

**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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A handwritten signature in black ink, appearing to read "Nobuy Murakami", written over a horizontal line.

Nobuy Murakami, P.E.

R.C.E. #78149

Exp. 09/30/2023

Prepared for:

Westport Properties, Inc.
2201 Dupont Drive, Suite 700
Irvine, CA 92612
Telephone: (949) 748-5900

Prepared by:

SDH & Associates, Inc.
27363 Via Industria
Temecula, California 92590
Telephone: (951) 683-3691

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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 reflect 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 once 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.

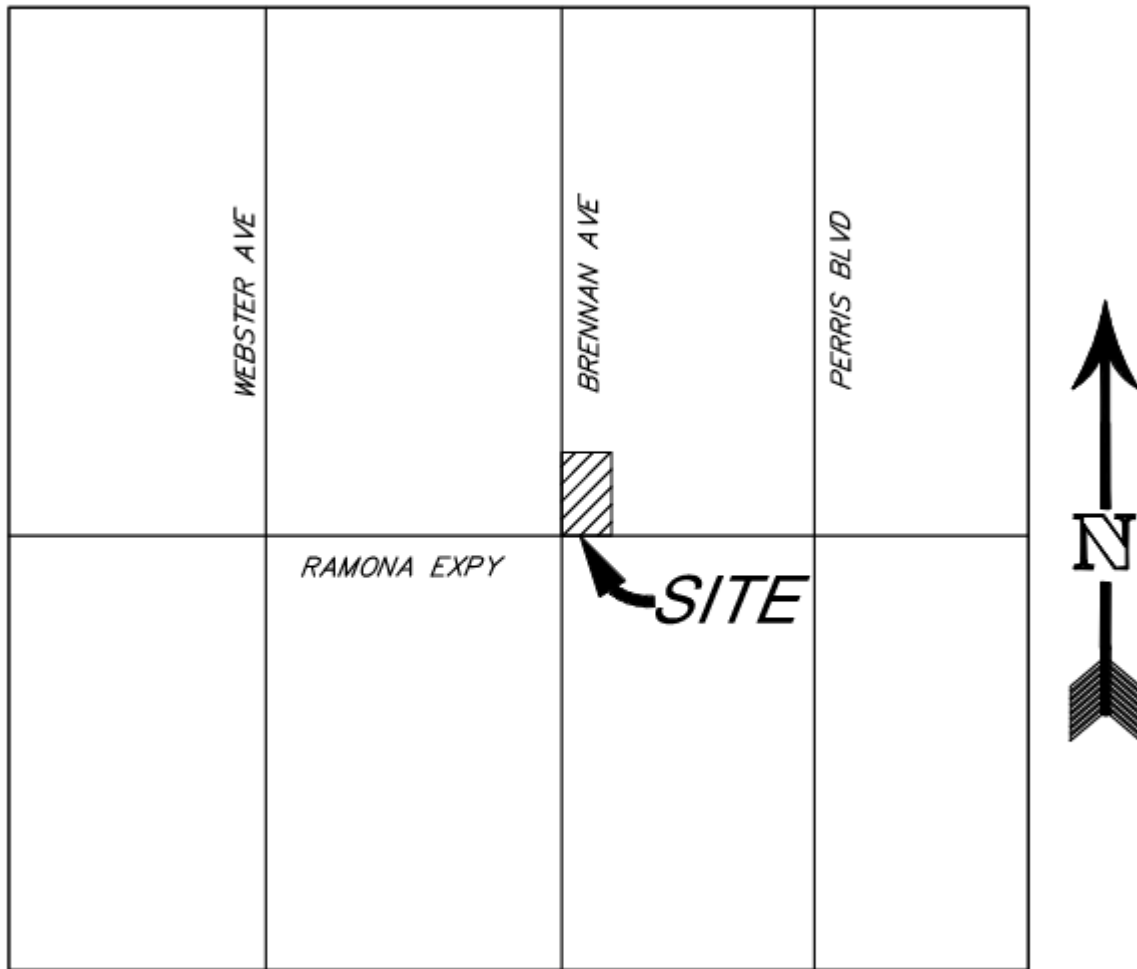
1.4 FEMA Flood Hazard Zone Information

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



VICINITY MAP
NOT TO SCALE

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

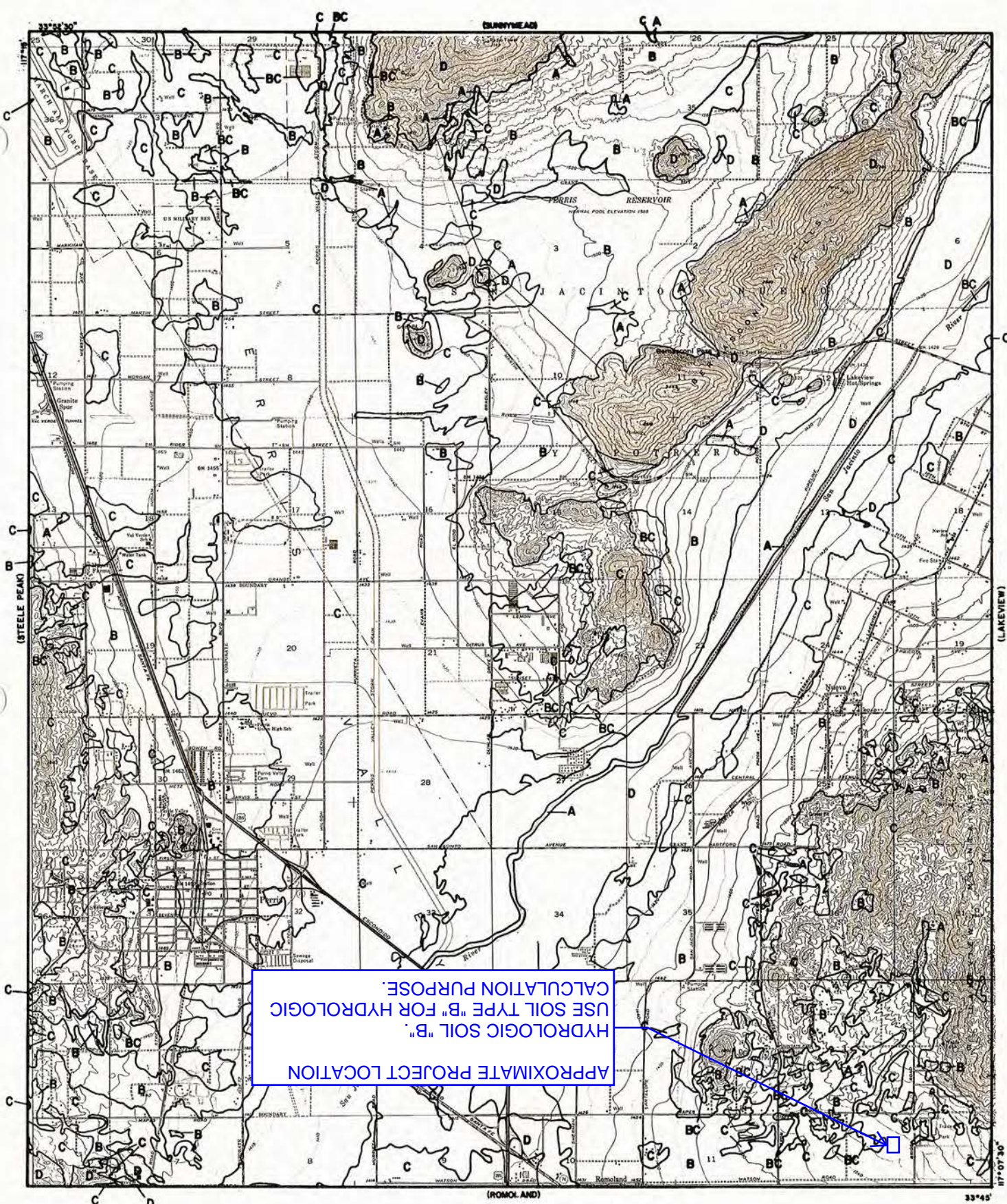
This drainage study presents preliminary hydrologic and hydraulic analyses for the proposed Westport-Perris project. Hydrologic calculations were computed in accordance with the Riverside County Flood Control and Water Conservation District - Hydrology Manual, dated April 1978 (manual). The Advanced 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



APPROXIMATE PROJECT LOCATION
 HYDROLOGIC SOIL "B"
 USE SOIL TYPE "B" FOR HYDROLOGIC
 CALCULATION PURPOSE.

LEGEND

- SOILS GROUP BOUNDARY
- A SOILS GROUP DESIGNATION

RCFC & WCD

Hydrology Manual

0 FEET 5000

**HYDROLOGIC SOILS GROUP MAP
 FOR
 PERRIS**

HYDROLOGIC SOILS GROUP
 SUPPORTING MATERIALS -

RAINFALL INTENSITY—INCHES PER HOUR

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

RCFC & WCD
 HYDROLOGY MANUAL

STANDARD
 INTENSITY - DURATION
 CURVES DATA

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 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 0.7 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, NIMS12
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 NIP 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.

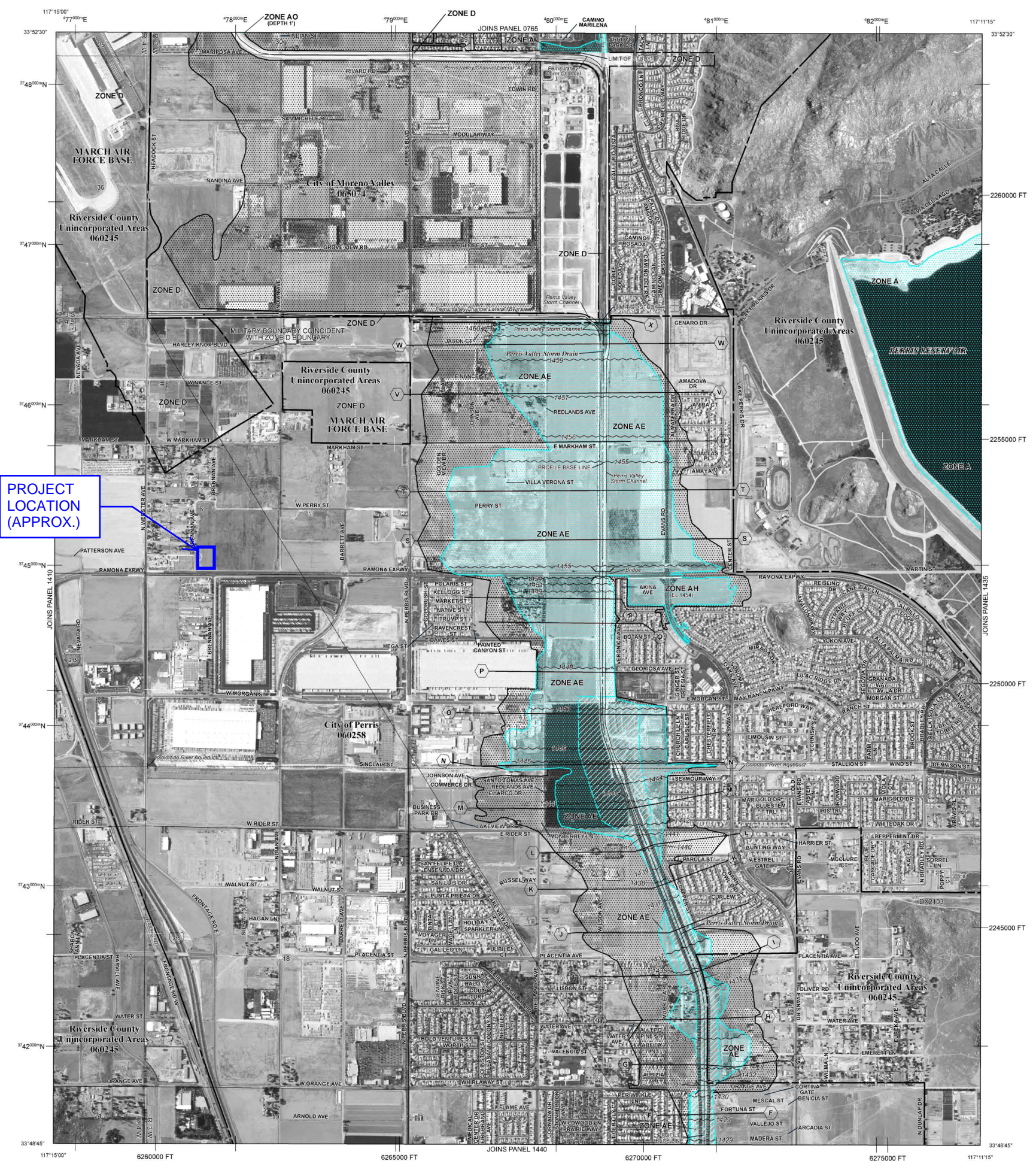
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

