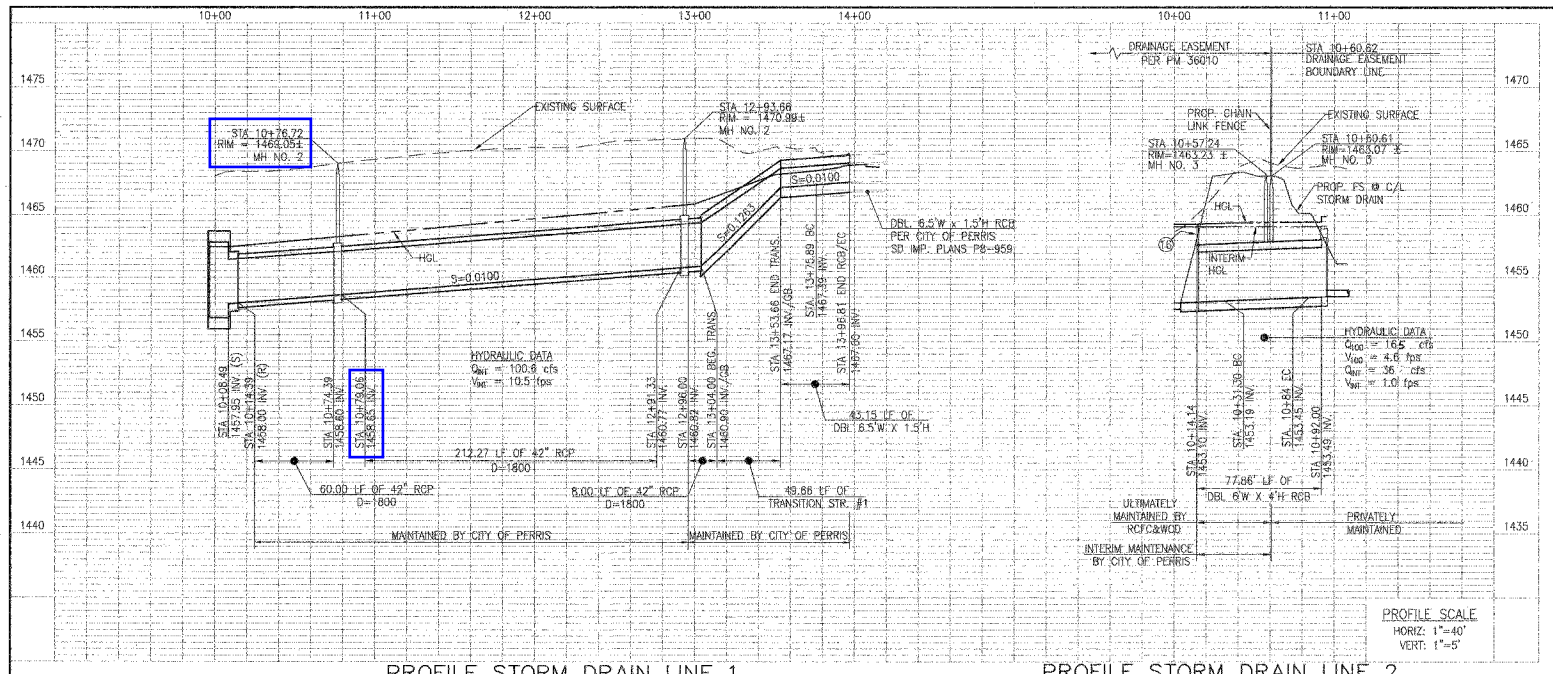
BENCH MARK
RIV. COUNTY BM #M-31: 3 1/4" ALUM. DISK LOCATED FLUSH AT THE SWC OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB AT CROSSING OF PERRIS BLVD. & RIV. CO. FLOOD CONTROL CHANNEL, ELEV. 1474.674', NGVD 1929 DATUM

REVISIONS			
REF.	DESCRIPTION	APPR.	DATE
1	"AS-BUILT"		

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: DATE: 4/5/2015
APPROVED BY: DATE 2/5/2015

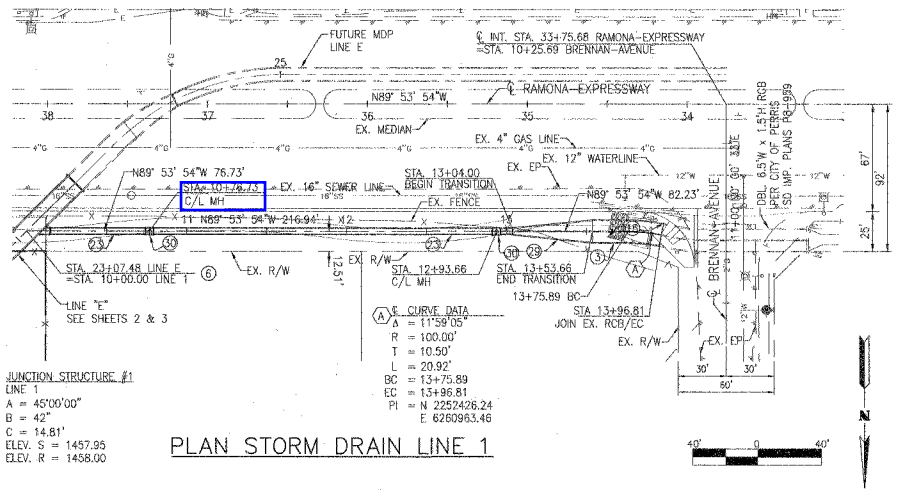
PERRIS VALLEY MDP
LINE "E", STAGE 2
STA. 18+00.00 TO 23+50.00

PROJECT NO. 4-0-0488
DRAWING NO. 4-1070
SHEET NO. 3 OF 20

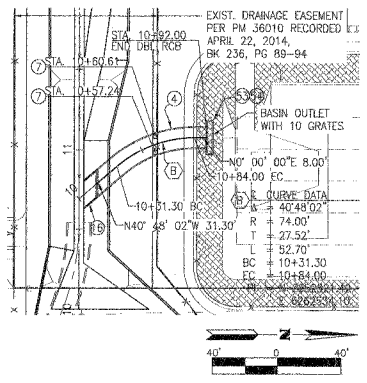


PROFILE STORM DRAIN LINE 1

PROFILE STORM DRAIN LINE 2



PLAN STORM DRAIN LINE 1



PLAN STORM DRAIN LINE 2

NOTES

3. CONSTRUCT 6.5'W x 1.5'H DBL. REINFORCED CONCTRETE BOX PER CALTRANS STD. PLAN D81.
4. CONSTRUCT 6'W x 4'H DBL. REINFORCED CONCRETE BOX PER CALTRANS STD. PLAN D81.
6. CONSTRUCT JUNCTION STRUCTURE NO.1 PER RCFC & WCD STD. DWG. NO. JS226.
7. CONSTRUCT MANHOLE NO. 3 PER RCFC & WCD STD. DWG. NO. MH253.
15. SAWCUT AND REMOVE EXISTING DBL. 6.5'W x 1.5'H RCB, WINGWALL, AND RIP-RAP PAD.
16. CONSTRUCT BOX CULVERT WINGWALLS TYPE "E" PER CALTRANDS STD. DWG. NO. D85 AND DETAIL "B" ON SHEET 5.
23. INSTALL 42" R.C.P - DLOAD PER PLAN
29. CONSTRUCT TRANSITION STRUCTURE NO.1 PER RCFC & WCD DWG. NO. TS301 INCLUDE PIER PER RCFC & WCD DWG. NO. TS304.
30. CONSTRUCT MANHOLE NO.2 PER RCFC & WCD NO. MH252.
53. CONSTRUCT MODIFIED GRATED INLET PER SSPWC STD. PLAN 305-3 AND DETAILS ON SHEET 20.
54. INSTALL OUTLET RESTRICTION PLATES PER DETAIL ON SHEET 20.

RECORD DRAWINGS

APPROVED BY: [signature] DATE: 4/6/15

LD 2/4/15

PM 36010

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

JASON K. ARDERY RCE No. C71508 DATE: 11/5/14

CITY OF PERRIS
APPROVED BY:
CITY ENGINEER DATE: 1/23/15

BENCH MARK
RIV. COUNTY BM #M-31: 3 1/4" ALUM. DISK LOCATED FLUSH AT THE SWC OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB AT CROSSING OF PERRIS BLVD & RIV. CO. FLOOD CONTROL CHANNEL. ELEV. 1474.674', NGVD 1929 DATUM

REVISIONS
REF. DESCRIPTION APPR. DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: DATE: 2/5/2015
APPROVED BY: DATE: 2/5/2015