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.**

**PROJECT
LOCATION
(APPROX.)**



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 determined to be obsolete. 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
Bench mark (See explanation in Notes to Users section of this FIRM panel)
Base Flood Elevation line and value; elevation in feet
Base Flood Elevation value where uniform within zone; elevation in feet

513
(EL 987)

A Referenced to the North American Vertical Datum of 1988

⊗ Cross section line

⊕ Transient line

Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
47°07'30", 32°22'30"
47°07'30"E
6000000 FT
DX5510,
● M1.5

MAP REPOSITORIES
Refer to Map Repositories List on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
August 28, 2009

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'

900 0 300 0 300 0 600
0 0 0 0 0
FEET
METERS

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	06258	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 0605C1430H

MAP REVISED AUGUST 18, 2014

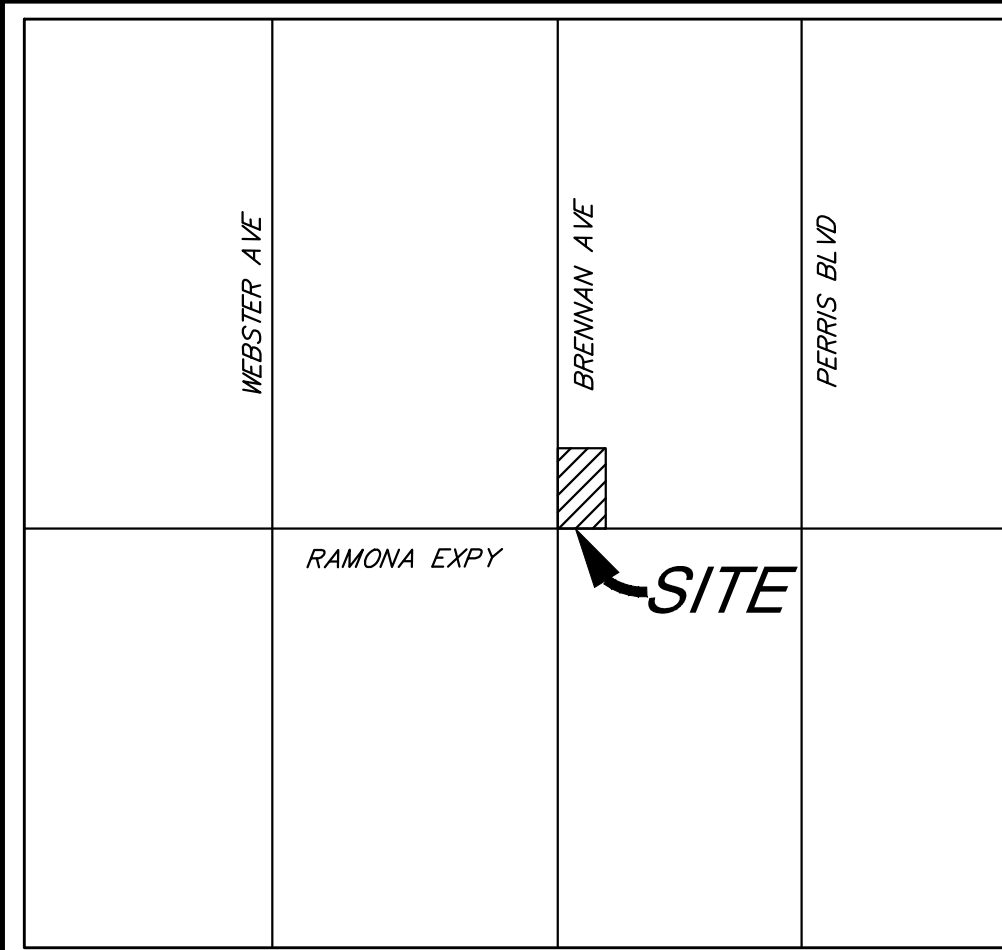
Federal Emergency Management Agency

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)



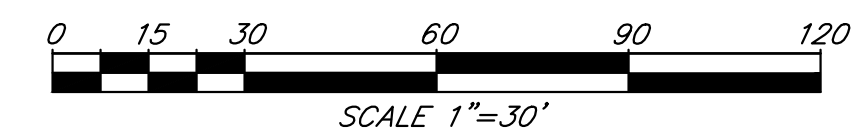
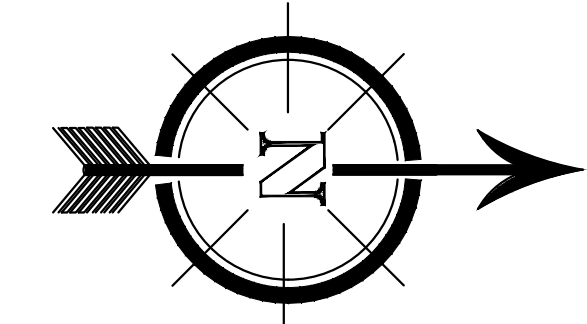
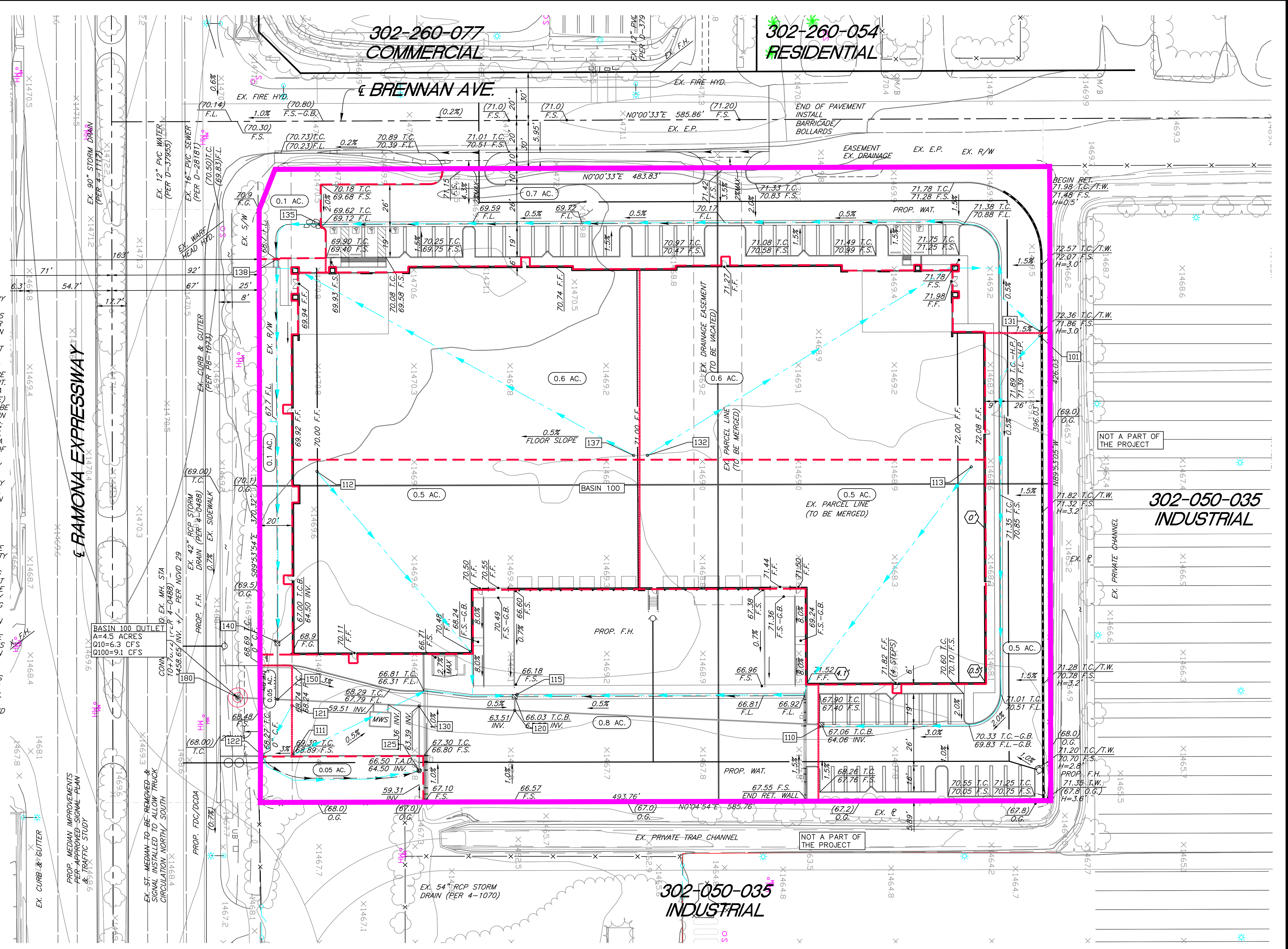
VICINITY MAP
NOT TO SCALE

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 ONCE 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 SOUTHEASTERN 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 ---



**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

NO.	HALF- CROWN TO		STREET-CROSSFALL:		CURB HEIGHT (FT)	GUTTER-GEOMETRIES:			MANNING FACTOR (n)
	WIDTH (FT)	CROSSFALL (FT)	IN- SIDE	OUT- /PARK- SIDE/ WAY		WIDTH (FT)	LIP (FT)	HIKE (FT)	
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 = $K * [(LENGTH^{**3}) / (ELEVATION CHANGE)]^{**0.2}$

INITIAL SUBAREA FLOW-LENGTH(FEET) = 146.00

UPSTREAM ELEVATION(FEET) = 68.89

DOWNSTREAM ELEVATION(FEET) = 66.03

ELEVATION DIFFERENCE(FEET) = 2.86

TC = $0.303 * [(146.00^{**3}) / (2.86)]^{**0.2} = 4.886$

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 NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (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 NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (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 NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (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 NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (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 = $K * [(LENGTH^{**3}) / (ELEVATION CHANGE)]^{**0.2}$
INITIAL SUBAREA FLOW-LENGTH(FEET) = 494.00
UPSTREAM ELEVATION(FEET) = 71.86
DOWNSTREAM ELEVATION(FEET) = 69.12
ELEVATION DIFFERENCE(FEET) = 2.74
TC = $0.303 * [(494.00^{**3}) / (2.74)]^{**0.2} = 10.239$
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.

```

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*****
FLOW PROCESS FROM NODE 150.00 TO NODE 150.00 IS CODE = 1
-----

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>>>>>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 NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (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 NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (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:

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

***** 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

NO.	HALF- CROWN TO		STREET-CROSSFALL:		CURB HEIGHT (FT)	GUTTER-GEOMETRIES:			MANNING FACTOR (n)
	WIDTH (FT)	CROSSFALL (FT)	IN- / SIDE	OUT- / PARK- WAY		WIDTH (FT)	LIP (FT)	HIKE (FT)	
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 = $K * [(LENGTH^{**3}) / (ELEVATION\ CHANGE)]^{**0.2}$

INITIAL SUBAREA FLOW-LENGTH(FEET) = 146.00

UPSTREAM ELEVATION(FEET) = 68.89

DOWNSTREAM ELEVATION(FEET) = 66.03

ELEVATION DIFFERENCE(FEET) = 2.86

TC = $0.303 * [(146.00^{**3}) / (2.86)]^{**0.2} = 4.886$

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 NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (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 NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (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 NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (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 NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (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 = $K * [(LENGTH^{**3}) / (ELEVATION\ CHANGE)]^{**0.2}$
INITIAL SUBAREA FLOW-LENGTH(FEET) = 494.00
UPSTREAM ELEVATION(FEET) = 71.86
DOWNSTREAM ELEVATION(FEET) = 69.12
ELEVATION DIFFERENCE(FEET) = 2.74
TC = $0.303 * [(494.00^{**3}) / (2.74)]^{**0.2} = 10.239$