PERRIS VALLEY MDP
LINE "E", STAGE 2
LINE 1 & LINE 2

PROJECT NO. 4-0-0488
DRAWING NO. 4-1070
SHEET NO. 4 OF 20

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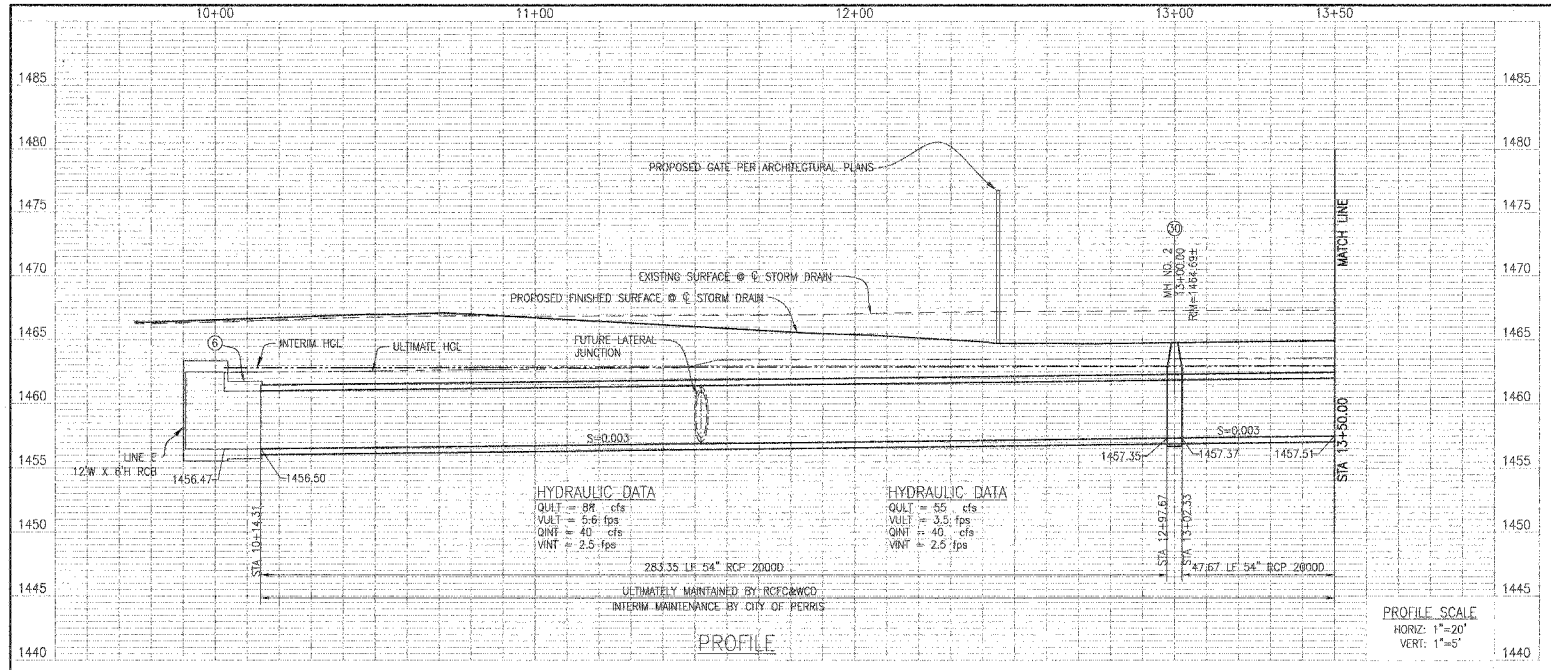
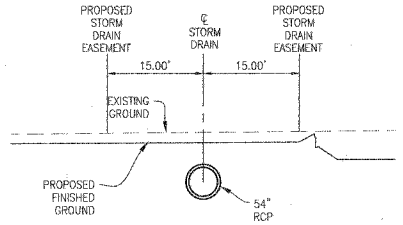
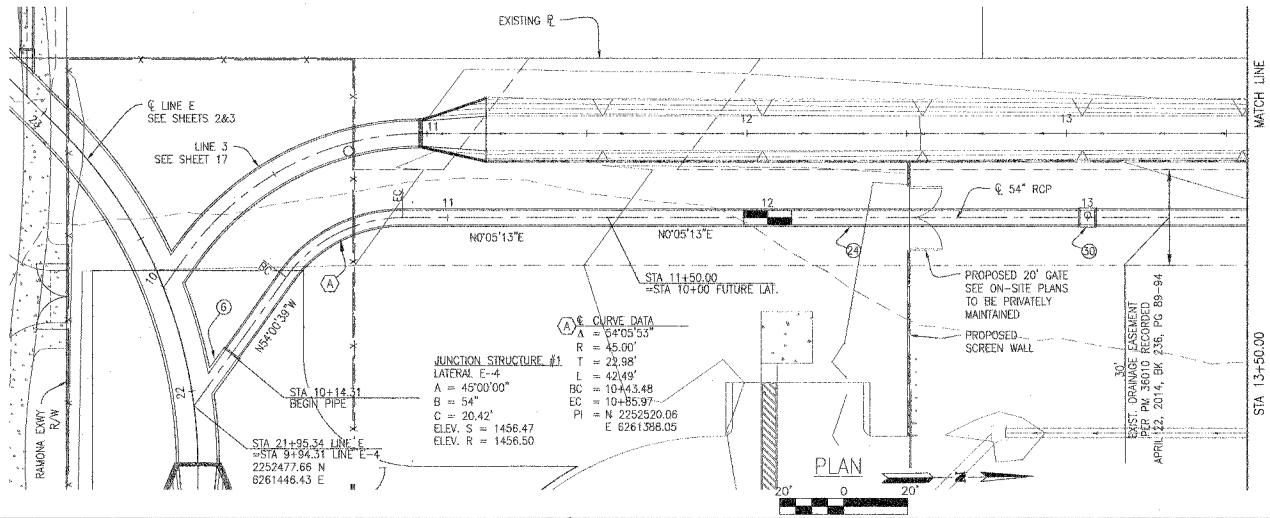




SECTION AT STA 12+00.00

TYPICAL FROM STA 10+00 TO 13+50

10' 0 10'



NOTES

(6) CONSTRUCT JUNCTION STRUCTURE NO. 1 PER RCFC & WCD STD. DWG. NO. JS228 AND DETAIL "C" ON SHEET 20.

(24) INSTALL 54" R.C.P. – D-LOAD PER PLAN.

(30) CONSTRUCT MANHOLE NO. 2 PER RCFC & WCD STD. DWG. NO. MH252.

RECORD DRAWINGS

APPROVED BY:

DATE: 4/5/17

LD 2/4/15

PM 36010

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

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

JASON K. ARDERY, RCE No. 71508 — DATE: 11/5/14

REGISTERED PROFESSIONAL ENGINEER JASON K. ARDERY NO. 071508 CIVIL STATE OF CALIFORNIA

CITY OF PERRIS
APPROVED BY:
CITY ENGINEER — DATE: 12/3/15

RIV. COUNTY BM #M-31: 3 1/4" ALUM. DISK LOCATED FLUSH AT THE SWC OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB AT CROSSING OF PERRIS BLVD & RIV. CO. FLOOD CONTROL CHANNEL. ELEV. 1474.674', NGVD 1929 DATUM

REVISIONS			
REF.	DESCRIPTION	APPR.	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

RECOMMENDED FOR APPROVAL BY: DATE: 2/5/2015

APPROVED BY: Mark W. Wills DATE: 2/5/2015

PERRIS VALLEY MDP

LATERAL "E-4", STAGE 1

STA 10+00.00 TO 13+50.00

PROJECT NO. 4-0-0460

DRAWING NO. 4-0070

SHEET NO. 9 OF 20

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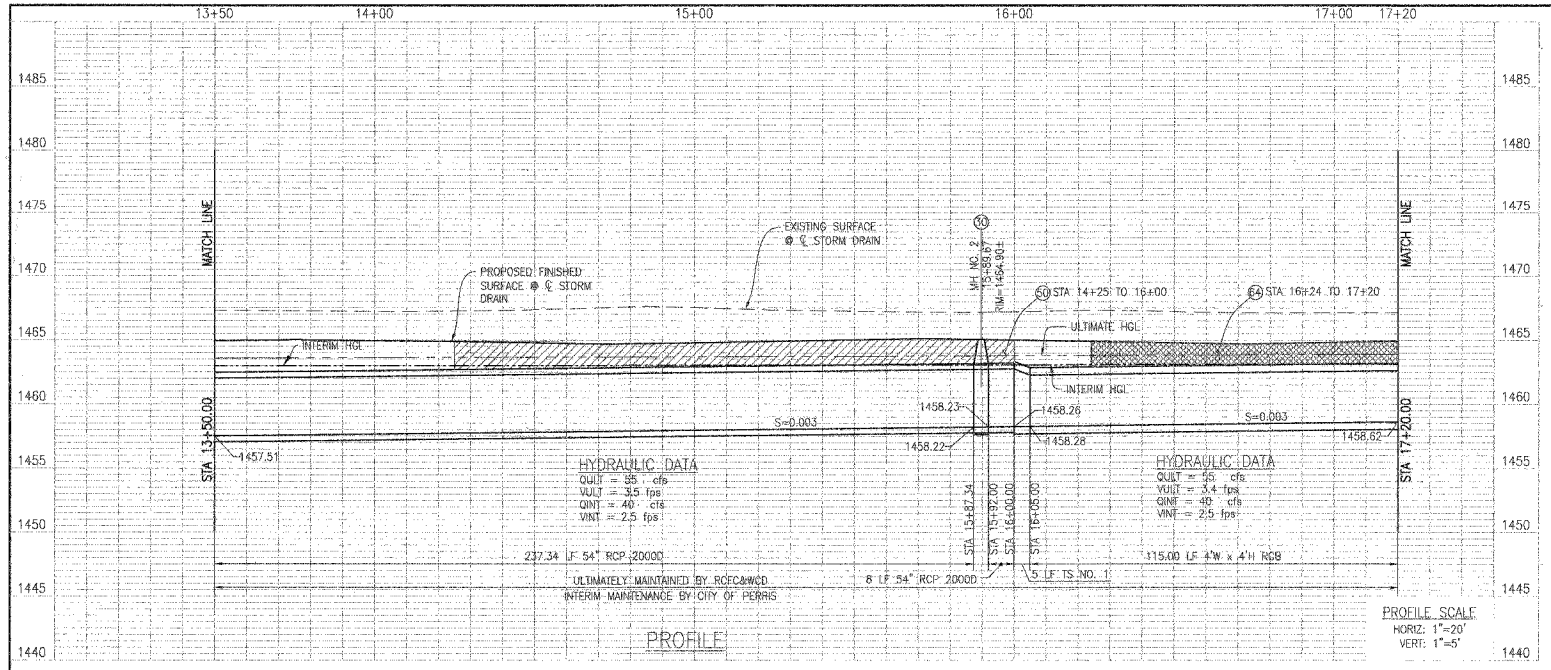
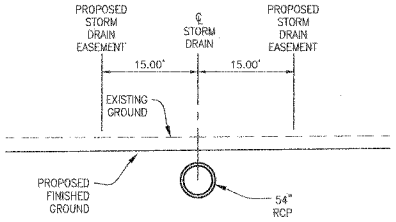