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 NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (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 NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (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

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)	<u>PRELIMINARY RECOMMENDATIONS³</u>	
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

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

Highlighted

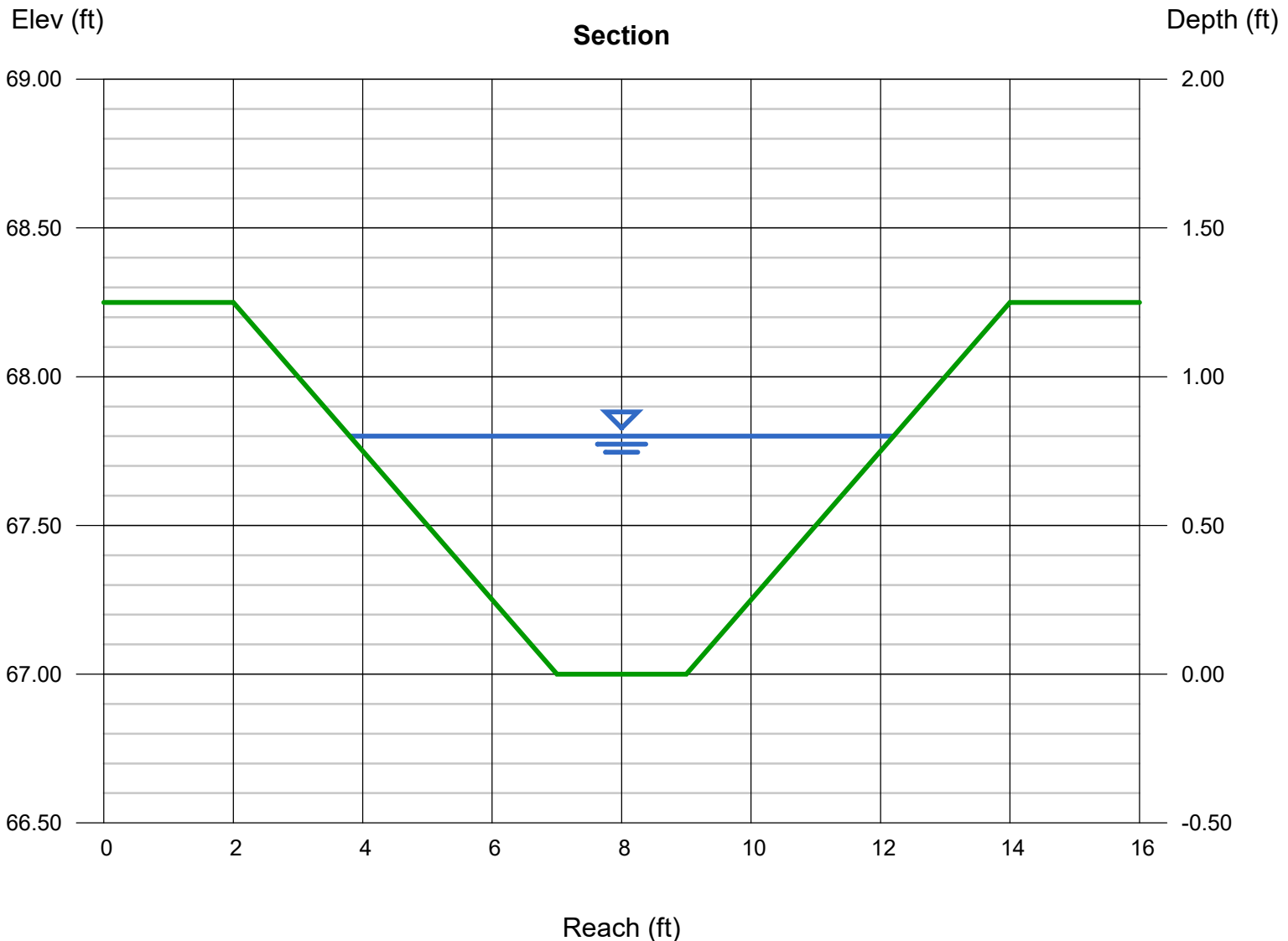
Depth (ft) = 0.80
Q (cfs) = 4.800
Area (sqft) = 4.16
Velocity (ft/s) = 1.15
Wetted Perim (ft) = 8.60
Crit Depth, Yc (ft) = 0.43
Top Width (ft) = 8.40
EGL (ft) = 0.82

Calculations

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

100-year peak flow = 4.8 cfs.

Normal depth = 0.8' < 1.25'. OK.



Channel Report

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

Highlighted

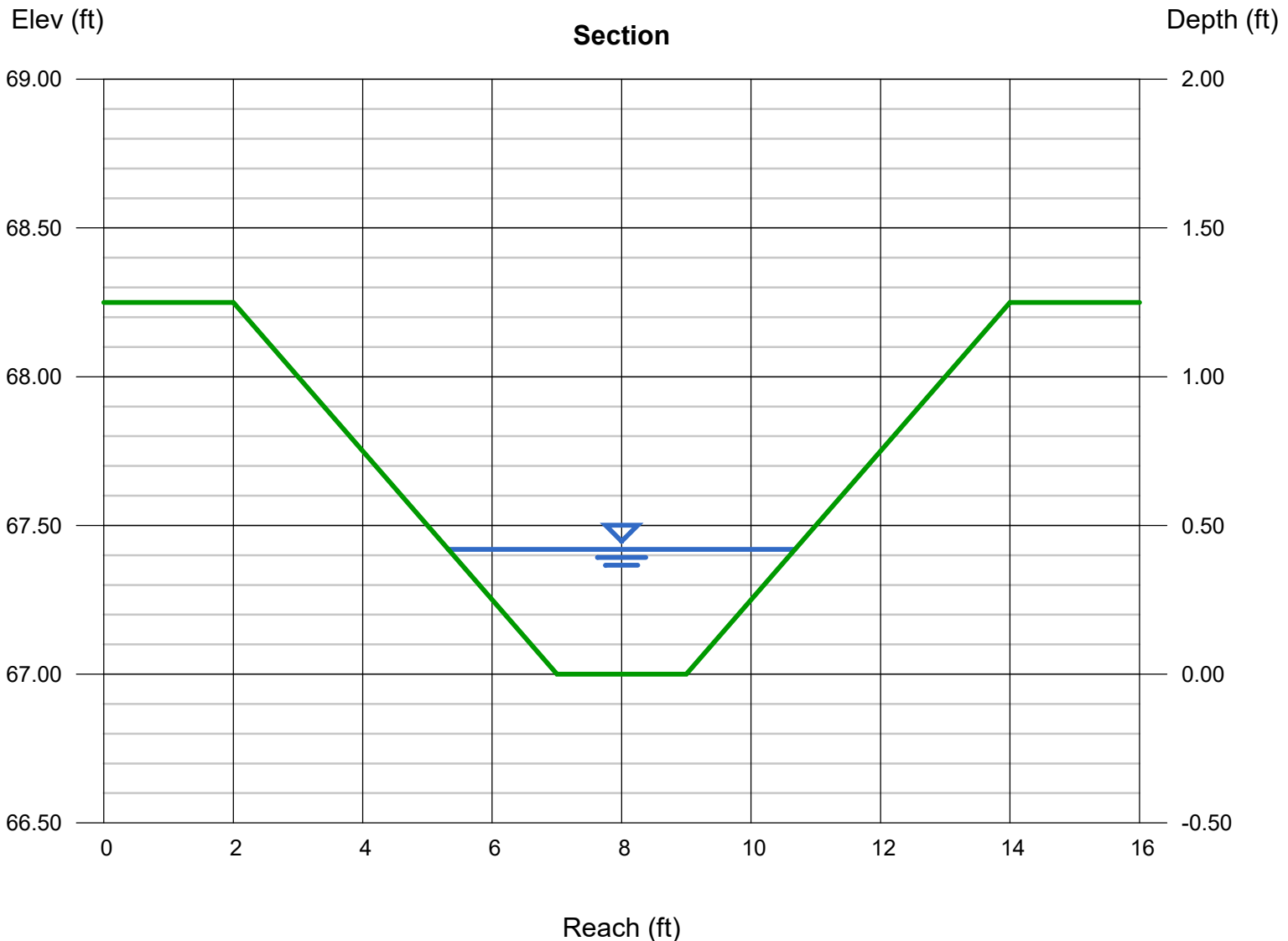
Depth (ft)	= 0.42
Q (cfs)	= 0.300
Area (sqft)	= 1.55
Velocity (ft/s)	= 0.19
Wetted Perim (ft)	= 5.46
Crit Depth, Yc (ft)	= 0.09
Top Width (ft)	= 5.36
EGL (ft)	= 0.42

Calculations

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

w/ Water Quality Flow Rate of ~0.3 cfs.

To meet a 10-minute residence time, the proposed vegetated swale would need to be a minimum of 108', based on $L=(0.19 \text{ ft/sec}) \cdot (10 \text{ min}) \cdot (60 \text{ sec/min})=114'$. 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: 2.33

City of Perris
Line 1
42" RCP

Perris Valley
MDP Line E
90" RCP

Brennan Ave

Carl's Jr

Ramona Expy

Google Earth

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

GENERAL NOTES

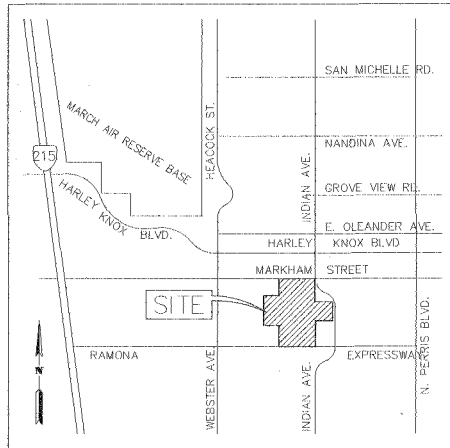
- THE CONTRACTOR SHALL CONSTRUCT THE FLOOD CONTROL IMPROVEMENTS SHOWN ON THE DRAWINGS IN CONFORMANCE WITH THE REQUIREMENTS OF THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT'S M.O.U. STANDARD SPECIFICATIONS DATED JUNE 24, 2008, AND RCFC&WCD STANDARD MANUAL. FOR THE LATEST DRAWINGS OF THE STANDARD MANUAL, PLEASE REFER TO THE "PUBLICATIONS AND RECORDS" PAGE FOUND ON THE DISTRICT'S WEBSITE.
- (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.
- 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.
- ALL STATIONING REFERS TO CENTERLINE OF CONSTRUCTION UNLESS OTHERWISE NOTED.
- STATIONING FOR LATERALS AND CONNECTOR PIPE REFER TO THE CENTERLINE INTERSECTION STATIONS.
- FORTY-EIGHT HOURS BEFORE EXCAVATION, CALL UNDERGROUND SERVICE ALERT 1-800-227-2800.
- ALL ELEVATIONS SHOWN ARE IN FEET AND DECIMALS THEREOF BASED ON THE NATIONAL GEODETIC VERTICAL DATUM (NGVD 29).
- 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.
- ALL CROSS SECTIONS ARE TAKEN LOOKING DOWNSTREAM.
- ELEVATIONS OF UTILITIES ARE APPROXIMATE UNLESS OTHERWISE NOTED.
- 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.
- 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.
- PIPE CONNECTED TO THE MAINLINE PIPE SHALL CONFORM TO JUNCTION STRUCTURE NO. 4 (JS 229) UNLESS OTHERWISE NOTED.
- 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.
- T-1 INDICATES SOIL BORING LOCATIONS BASED ON THE SOILS REPORT DATED OCTOBER 20, 2006. LOCATIONS SHOWN ARE APPROXIMATE.
- "V" IS THE DEPTH OF CATCH BASINS MEASURED FROM THE TOP OF CURB TO INVERT OF CONNECTOR PIPE.
- CATCH BASINS SHALL BE LOCATED SO THAT LOCAL DEPRESSION SHALL BEGIN AT EXISTING CURB RETURN JOINT, UNLESS OTHERWISE SPECIFIED.
- 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.
- STANDARD DRAWINGS CALLED FOR ON THE PLAN AND PROFILE SHALL CONFORM TO DISTRICT STANDARD DRAWINGS UNLESS NOTED OTHERWISE.
- THE CONTRACTOR IS REQUIRED TO CALL ALL UTILITY AGENCIES REGARDING TEMPORARY SHORING AND SUPPORT REQUIREMENTS FOR THE VARIOUS UTILITY LINES SHOWN ON THESE PLANS.
- 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.
- 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.
- THE CONTRACTOR OR DEVELOPER SHALL SECURE ALL REQUIRED ENCROACHMENT AND/OR STATE AND FEDERAL REGULATORY PERMITS PRIOR TO THE COMMENCEMENT OF ANY WORK.
- 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.
- CONSTRUCTION JOINT FOR CALTRANS STANDARD REINFORCED CONCRETE BOX SHALL BE ACCORDING TO RCFC&WCD STANDARD DRAWING NO. BX 401.

PM 36010

PROJECT NO. 4-0-0488
4-0-0460

DRAWING NO. 4-1070

SHEET NO. 1 OF 20



VICINITY MAP
NTS

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 STRUCTURAL DETAILS
- CH 330 MAINTENANCE RAMP FOR TRAPEZOIDAL CHANNEL
- M 801 CHAIN LINK FENCE DETAILS
- M 803 CONCRETE COLLAR
- M 816 CONCRETE BULKHEAD

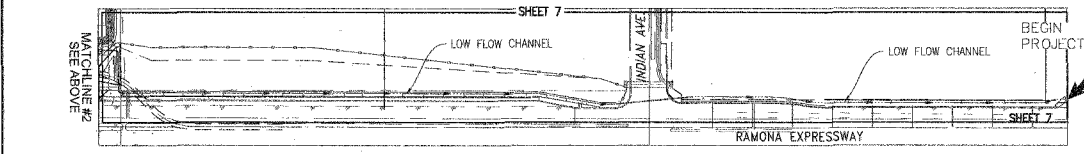
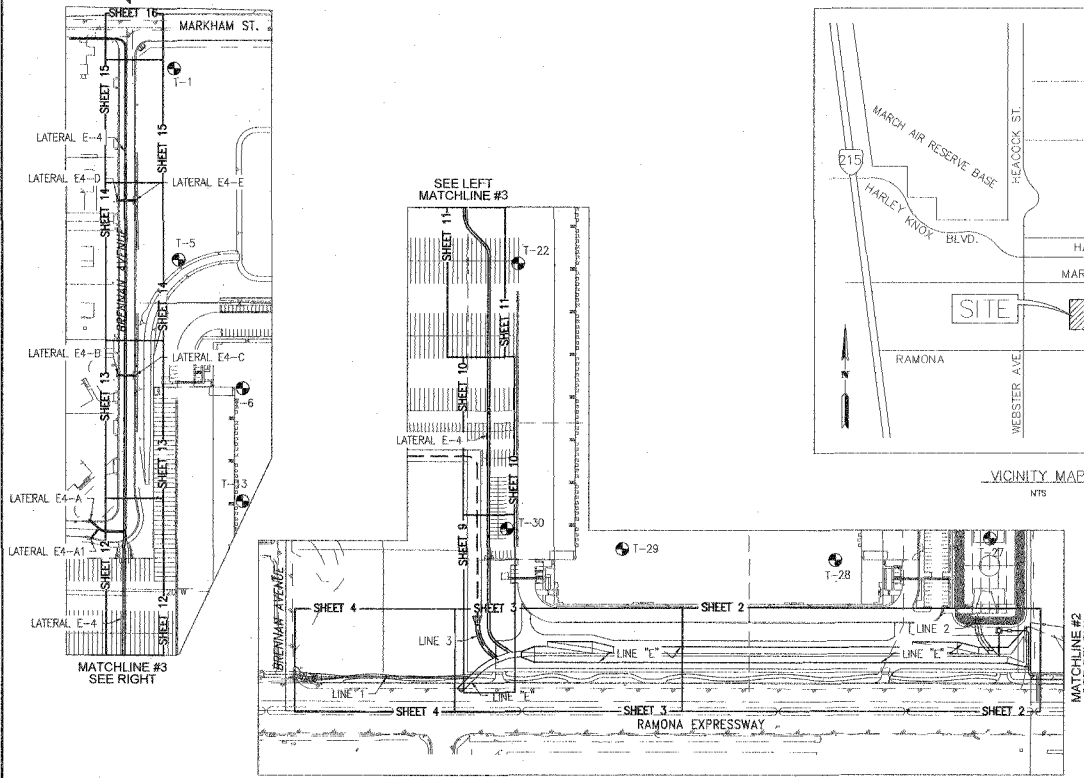
CALTRANS STD. DRAWINGS

- 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 WINGWALLS
- B 3-1A RETAINING WALL TYPE 1

SHEET INDEX

TITLE SHEET	1
LINE "E" PLAN AND PROFILE	2-3
LINE 1 PLAN AND PROFILE	4
LINE 2	4
LINE "E" DETAILS	5
STORM WATER PUMP STATION	6
LOW FLOW CHANNEL PLAN	7
LOW FLOW CHANNEL SECTIONS	8
LATERAL "E-4" PLAN AND PROFILE	9-16
LINE 3 PLAN AND PROFILE	17
LINE 4, 5, & 6 PLAN AND PROFILE	18
LATERAL "E-4" CONNECTOR PIPES	19
OUTLET STRUCTURE DETAILS	20

END PROJECT



RECORD DRAWINGS

APPROVED BY: *[Signature]*
DATE: 4/15/15

Don't Dig...Until You Call!
U.S.A. Toll Free: 1-800-227-2600
Call before you dig to locate underground utilities. Don't dig until you call.

PREPARED BY: **ALBERT A. WEBB ASSOCIATES**
ENGINEERING CONSULTANTS
3739 MCCRAY STREET
RIVERSIDE, CA 92506
PH: (951) 680-1070
FAX: (951) 780-1250
DATE: 11/15/14



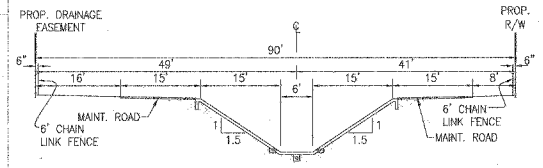
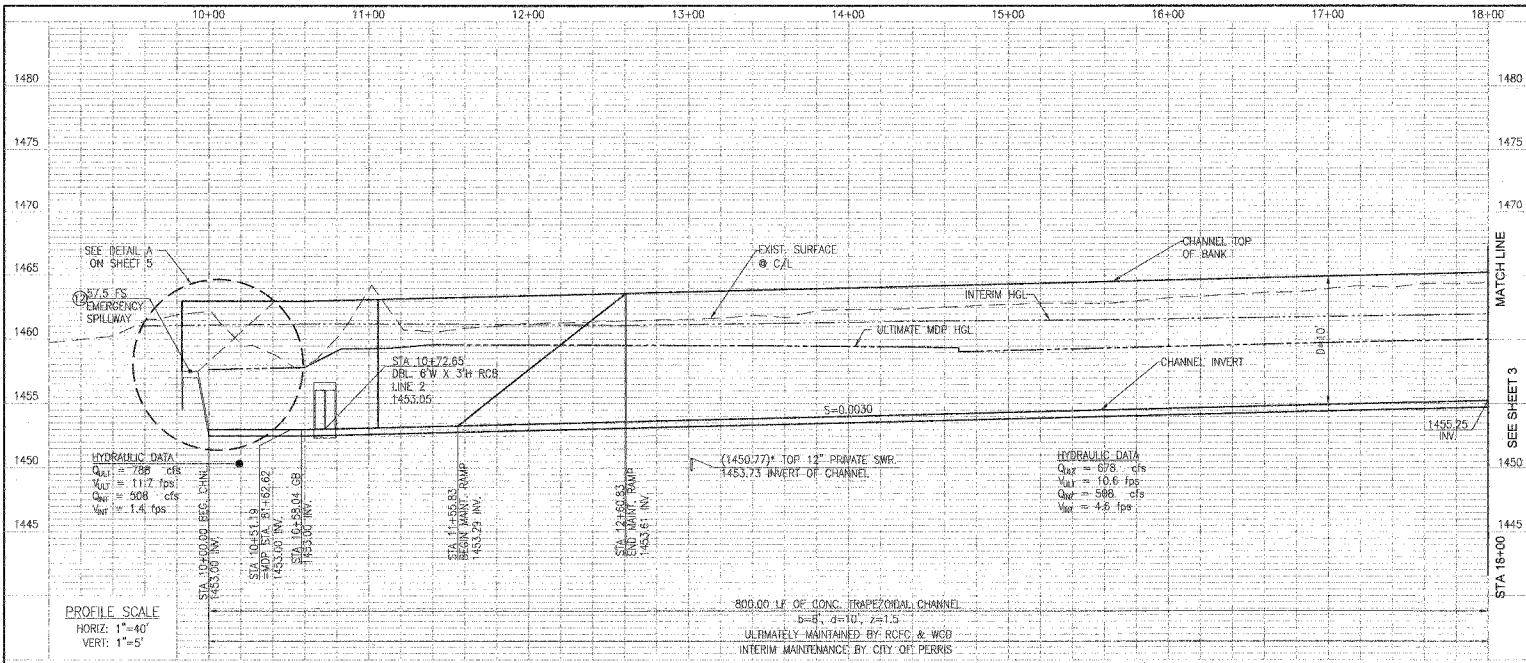
CITY OF PERRIS
APPROVED BY: *[Signature]*
CITY ENGINEER

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

REF.	DESCRIPTION	APPR.	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: *[Signature]*
PLANNING ENGINEER