PROFILE

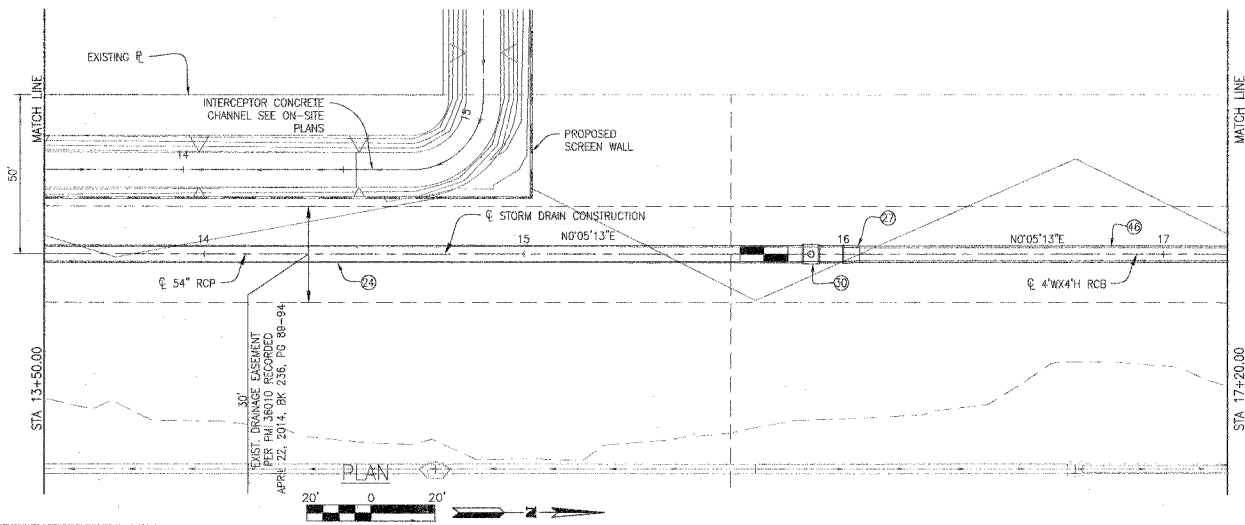
PROFILE SCALE
HORIZ: 1"=20'
VERT: 1"=5'



SECTION AT STA 15+75.00

TYPICAL FROM STA 13+50 TO 16+00

10' 0 10'



NOTES

(24) INSTALL 54" R.C.P. – D-LOAD PER PLAN.

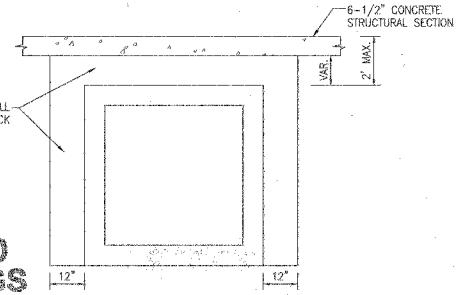
(27) CONSTRUCT TRANSITION STRUCTURE NO. 1 PER RCFC & WCD STD. DWG. NO. TS301.

(30) CONSTRUCT MANHOLE NO. 2 PER RCFC & WCD STD. DWG. NO. MH252.

(46) CONSTRUCT 4'W X 4'H REINFORCED CONCRETE BOX PER CALTRANS STD. PLAN D80.

(50) SLURRY BACKFILL PER NOTE 14 OF GENERAL NOTES ON SHEET 1.

(54) SLURRY BACKFILL PER DETAIL SHOWN HEREON.



(54) 4'W X 4'H RCB BACKFILL DETAILS
NTS

RECORD DRAWINGS
APPROVED BY:
DATE: 4/5/17

LD 4/4/15

PM 36010

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PREPARED BY:
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3788 McCRAY STREET
RIVERSIDE, CA. 92506
PH. (951) 686-1070
FAX (951) 788-1256
JASON K. ARGENT, RCE No. C71508
11/15/14
DATE:

REGISTERED PROFESSIONAL ENGINEER JASON K. ARGENT NO. C71508 CIVIL STATE OF CALIFORNIA

CITY OF PERRIS
APPROVED BY:
CITY ENGINEER
1/23/15
DATE:

RIV. COUNTY BM #M-31: 3 1/4" ALUM. DISK LOCATED FLUSH AT THE SWC OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB AT CROSSING OF PERRIS BLVD & RIV. CO. FLOOD CONTROL CHANNEL. ELEV. 1474.674', NGVD 1929 DATUM

REVISIONS			
REF.	DESCRIPTION	APPR.	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

RECOMMENDED FOR APPROVAL BY:
DATE: 2/5/2015

APPROVED BY:
DATE: 2/5/2015

PERRIS VALLEY MDP
LATERAL "E-4", STAGE 1
STA 13+50.00 TO 17+20.00

PROJECT NO. 4-0-0460
DRAWING NO. 4-1070
SHEET NO. 10 OF 20

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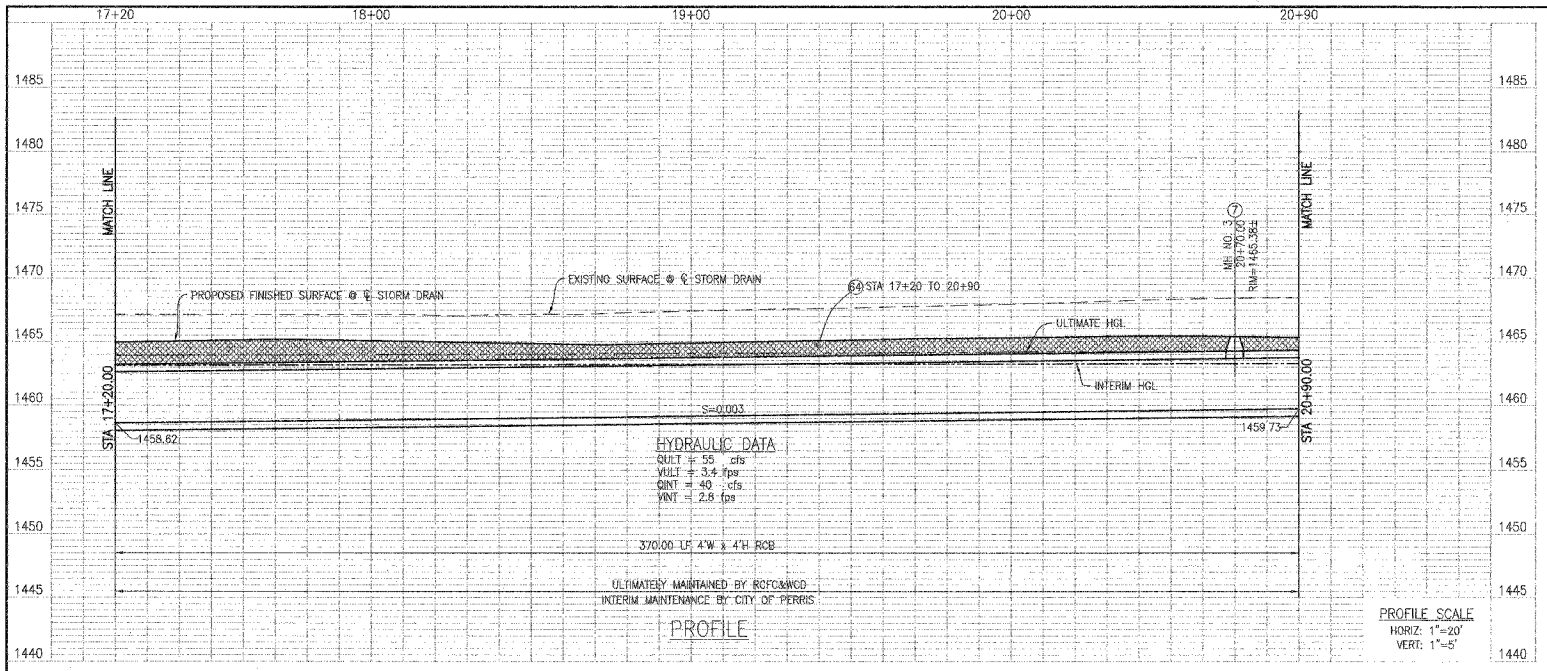
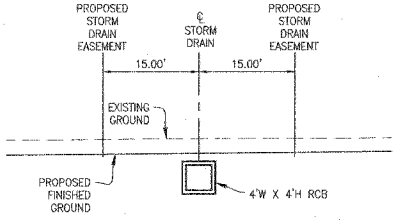
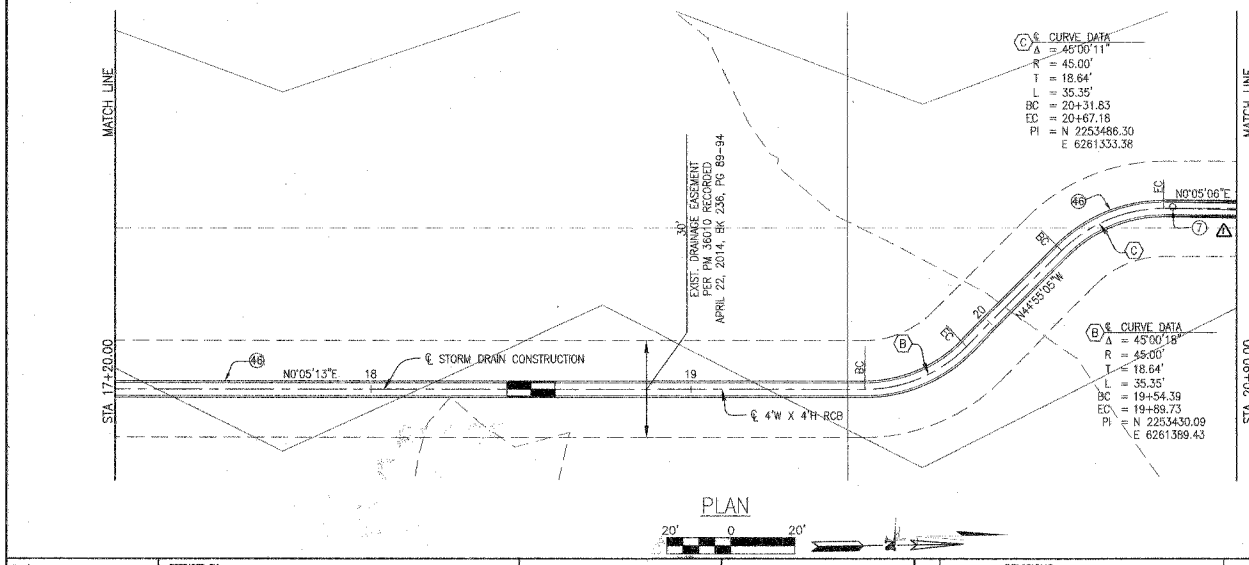