DATE: 2/15/2015
APPROVED BY: *[Signature]*
CHIEF ENGINEER
DATE: 2/15/15

PERRIS VALLEY MDP
LINE "E", STAGE 2
LATERAL "E-4", STAGE 1
TITLE SHEET



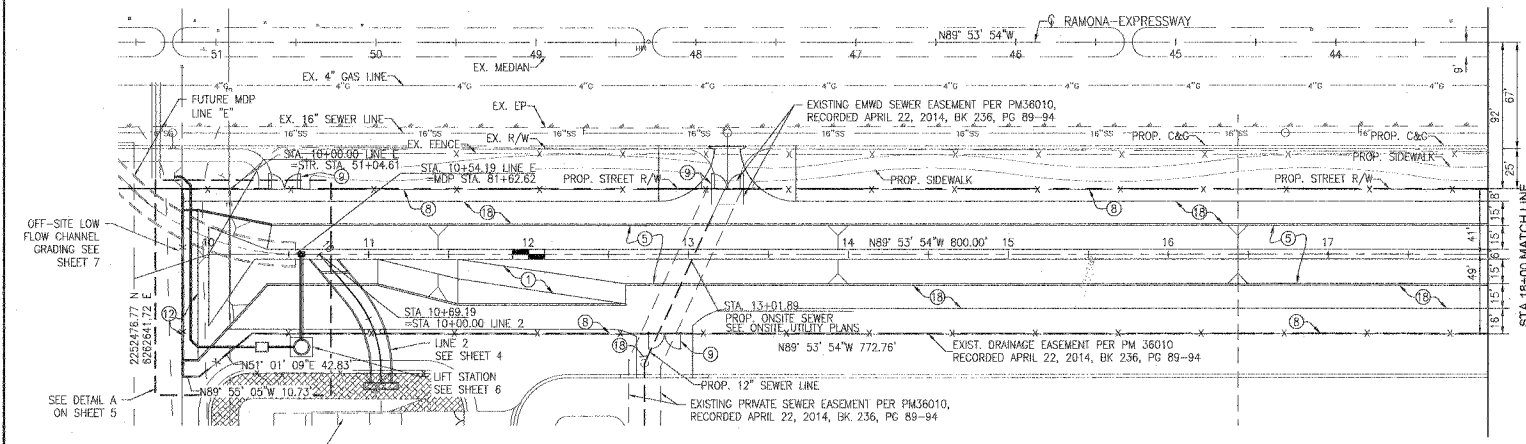
SECTION AT STA. 12+00
TYPICAL FROM STA. 10+41.29 TO STA. 21+55.14
NOT TO SCALE

ALL X-SECTIONS TAKEN
LOOKING DOWN STREAM

PROFILE LINE "E"

NOTES

- ① CONSTRUCT MAINTENANCE RAMP PER RCFC&WCD STD. DWG CH330. SEE DETAILS ON SHEET 5.
- ② CONSTRUCT CONCRETE TRAPEZOIDAL CHANNEL PER RCFC&WCD STD. DWG CH326; SIZE PER PLAN.
- ③ CONSTRUCT 6' HIGH CHAIN LINK FENCE PER RCFC & WCD STD. DWG. M801.
- ④ CONSTRUCT 20' DOUBLE DRIVE GATE PER RCFC & WCD STD. DWG. M801.
- ⑤ CONSTRUCT EMERGENCY SPILLWAY PER DETAILS "A" ON SHEET 5.
- ⑥ INSTALL 3" CLASS 2 AGGREGATE BASE MAINTENANCE ROAD PER RCFC&WCD STD. DWG CH326.



PLAN LINE "E"

RECORD DRAWINGS

APPROVED BY: *[Signature]*
DATE: 4/5/15



Don't Dig Until You Call
U.S.A. Toll Free:
1-800-227-2600
for the location of buried utility lines.
Don't attempt vital services.
TPO: 800-945-4343

PREPARED BY:
ALBERT A. WEBB ASSOCIATES
ENGINEERING CONSULTANTS
3708 MCARDY STREET
PERRIS, CA 92506
PH: (951) 686-1070
FAX: (951) 798-1258
DATE: 4/5/15

CITY OF PERRIS
APPROVED BY: *[Signature]*
DATE: 4/23/15

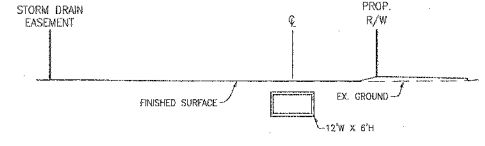
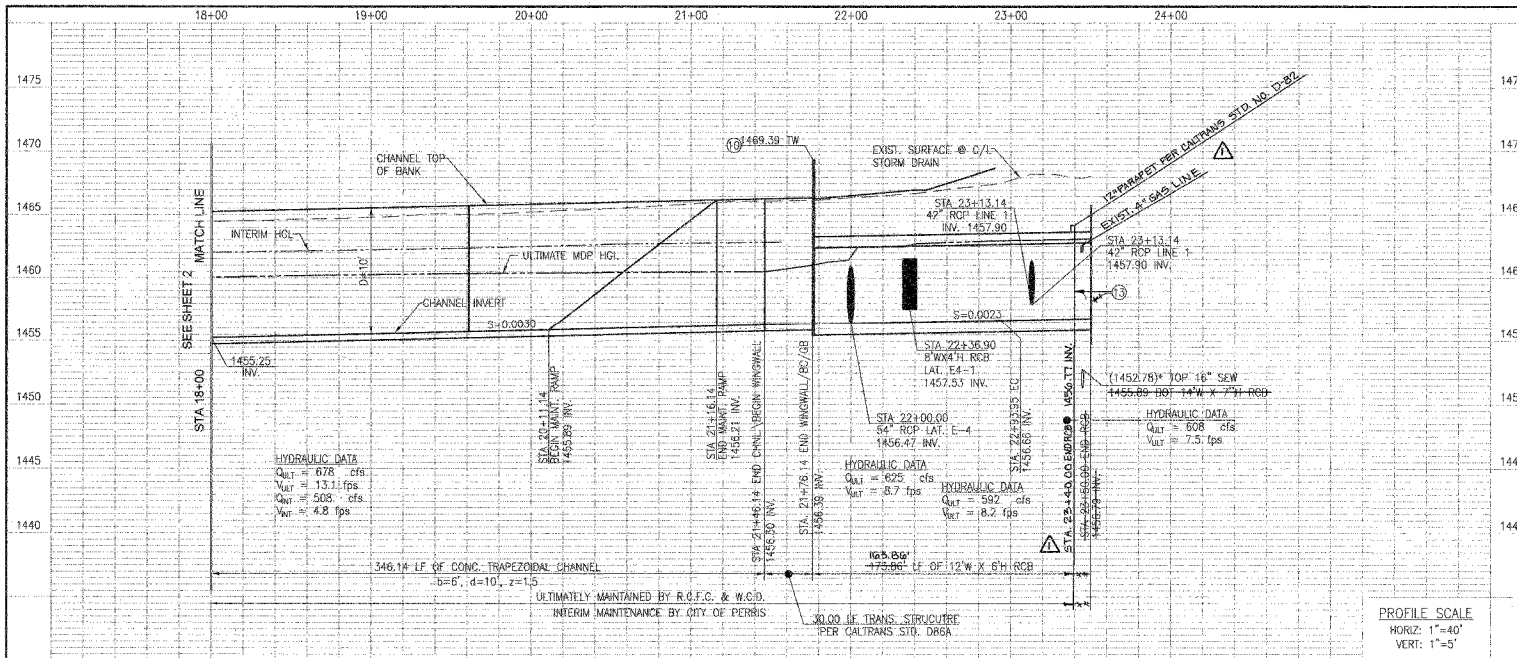
BENCH MARK
R.V. COUNTY BM 31: 3 1/4" ALUM DISK LOCATED FLUSH AT THE SWC OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB AT CROSSING OF PERRIS BLVD & R.V. CO. FLOOD CONTROL CHANNEL. ELEV. 1474.674, NGVD 1929 DATUM

REV.	DESCRIPTION	APPR.	DATE

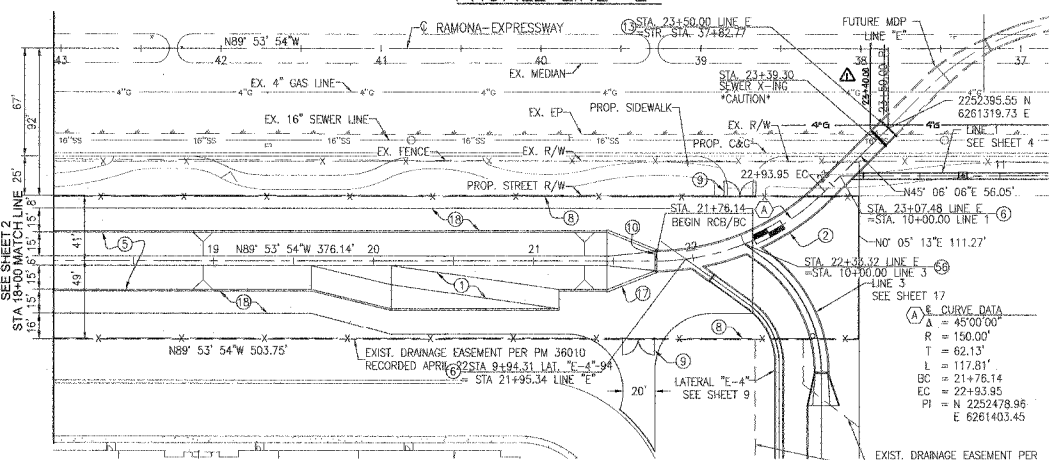
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: *[Signature]*
DATE: 4/5/2015
APPROVED BY: *[Signature]*
DATE: 2/5/2015

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



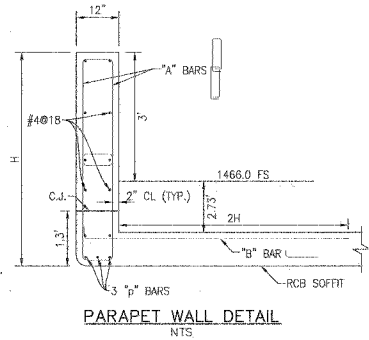
PROFILE LINE "E"



PLAN LINE "E"

NOTES

- 1 CONSTRUCT MAINTENANCE RAMP PER RCFC&WCD STD. DWG CH330.
- 2 CONSTRUCT 12' x 6' H REINFORCED CONCRETE BOX PER CALTRANS STD. PLAN D80.
- 3 CONSTRUCT CONCRETE TRAPEZOIDAL CHANNEL PER RCFC&WCD STD. DWG CH326; SIZE PER PLAN.
- 4 CONSTRUCT JUNCTION STRUCTURE NO.1 PER RCFC & WCD STD. DWG. NO. J5226 AND DETAILS ON SHEET 20 FOR LATERAL "E-4".
- 5 CONSTRUCT 6' HIGH CHAIN LINK FENCE PER RCFC & WCD STD. DWG. MB01.
- 6 CONSTRUCT 20' DOUBLE DRIVE GATE PER RCFC & WCD STD. DWG. MB01.
- 7 CONSTRUCT PARAPET WALL PER DETAIL SHOWN HEREON.
- 8 CONSTRUCT CONCRETE BULKHEAD PER RCFC & WCD STD. DWG. NO. MB16.
- 9 CONSTRUCT BOX CULVERT WARPED WINGWALLS PER CALTRANS STD. DWG. NO. D66A.
- 10 INSTALL 3" CLASS 2 AGGREGATE BASE MAINTENANCE ROAD PER RCFC&WCD STD. DWG CH326.
- 11 CONSTRUCT BOX TO BOX JUNCTION PER DETAILS ON SHEET 17.



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

JUNCTION STRUCTURE #1
 LINE E-4
 A = 45'00"00"
 R = 150.00'
 T = 62.13'
 C = 14.73'
 L = 117.81'
 BC = 21+76.14
 EC = 22+93.95