SECTION AT STA 18+50.00

TYPICAL FROM STA 17+20 TO 20+90

10' 0 10'



PLAN

20' 0 20'

NOTES

(7) CONSTRUCT MANHOLE NO. 3 PER RCFC & WCD STD. DWG. NO. MH253.

(46) CONSTRUCT 4'W X 4'H REINFORCED CONCRETE BOX PER CALTRANS STD. PLAN D80.

(64) SLURRY BACKFILL PER DETAIL SHOWN ON SHEET 10.

RECORD DRAWINGS

APPROVED BY: [signature]

DATE: 4/5/17

LD 2/4/15

PM 36010

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

PREPARED BY:
ALBERT A. WEBB ASSOCIATES
ENGINEERING CONSULTANTS
3795 McCRAY STREET
RIVERSIDE, CA. 92506
PH. (951) 686-1070
FAX (951) 788-1256

JASON E. ARDERY, RCE No. C71508 DATE: 11/5/14

REGISTERED PROFESSIONAL ENGINEER JASON E. ARDERY NO. C71508 CIVIL STATE OF CALIFORNIA

CITY OF PERRIS
APPROVED BY:
CITY ENGINEER DATE: 1/23/15

RIV. COUNTY BM #M-31: 3 1/4" ALUM. DISK LOCATED FLUSH AT THE SWC OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB AT CROSSING OF PERRIS BLVD & RIV. CO. FLOOD CONTROL CHANNEL. ELEV. 1474.674', NGVD 1929 DATUM

REVISIONS			
⚠ "As-Built"			
REF.	DESCRIPTION	APPR.	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

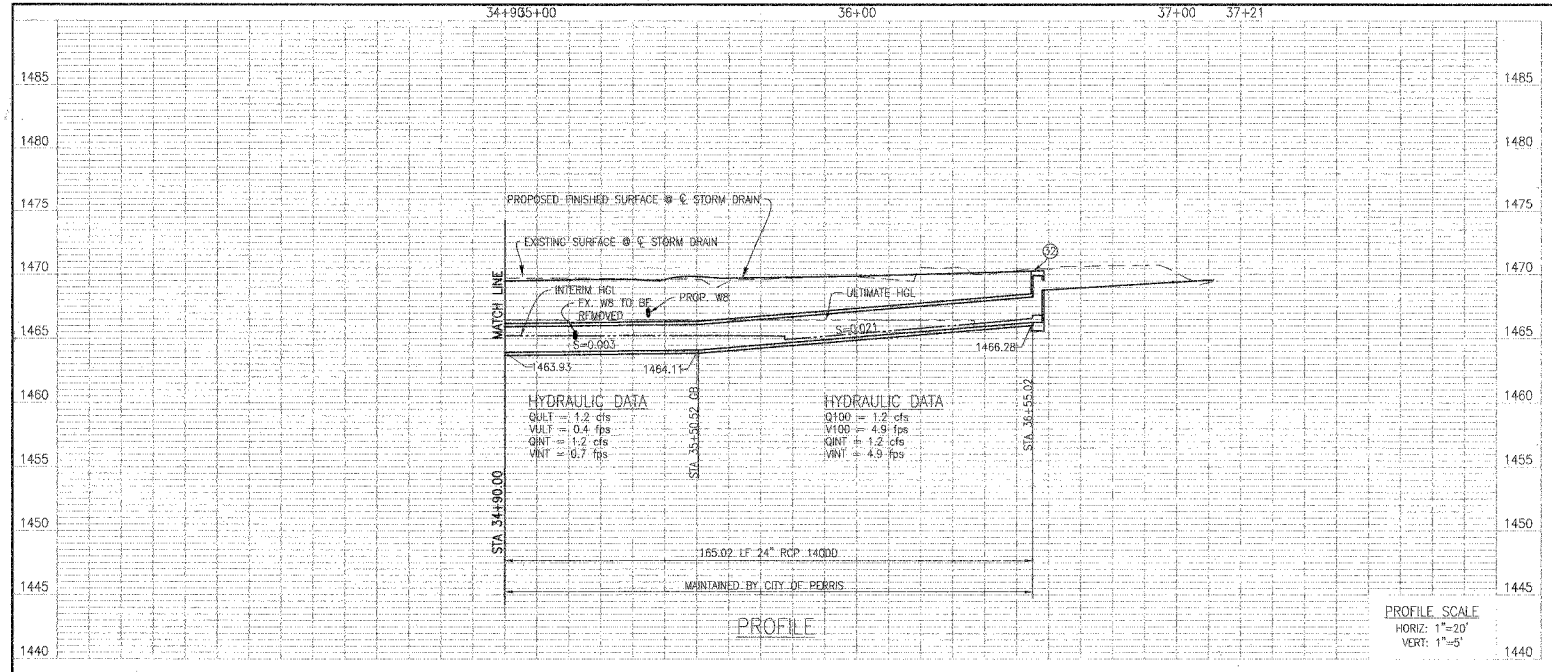
RECOMMENDED FOR APPROVAL BY: [signature] DATE: 4/15/2015

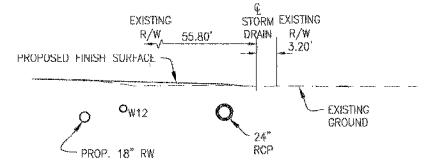
APPROVED BY: Mark H. Wills DATE: 2/5/2015

PERRIS VALLEY MDP
LATERAL "E-4", STAGE 1
STA 17+20.00 TO 20+90.00

PROJECT NO. 4-0-0460
DRAWING NO. 4-1070
SHEET NO. 11 OF 20

D:\247\11-0112\DWG & PROJDESIGN\11-0112-C-SS.DWG 11/13/2014 3:37:28 PM

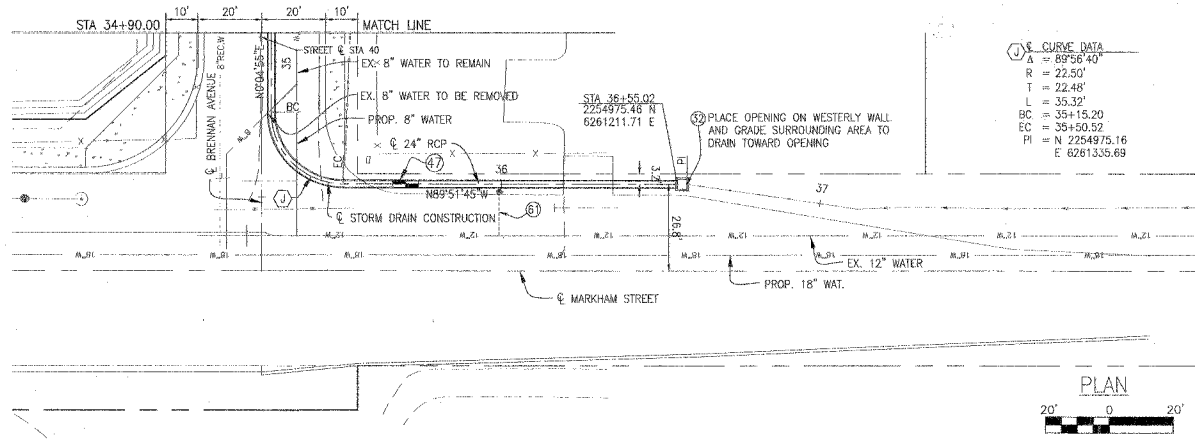




SECTION AT STA 35+70.00

TYPICAL FROM STA 34+90 TO END OF PROJECT

10' 0 10'



NOTES

(32) CONSTRUCT CONCRETE DROP INLET PER PER RCFC & WCD STD. DWG. NO. CB110 WITH H=9", V=4', W=3', T=6", D=24", & A=3'.

(47) INSTALL 24" R.C.P. - D-LOAD PER PLAN.

(61) REMOVE EXISITING FIRE HYDRANT PER WATER IMPROVEMENT PLANS.

RECORD DRAWINGS

APPROVED BY:

DATE: 4/5/17

LD 2/4/15

PM 36010

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3788 McCRAY STREET
RIVERSIDE, CA. 92506
PH. (951) 686-1070
FAX (951) 788-1256

JASON K. ARBERG, RCE No. 071508 — DATE: 11/15/14

CITY OF PERRIS
APPROVED BY:
CITY ENGINEER — DATE: 4/23/15

RIV. COUNTY BM #M-31: 3 1/4" ALUM. DISK LOCATED FLUSH AT THE SWC OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB AT CROSSING OF PERRIS BLVD & RIV. CO. FLOOD CONTROL CHANNEL. ELEV. 1474.674', NGVD 1929 DATUM

REVISIONS			
REF.	DESCRIPTION	APPR.	DATE

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

PERRIS VALLEY MDP
LATERAL "E-4", STAGE 1
STA 34+90.00 TO END OF PROJECT

PROJECT NO. 4-0-0460
DRAWING NO. 4-1070
SHEET NO. 16 OF 20

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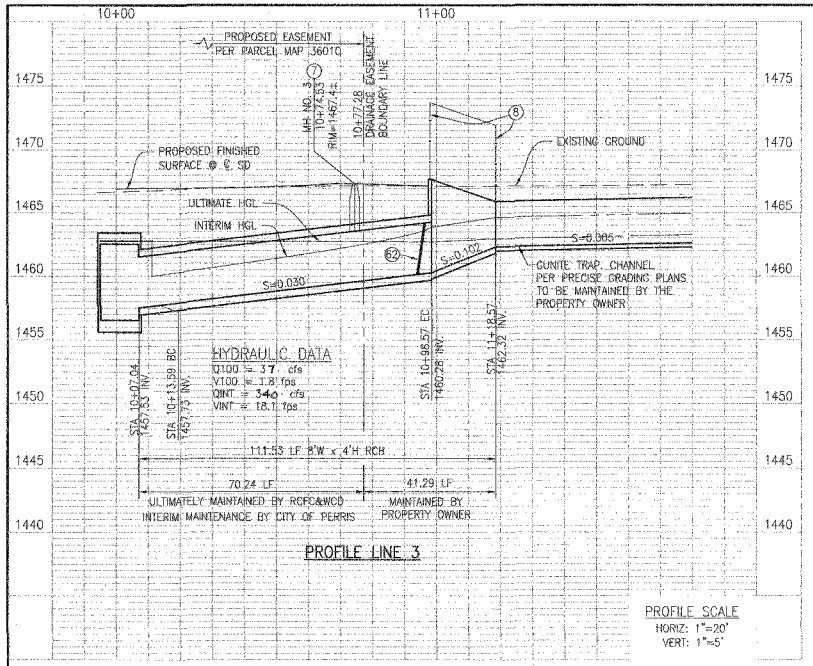
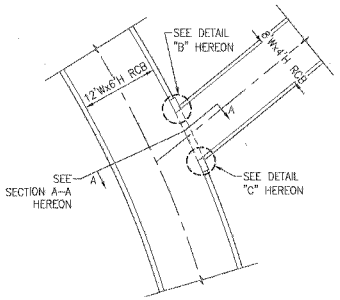
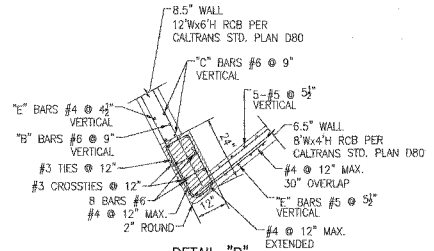


PROFILE LINE 3

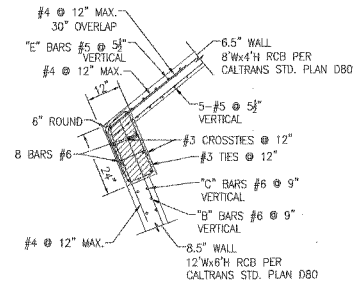
PROFILE SCALE
HORIZ: 1"=20'
VERT: 1"=5'



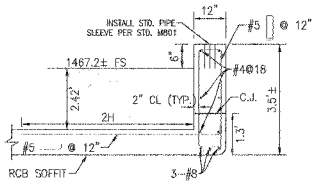
JUNCTION STRUCUTRE
RCB TO RCB DETAIL
DETAIL "A"
NTS



DETAIL "B"
NTS



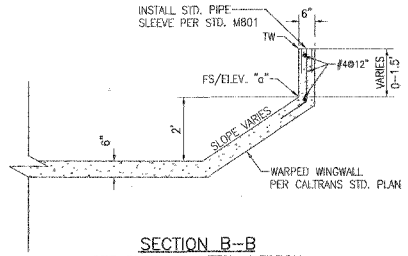
DETAIL "C"
NTS



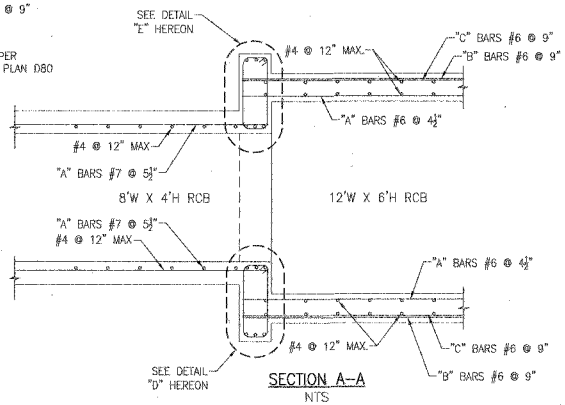
PARAPET WALL DETAIL
NTS

NOTES

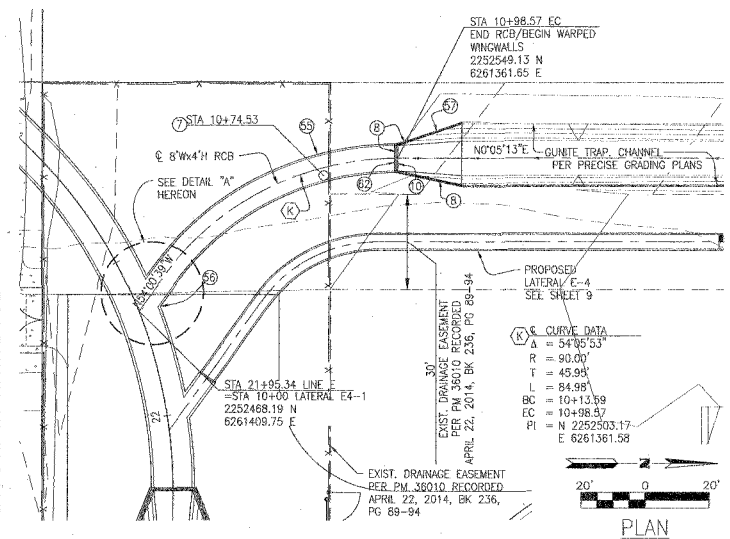
(7) CONSTRUCT MANHOLE #3 PER RCFC & WCD STD. DWG. MH253.
(8) CONSTRUCT 6' HIGH CHAIN LINK FENCE PER RCFC & WCD STD. DWG. M801.
(10) CONSTRUCT PARAPET WALL PER DETAIL SHOWN HEREON.
(55) CONSTRUCT 8'W x 4'H REINFORCED CONCRETE BOX PER CALTRANS STD. PLAN D80.
(56) CONSTRUCT BOX TO BOX JUNCTION PER DETAIL ON SHEETS HEREON.
(57) CONSTRUCT BOX CULVERT WARPED WINGWALLS PER CALTRANS STD. PLAN D86A AND DETAILS SHOWN HEREON.
(62) CONSTRUCT SLOPED PROTECTION BARRIER PER S.P.P.W.C. STD. PLAN 360.



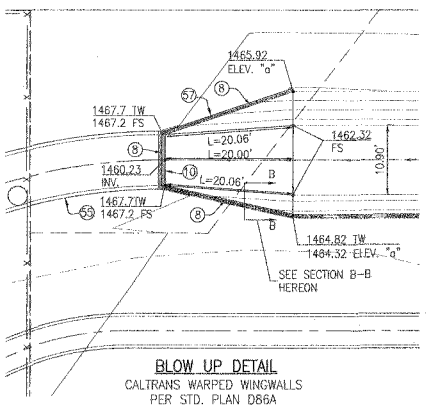
SECTION B--B
SEE BLOW UP DETAIL HEREON



SECTION A--A
NTS

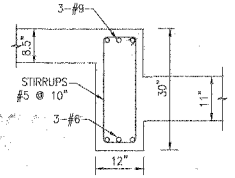


PLAN



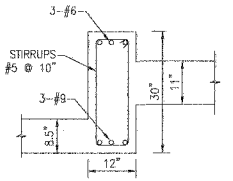
BLOW UP DETAIL
CALTRANS WARPED WINGWALLS
PER STD. PLAN D86A
SEE PLAN VIEW TO THE LEFT
10' 0 10'

RECORD DRAWINGS
APPROVED BY:
DATE: 4/5/17



EDGE BEAM SHALL BE CONSTRUCTED LONGITUDINALLY ALONG THE MAIN LINE FOR ENTIRE WIDTH OF BOX OPENING PLUS 1.5 FEET ON EACH SIDE.

DETAIL "D" BOTTOM EDGE BEAM
NTS



EDGE BEAM SHALL BE CONSTRUCTED LONGITUDINALLY ALONG THE MAIN LINE FOR ENTIRE WIDTH OF BOX OPENING PLUS 1.5 FEET ON EACH SIDE.