 PI = N 225°47'8.95"
 E 6261403.45

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

RECORD DRAWINGS

APPROVED BY: *[Signature]*
 DATE: 4/5/17

LD 2/14/15

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.

PREPARED BY:
ALBERT A. WEBB ASSOCIATES
 ENGINEERING CONSULTANTS
 3728 HICKORY STREET
 RIVERSIDE, CA 92506
 PH. (951) 686-1070
 FAX (951) 298-1299

CITY OF PERRIS
 APPROVED BY: *[Signature]*
 DATE: 1/23/15

BENCH MARK
 RMV. COUNTY BM 8A-31 3 1/4" AXIAL
 BOLT LOCATED FLUSH AT THE SWC OF
 BRIDGE ON TOP OF SIDEWALK NEAR FACE
 OF CURB AT CROSSING OF PERRIS BLVD
 & RMV. CO. FLOOD CONTROL CHANNEL.
 ELEV. 1474.674', NVD1 1929 DATUM

REVISIONS

NO.	DESCRIPTION	DATE
1	AS-BUILT	4/5/2015

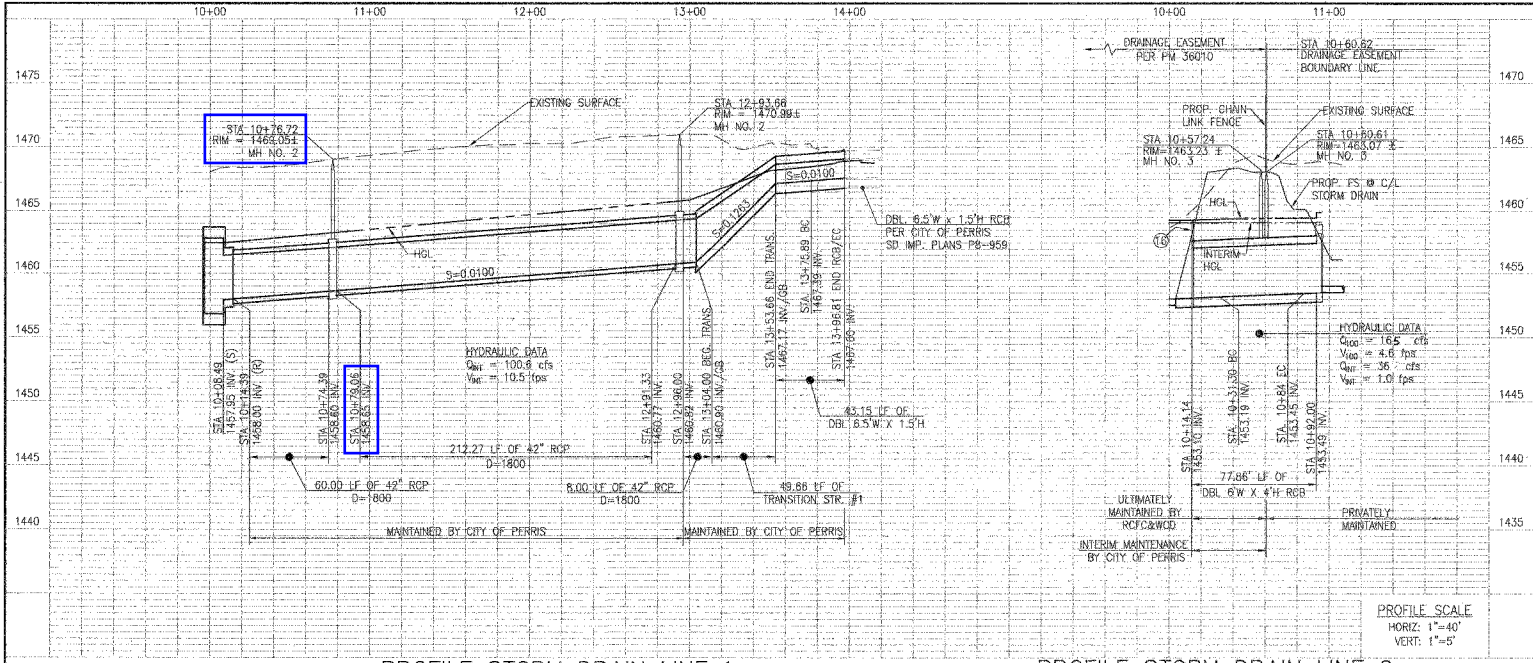
RIVERSIDE COUNTY FLOOD CONTROL
 AND
 WATER CONSERVATION DISTRICT

RECOMMENDED FOR APPROVAL BY: *[Signature]*
 DATE: 4/5/2015

APPROVED BY: *[Signature]*
 DATE: 2/5/2015

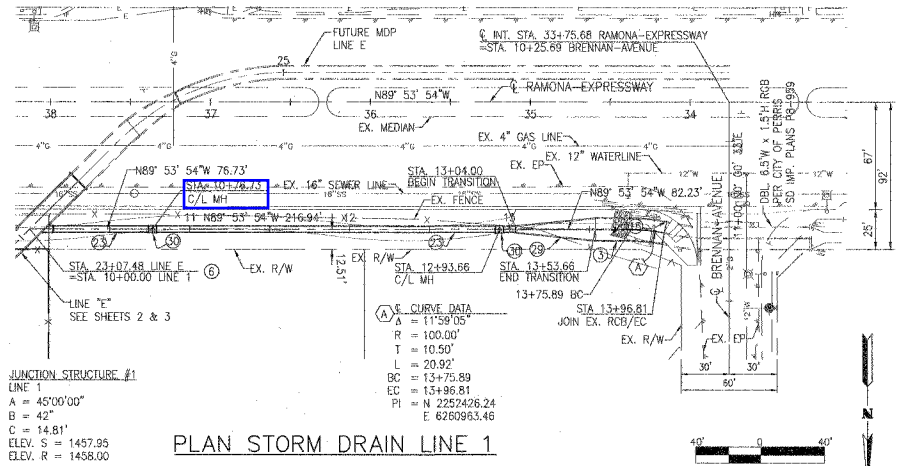
PERRIS VALLEY MDP
LINE "E", STAGE 2
 STA. 18+00.00 TO 23+50.00

PROJECT NO. **PM 36010**
 DRAWING NO. **4-0-0488**
 SHEET NO. **4-1070**
 3 OF 20

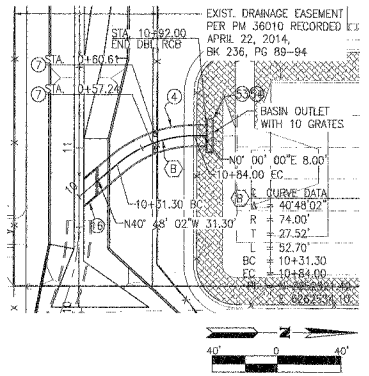


PROFILE STORM DRAIN LINE 1

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 CONCRETE 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.
- ⑯ SAWCUT AND REMOVE EXISTING DBL. 6.5'W X 1.5'H RCB, WINGWALL, AND RIP-RAP PAD.
- ⑰ CONSTRUCT BOX CULVERT WINGWALLS TYPE "E" PER CALTRANS STD. DWG. NO. DB5 AND DETAIL "B" ON SHEET 5.
- ⑳ INSTALL 42" R.C.P - DLOAD PER PLAN
- ㉑ CONSTRUCT TRANSITION STRUCTURE NO.1 PER RCFC & WCD DWG. NO. TS301 INCLUDE PIER PER RCFC & WCD DWG. NO. TS304.
- ㉒ CONSTRUCT MANHOLE NO.2 PER RCFC & WCD NO. MH252.
- ㉓ CONSTRUCT MODIFIED GRATED INLET PER SSPWC STD. PLAN 305-3 AND DETAILS ON SHEET 20.
- ㉔ INSTALL OUTLET RESTRICTION PLATES PER DETAIL ON SHEET 20.

RECORD DRAWINGS

APPROVED BY: *[Signature]*
DATE: 4/5/12

LD 2/14/15

Don't Dig...Until You Call:
U.S.A. Toll Free:
1-800-227-2600
for the location of buried utility lines.
Don't disturb utility services.

PREPARED BY:
ALBERT A. WEBB ASSOCIATES
ENGINEERING CONSULTANTS
3789 MADISON STREET
RIVERSIDE, CA 92506
PH. (951) 686-1070
FAX (951) 788-1262

DATE: 11/5/14

CITY OF PERRIS
APPROVED BY: *[Signature]*
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
& HWY. 52. FLOOD CONTROL CHANNEL.
ELEV. 1474.674, NGVD 1929 DATUM

NO.	REVISIONS

RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

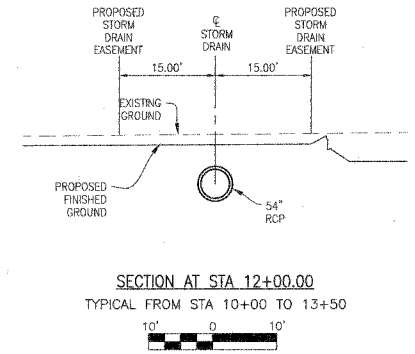
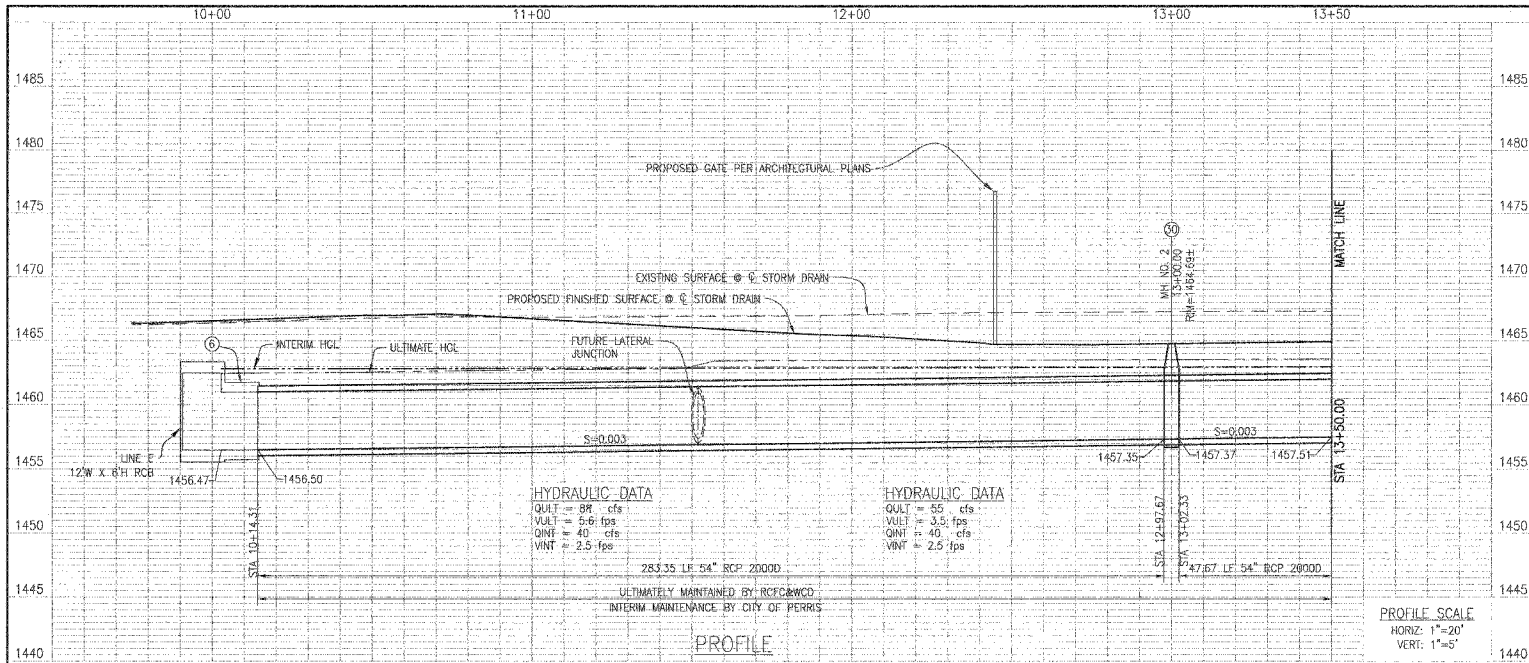
RECOMMENDED FOR APPROVAL BY: *[Signature]*
DATE: 4/5/2012

APPROVED BY: *[Signature]*
DATE: 2/5/2015

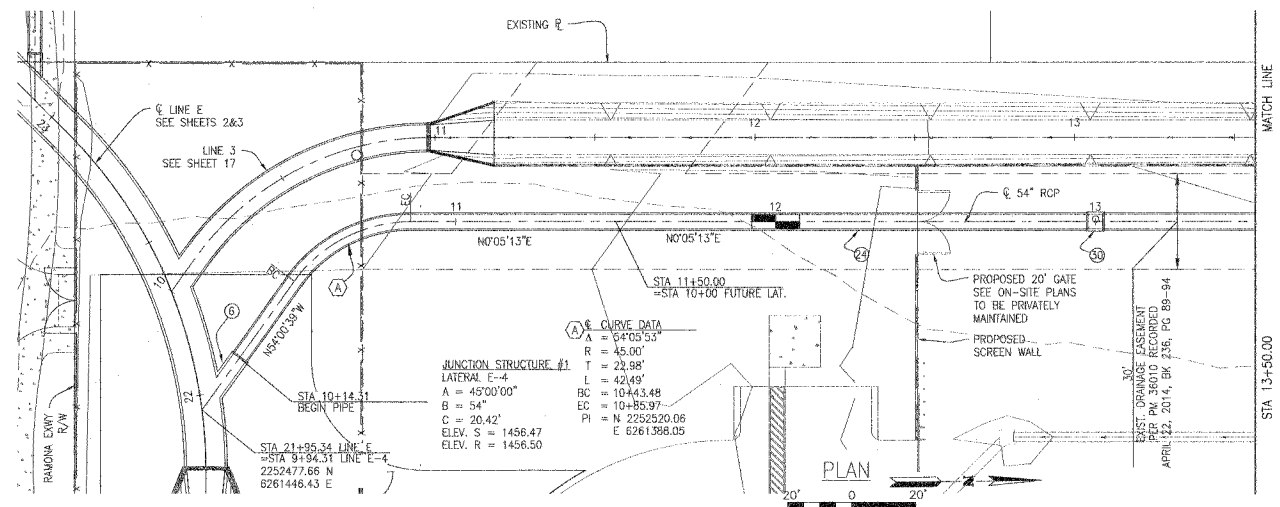
PROJECT NO.: PM 36010
4-0-0488

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

DRAWING NO.: 4-1070
SHEET NO.: 4 of 20



- NOTES**
- ⑥ CONSTRUCT JUNCTION STRUCTURE NO. 1 PER RCFC & WCD STD. DWG. NO. JS226 AND DETAIL "C" ON SHEET 20.