DETAIL "E" TOP EDGE BEAM
NTS

LD 2/4/15

PM 36010

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JASON K. ARDERY, RCE No. C71508 — DATE: 11/15/14

CITY OF PERRIS
APPROVED BY:
CITY ENGINEER — DATE: 1/23/15

RIV. COUNTY BM #M-31: 3 1/4" ALUM. DISK LOCATED FLUSH AT THE SWC OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB AT CROSSING OF PERRIS BLVD & RIV. CO. FLOOD CONTROL CHANNEL. ELEV. 1474.674', NGVD 1929 DATUM

REVISIONS			
REF.	DESCRIPTION	APPR.	DATE

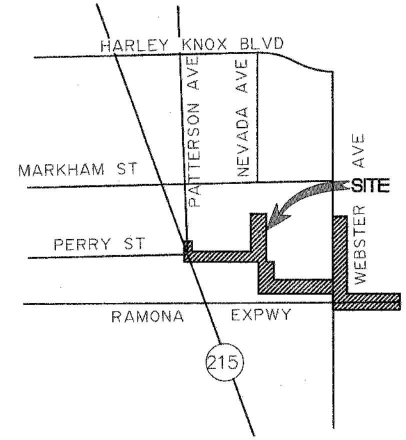
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: DATE: 2/5/2015
APPROVED BY: Mark A. Wills DATE: 2/5/2015

PERRIS VALLEY MDP
LINE "E", STAGE 2
LINE 3

PROJECT NO. 4-0-0488
DRAWING NO. 4-1070
SHEET NO. 17 OF 20

S:\2011\11-012\DWG & PRO\DESIGN\11-012-C-SIG.DWG 11/13/2014 3:37:26 PM

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT



VICINITY MAP
N.T.S.
T.4S, R.4W, S.1
T.4S, R.3W, S.7

INDEX

GENERAL NOTES:

1. THE CONTRACTOR SHALL CONSTRUCT THE FLOOD CONTROL IMPROVEMENTS SHOWN ON THE DRAWINGS IN CONFORMANCE WITH THE REQUIREMENTS OF THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT'S M.O.U. STANDARD SPECIFICATIONS DATED JUNE 24, 2008, AND RCFC&WCD STANDARD MANUAL. FOR THE LATEST DRAWINGS OF THE STANDARD MANUAL, PLEASE REFER TO THE "PUBLICATIONS AND RECORDS" PAGE FOUND ON THE DISTRICT'S WEBSITE.
2. CONTACT THE ENCROACHMENT PERMIT ENGINEER AT 951.955.1266 IF AN ENCROACHMENT PERMIT IS REQUIRED FROM RIVERSIDE COUNTY FLOOD CONTROL. AFTER THE PERMIT IS ISSUED THE DISTRICT MUST BE NOTIFIED ONE WEEK PRIOR TO CONSTRUCTION.
3. CONTACT CONTRACT ADMINISTRATION AT 951.955.1288 IF CONSTRUCTION INSPECTION WILL BE PERFORMED BY RIVERSIDE COUNTY FLOOD CONTROL. THE DISTRICT MUST BE NOTIFIED TWENTY DAYS (20) PRIOR TO CONSTRUCTION.
4. ALL STATIONING REFERS TO CENTERLINE OF CONSTRUCTION UNLESS OTHERWISE NOTED.
5. STATIONING FOR LATERALS AND CONNECTOR PIPE REFER TO THE CENTERLINE INTERSECTION STATIONS.
6. FORTY-EIGHT HOURS BEFORE EXCAVATION, CALL UNDERGROUND SERVICE ALERT 1.800.227.2600 OR 811.
7. ALL ELEVATIONS SHOWN ARE IN FEET AND DECIMALS THEREOF BASED ON THE NORTH AMERICAN VERTICAL DATUM (NAVD 88).
8. ALL COORDINATES ARE SHOWN IN FEET AND DECIMALS THEREOF BASED ON THE NORTH AMERICAN DATUM (NAD 83), CALIFORNIA COORDINATE SYSTEM (CCS), ZONE 6, EPOCH 1992.88.
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 AGGREGATE BASE OR AS SPECIFIED BY THE ENGINEER.
12. OPENINGS RESULTING FROM THE CUTTING OR PARTIAL REMOVAL OF EXISTING CULVERTS, PIPES OR SIMILAR STRUCTURES TO BE ABANDONED SHALL BE SEALED WITH 6" CLASS "B" CONCRETE.
13. PIPE CONNECTED TO THE MAINLINE PIPE SHALL CONFORM TO JUNCTION STRUCTURE NO. 4 (JS229) UNLESS OTHERWISE NOTED.
14. PIPE BEDDING SHALL CONFORM TO RCFC&WCD STANDARD DRAWING NO. M815 EXCEPT FOR COVER <2 FEET. FOR COVER <2 FEET, CONCRETE SLURRY (2000 PSI) SHALL BE USED. THE ENTIRE TRENCH SHALL BE SLURRY EXTENDING 4 INCHES MINIMUM AND 12 INCHES MAXIMUM ABOVE THE TOP OF PIPE.
15. ⯐ INDICATES SOIL BORING LOCATIONS BASED ON THE SOILS REPORT DATED MAY 9, 2016. LOCATIONS SHOWN ARE APPROXIMATE.
16. "V" IS THE DEPTH OF CATCH BASINS MEASURED FROM THE TOP OF CURB TO INVERT OF CONNECTOR PIPE.
17. ALL CURB INLET STATIONING REPRESENTS THE LOCATION WHERE THE PROPOSED STORM DRAIN INTERSECTS THE INSIDE OF THE CURB INLET.
18. CATCH BASINS SHALL BE LOCATED SO THAT LOCAL DEPRESSION SHALL BEGIN AT EXISTING CURB RETURN JOINT, UNLESS OTHERWISE SPECIFIED.
19. ALL CURBS, GUTTERS, SIDEWALKS, DRIVEWAYS AND OTHER EXISTING IMPROVEMENTS TO BE RECONSTRUCTED IN KIND AND AT THE SAME ELEVATION AND LOCATION AS THE EXISTING IMPROVEMENTS UNLESS OTHERWISE NOTED.
20. STANDARD DRAWINGS CALLED FOR ON THE PLAN AND PROFILE SHALL CONFORM TO DISTRICT STANDARD DRAWINGS UNLESS NOTED OTHERWISE.
21. THE CONTRACTOR IS REQUIRED TO CALL ALL UTILITY AGENCIES REGARDING TEMPORARY SHORING AND SUPPORT REQUIREMENTS FOR THE VARIOUS UTILITY LINES SHOWN ON THESE PLANS.
22. DURING ROUGH GRADING OPERATIONS AND PRIOR TO CONSTRUCTION OF PERMANENT DRAINAGE STRUCTURES, TEMPORARY DRAINAGE CONTROL SHOULD BE PROVIDED TO PREVENT PONDING WATER AND DAMAGE TO ADJACENT PROPERTIES.
23. APPROVAL OF THESE PLANS BY THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT DOES NOT RELIEVE THE DEVELOPER'S ENGINEER OF RESPONSIBILITY FOR THE ENGINEERING DESIGN. IF FIELD CHANGES ARE REQUIRED, IT WILL BE THE RESPONSIBILITY OF THE DESIGN ENGINEER TO MAKE THE NECESSARY CORRECTIONS.
24. THE CONTRACTOR OR DEVELOPER SHALL SECURE ALL REQUIRED ENCROACHMENT AND/OR STATE AND FEDERAL REGULATORY PERMITS PRIOR TO THE COMMENCEMENT OF ANY WORK.
25. THE CONCRETE COATING ON THE INSIDE OF ALL REINFORCED CONCRETE PIPES MUST BE INCREASED TO PROVIDE 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 DESIGN VELOCITIES EXCEED 20 FEET PER SECOND. THE CONCRETE DESIGN STRENGTH IN THESE REACHES SHALL BE F'C=5,000 PSI FOR VELOCITIES EXCEEDING 20 FEET PER SECOND AND F'C=6,000 PSI FOR VELOCITIES EXCEEDING 30 FEET PER SECOND.
26. CONSTRUCTION JOINTS FOR CALTRANS STANDARD REINFORCED CONCRETE BOX SHALL BE PLACED ACCORDING TO RCFC&WCD STANDARD DRAWING NO. BX401.
27. ALL STATION OFFSETS ARE TAKEN LOOKING UPSTREAM UNLESS OTHERWISE NOTED.

CALTRANS STANDARD DRAWINGS

D80	CAST-IN-PLACE REINFORCED CONCRETE SINGLE BOX CULVERT
D89	PIPE CULVERT HEADWALLS
D90	PIPE CULVERT HEADWALLS, ENDWALLS AND WINGWALLS

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

BX401	SINGLE CELL REINFORCED CONCRETE BOX (STRUCTURAL DETAILS)
CB100	CATCH BASIN NO. 1
JS226	JUNCTION STRUCTURE NO. 1
JS229	JUNCTION STRUCTURE NO. 4
LD201	LOCAL DEPRESSION NO. 2
M807	SANITARY SEWER PROTECTION
M815	BEDDING AND PAYLINES
M816	CONCRETE BULKHEAD
MH252	MANHOLE NO. 2
MH253	MANHOLE NO. 3
MH254	MANHOLE NO. 4
TS301	TRANSITION STRUCTURE NO. 1
TS303	TRANSITION STRUCTURE NO. 3

WORK TO BE DONE

THE IMPROVEMENTS CONSIST OF THE FOLLOWING WORK TO BE DONE ACCORDING TO THESE PLANS AND THE FOLLOWING SPECIFICATIONS AND STANDARD DRAWINGS:

1. RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT STANDARD DRAWINGS (REVISED FEBRUARY 2011)
2. CALIFORNIA DEPARTMENT OF TRANSPORTATION REVISION 1 OF "CALIFORNIA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (2014 EDITION)
3. STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION, STANDARD SPECIFICATIONS (2015 EDITION)
4. STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION, STANDARD PLANS (2015 EDITION)
5. RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT'S M.O.U. STANDARD SPECIFICATIONS (DATED JUNE 2008)
6. COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, COUNTY ROAD IMPROVEMENT STANDARDS AND SPECIFICATIONS, FILED DECEMBER, 2007.
7. STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION (2012 EDITION)

NOTE: STORM DRAIN VIDEO SHALL BE SUBMITTED TO THE CITY ENGINEER FOR REVIEW AND APPROVAL PRIOR TO PAVEMENT CAPPING OR CONCRETING.

CITY OF PERRIS

APPROVED BY: [signature] 7/31/17
CITY ENGINEER DATE

CAUTION!! LOCATION OF EXISTING UTILITIES ON THESE PLANS ARE APPROXIMATE AND SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

Kimley»Horn
401 B STREET, SUITE 600, SAN DIEGO, CA 92101
TEL (619) 234-9411

PREPARED BY: [signature] 7/20/17
KATHRYN DANEKER R.C.E. 81398 DATE

REGISTERED PROFESSIONAL ENGINEER KATHRYN DANEKER No. 81398 CIVIL STATE OF CALIFORNIA

811 Know what's below. Call before you dig.
DIAL TOLL FREE 811
AT LEAST TWO DAYS BEFORE YOU DIG
UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA

BENCHMARK:
COUNTY BENCHMARK 600-40-68 APPEARS TO HAVE BEEN DESTROYED BY THE CONSTRUCTION OF THE METROLINK TRACK. BENCHMARK UTILIZED IS NGS PID: DX5442, BEING A BRASS DISK SET IN TOP OF CURB MARKED "B.M. 435 METROPOLITAN WATER DISTRICT", LOCATED 300' WEST OF THE INTERSECTION OF HARVILL AVENUE AND RIDER STREET, PERRIS, CA.
ELEVATION: 1515.12 FEET
DATUM: NAVD 88

REF.	REVISIONS DESCRIPTION	APPR.	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

RECOMMENDED FOR APPROVAL BY: [signature] PLANNING ENGINEER DATE: 8-9-2017
APPROVED BY: [signature] CHIEF ENGINEER DATE: 8-9-2017

PM 36512, PM 36582

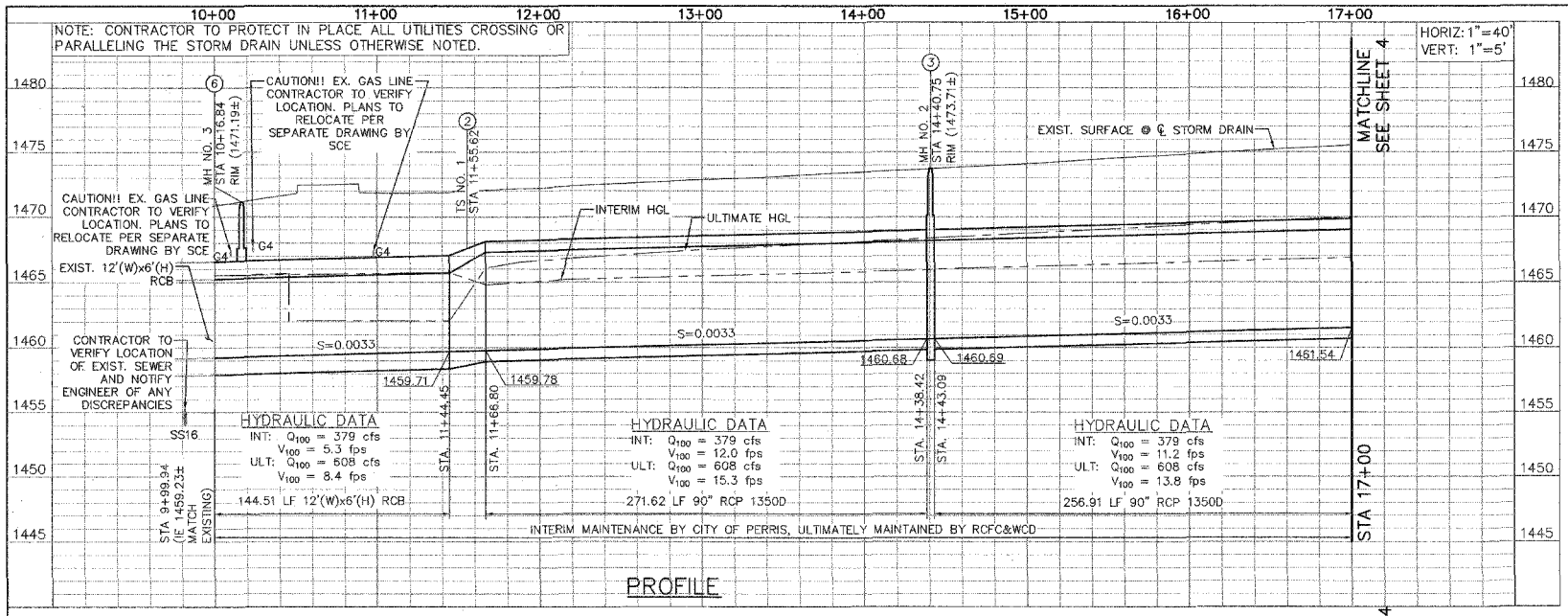
PERRIS VALLEY MDP LINE E, STAGE 3
PERRIS VALLEY – PERRY STREET SD, STAGE 1
PERRIS VALLEY – WEBSTER AVENUE SD, STAGE 1
PERRIS VALLEY MDP LINE F, STAGE 1
TITLE SHEET

MDC
CITY FILE NO. P8-1226

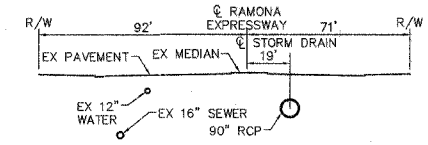
PROJECT NO. 4-0-00488, 4-0-00448, 4-0-00449, 4-0-00450

DRAWING NO. 4-1117

SHEET NO. 1 OF 20



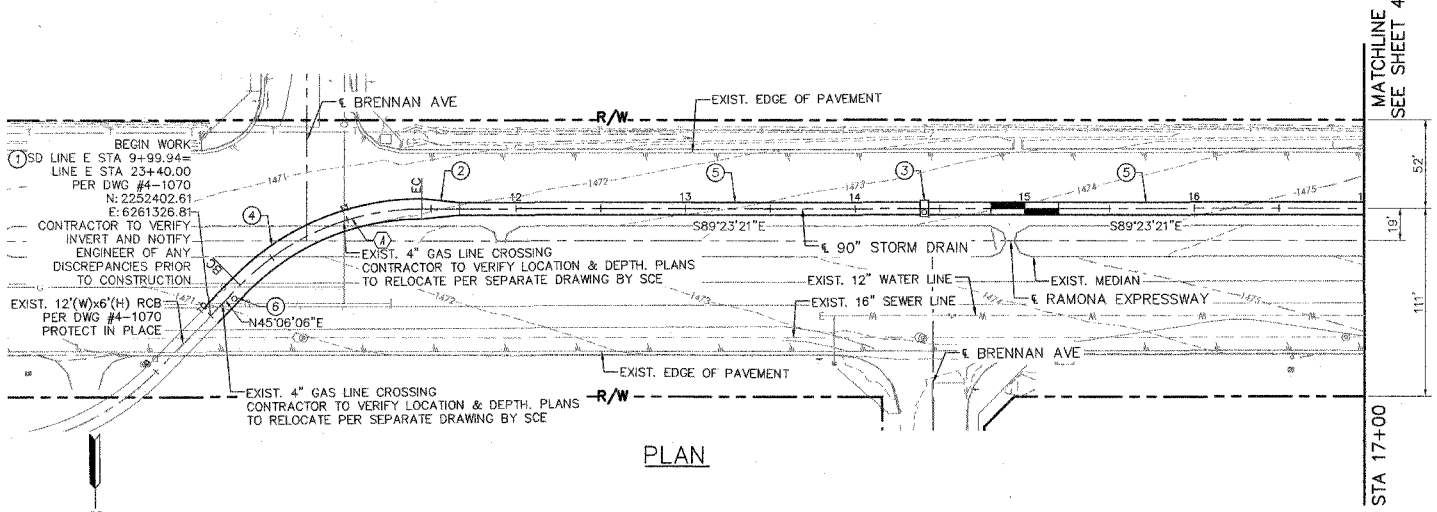
PROFILE



SECTION AT STA 15+00

TYPICAL FROM STA 13+78.89 TO STA 17+00.00

30' 0 30'



PLAN

℄ CURVE DATA							
CURVE	DELTA	RADIUS	LENGTH	BC	EC	PI NORTHING	PI EASTING
A	45°30'33"	150.00'	119.14'	STA 10+25.31	STA 11+44.45	2252340.30	6261264.28

NOTES

1. REMOVE CONCRETE BULKHEAD AND CONNECT TO EXIST 12'(W)x6'(H) RCB. SEE DETAIL B ON SHEET 20
2. CONSTRUCT TRANSITION STRUCTURE NO. 1 PER RCFC&WCD TS301 (L=22.35')
3. CONSTRUCT MANHOLE NO. 2 PER RCFC&WCD MH252 D1=90", D2=90"
4. CONSTRUCT 12'(W)x6'(H) RCB PER CALTRANS STD. D80
5. CONSTRUCT 90" RCP. D LOAD PER PROFILE.
6. CONSTRUCT MANHOLE NO. 3 PER RCFC&WCD MH253

NOTE: RESURFACE STORM DRAIN TRENCH PER CITY OF PERRIS UTILITY TRENCH SURFACE REPAIR STANDARD ON SHEET 20.

NOTE: STORM DRAIN VIDEO SHALL BE SUBMITTED TO THE CITY ENGINEER FOR REVIEW AND APPROVAL PRIOR TO PAVEMENT CAPPING OR CONCRETING.

MDC

PM 36512, PM 36582

CITY FILE NO. P8-1226

Kimley»Horn
401 B STREET, SUITE 600, SAN DIEGO, CA 92101
TEL (619) 234-9411

PREPARED BY:
KATHRYN DANEKER R.C.E. 81398 DATE 7/20/17

REGISTERED PROFESSIONAL ENGINEER KATHRYN DANEKER No. 81398 CIVIL STATE OF CALIFORNIA

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UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA

BENCHMARK:
COUNTY BENCHMARK 600-40-68 APPEARS TO HAVE BEEN DESTROYED BY THE CONSTRUCTION OF THE METROLINK TRACK. BENCHMARK UTILIZED IS NGS PID: DX5442, BEING A BRASS DISK SET IN TOP OF CURB MARKED "B.M. 435 METROPOLITAN WATER DISTRICT", LOCATED 300' WEST OF THE INTERSECTION OF HARVILL AVENUE AND RIDER STREET, PERRIS, CA.
ELEVATION: 1513.12 FEET
DATUM: NAVD 88

REVISIONS			
REF.	DESCRIPTION	APPR.	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

RECOMMENDED FOR APPROVAL BY: Deborah deChenneau DATE: 8/8/17

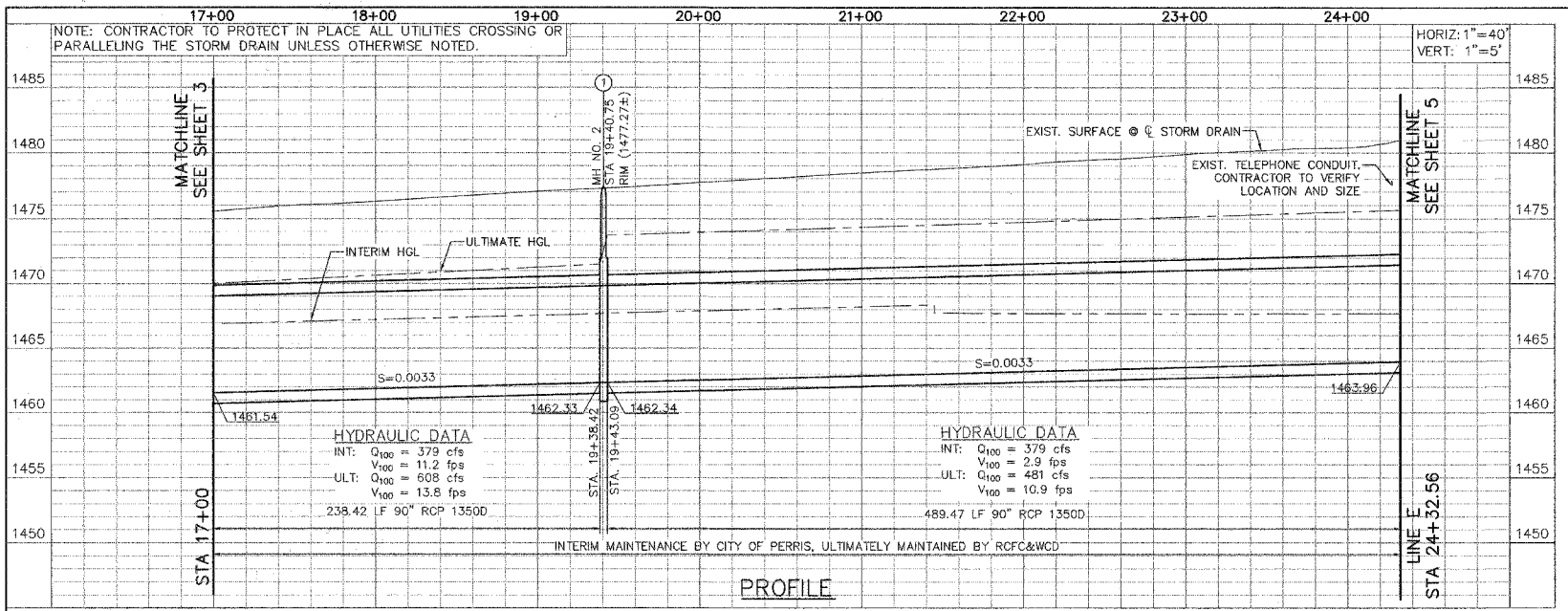
APPROVED BY: Stuart E. McKibbin DATE: 8-9-2017

PERRIS VALLEY MDP LINE E STAGE 3

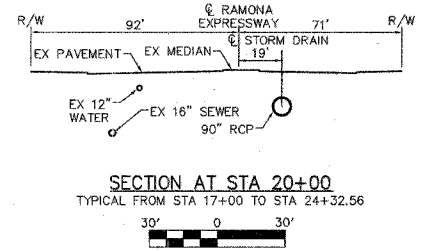
LINE E STA 9+99.94 TO STA 17+00

PROJECT NO. 4-0-00488
DRAWING NO. 4-1117
SHEET NO. 3 OF 20

Plotted By: Sangeson, Matthew July 12, 2017 01:51:19pm K:\SND_PDEV\196043000 - Rockefeller Optimus Design\RCFCD\RCFCD-LINE E-F.dwg

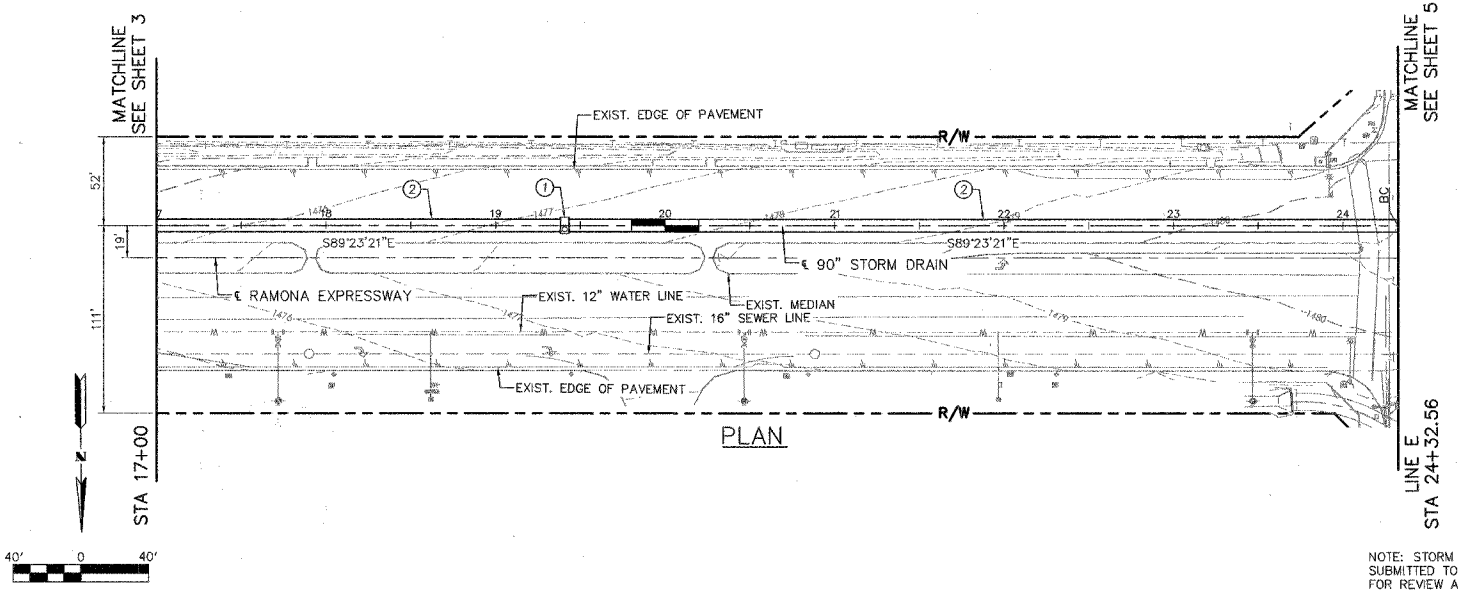


PROFILE



SECTION AT STA 20+00
TYPICAL FROM STA 17+00 TO STA 24+32.56

30' 0 30'



PLAN

NOTES

1. CONSTRUCT MANHOLE NO. 2 PER RCFC&WCD MH252 D1=90", D2=90"
2. CONSTRUCT 90" RCP. D LOAD PER PROFILE.

NOTE: RESURFACE STORM DRAIN TRENCH PER CITY OF PERRIS UTILITY TRENCH SURFACE REPAIR STANDARD ON SHEET 20.

NOTE: STORM DRAIN VIDEO SHALL BE SUBMITTED TO THE CITY ENGINEER FOR REVIEW AND APPROVAL PRIOR TO PAVEMENT CAPPING OR CONCRETING.

MDC

PM 36512, PM 36582

CITY FILE NO. P8-1226

Kimley»Horn
401 B STREET, SUITE 600, SAN DIEGO, CA 92101
TEL (619) 234-9411

PREPARED BY:
KATHRYN DANEKER R.C.E. 81398 DATE 7/20/17

REGISTERED PROFESSIONAL ENGINEER KATHRYN DANEKER No. 81398 CIVIL STATE OF CALIFORNIA

811 Know what's below. Call before you dig. UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA

DIAL TOLL FREE 811 AT LEAST TWO DAYS BEFORE YOU DIG

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Printed By: Peterson, Matthew July 19, 2017 01:51:43pm K:\SND_LDEV\193034000 - Rockefeller Options\Design\PDP\VRCSD-LINE_E-F.dwg