 - ②④ INSTALL 54" R.C.P. - D-LOAD PER PLAN.
 - ⑤⑩ CONSTRUCT MANHOLE NO. 2 PER RCFC & WCD STD. DWG. NO. MH252.



RECORD DRAWINGS

APPROVED BY: *[Signature]*
DATE: 4/5/17

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
utility services.

PREPARED BY:
ALBERT A. WEBB ASSOCIATES
ENGINEERING CONSULTANTS
3788 MIDWAY STREET
RIVERSIDE, CA 92506
PH: (951) 686-1070
FAX: (951) 798-1296

DATE: 11/15/14



CITY OF PERRIS
APPROVED BY: *[Signature]*
DATE: 4/5/17

RY. COUNTY EM #M-31: 3 1/8" ALUM.
DRK LOCATED FLOOR AT THE SWC OF
BRIDGE ON TOP OF SIDEWALK NEAR FACE
OF CURB AT CROSSING OF PERRIS BLVD
& RW 10. FLOOD CONTROL CHANNEL
ELEV. 1474.674, NVD 1929 DATUM

REV.	DESCRIPTION	APPR.	DATE

RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

RECOMMENDED FOR APPROVAL BY: *[Signature]*
DATE: 2/5/2017

APPROVED BY: *[Signature]*
DATE: 2/6/2018

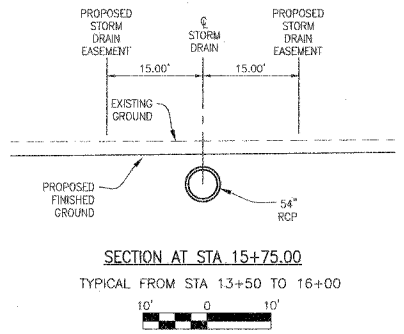
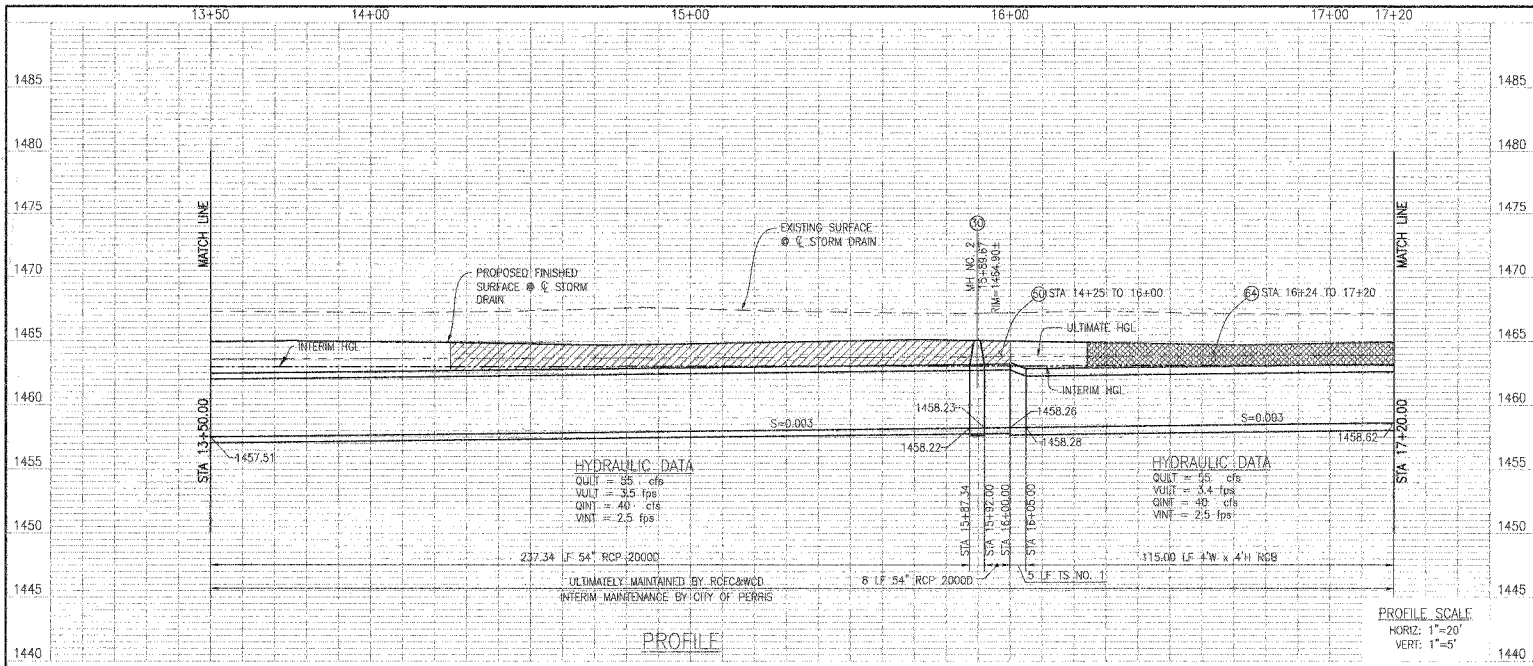
PROJECT NO.
4-0-0460

DRAWING NO.
4-1070

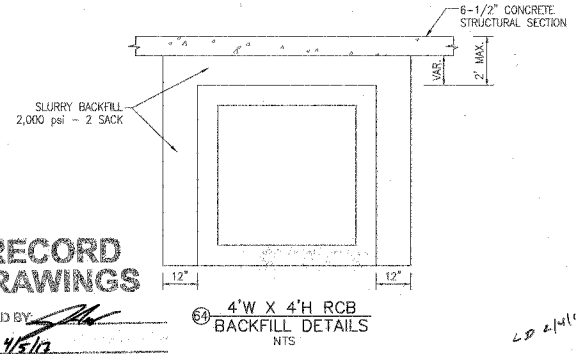
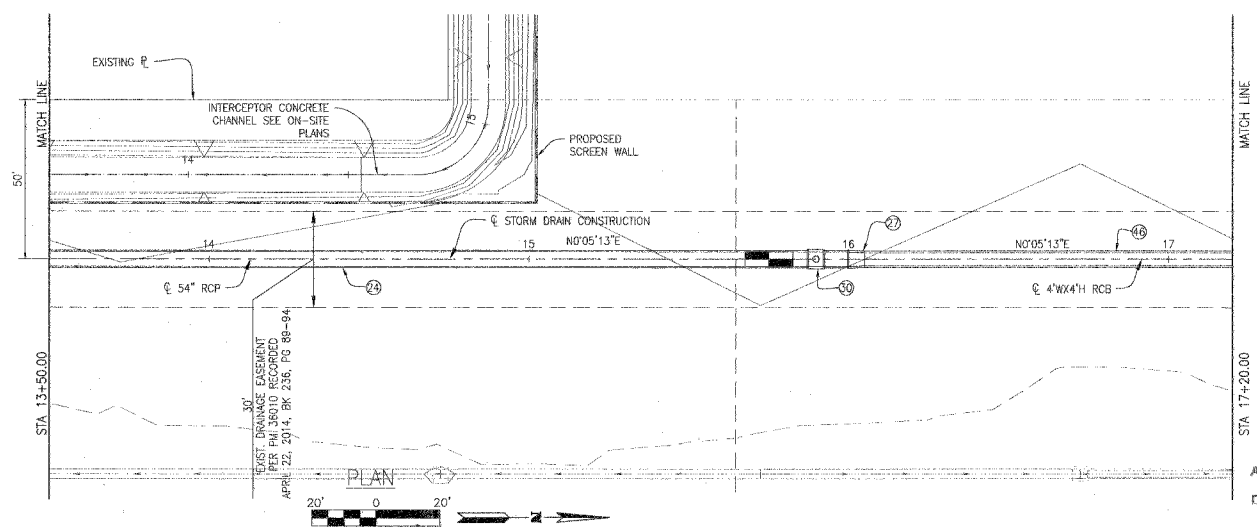
SHEET NO.
9 OF **20**

PERRIS VALLEY MDP
LATERAL "E-4", STAGE 1
STA 10+00.00 TO 13+50.00

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- 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 DBO.
 - 50 SLURRY BACKFILL PER NOTE 14 OF GENERAL NOTES ON SHEET 1.
 - 54 SLURRY BACKFILL PER DETAIL SHOWN HEREON.



RECORD DRAWINGS

APPROVED BY: *[Signature]*
DATE: 4/5/15

Don't Dig...Until You Call!
U.S.A. Toll Free:
1-800-227-2600
for the location
of buried
utility lines.
Don't dig
and
perish.

PREPARED BY:
ALBERT A. WEBB ASSOCIATES
ENGINEERING CONSULTANTS
3728 MCCRAY STREET
RIVERSIDE, CA 92506
PH: (951) 686-1070
FAX: (951) 788-1236
DATE: 11/5/14



CITY OF PERRIS
APPROVED BY: *[Signature]*
DATE: 1/23/15

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

REV.	DESCRIPTION	APPR.	DATE

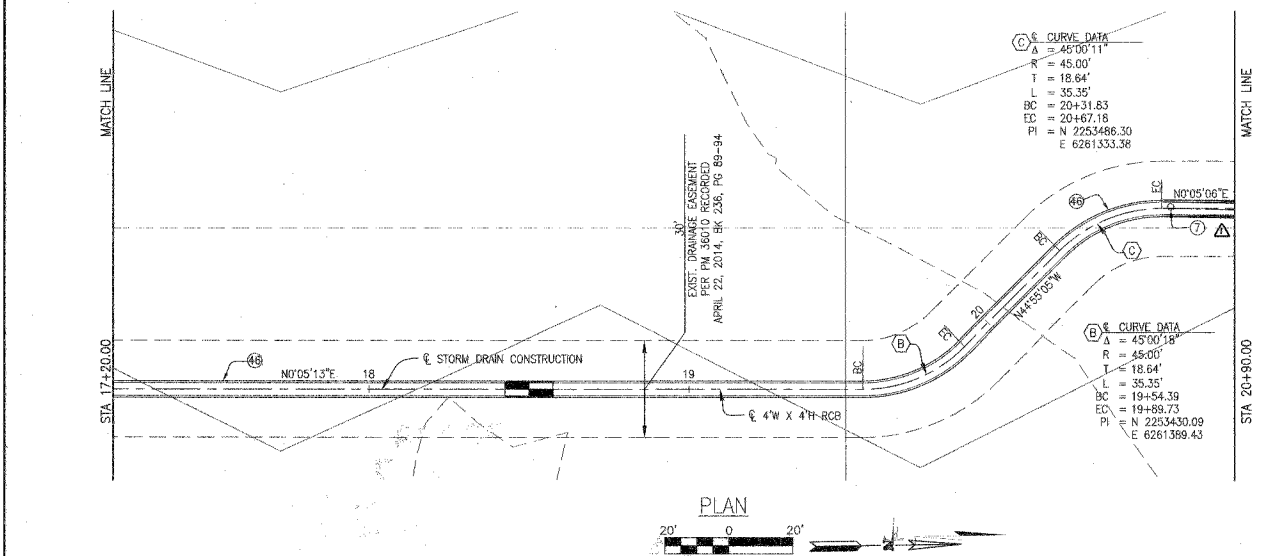
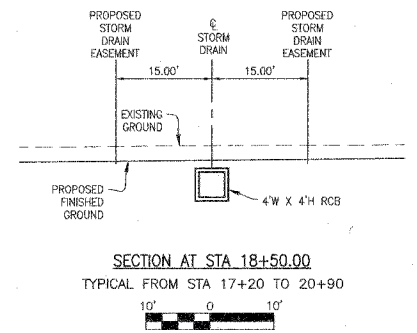
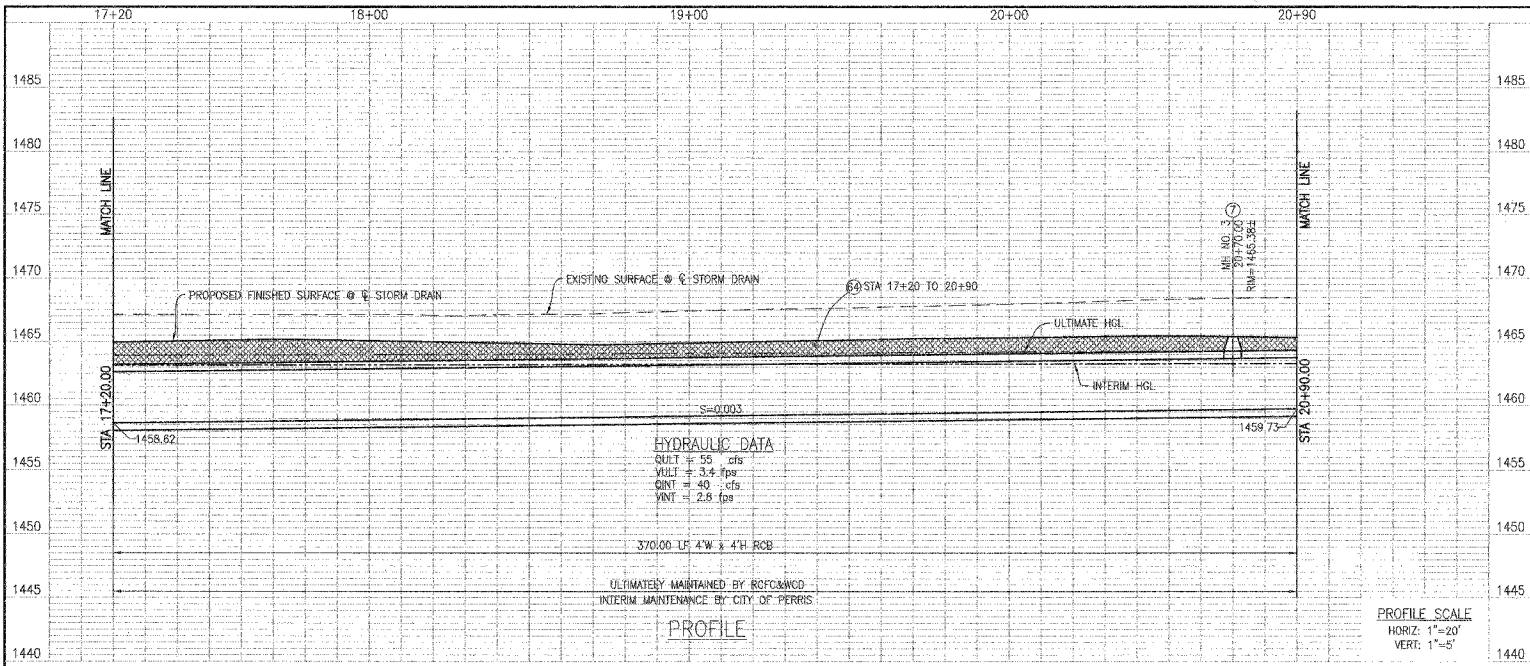
RECOMMENDED FOR APPROVAL BY: *[Signature]*
DATE: 2/5/2015

APPROVED BY: *[Signature]*
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

DATE PLOTTED: 11/13/2014 3:27:29 PM



- NOTES**
- ⑦ CONSTRUCT MANHOLE NO. 3 PER RCF & WCD STD. DWG. NO. MH253.
 - ④⑤ CONSTRUCT 4' W X 4' H REINFORCED CONCRETE BOX PER CALTRANS STD. PLAN D80.
 - ⑤④ SLURRY BACKFILL PER DETAIL SHOWN ON SHEET 10.

RECORD DRAWINGS

APPROVED BY: *[Signature]*
DATE: 11/5/12

LD 2/11/15

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
3708 McGRAY STREET
RIVERSIDE, CA 92506
PH: (951) 509-1070
FAX: (951) 788-1258



CITY OF PERRIS
APPROVED BY: *[Signature]*
DATE: 1/31/15
CITY ENGINEER

RV. COUNTY BM 84-31: 3 1/4" ALUM. DISK LOCATED FLOSH AT THE SWC OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB AT CROSSING OF PERRIS BLVD & RV. CO. FLOOD CONTROL CHANNEL. ELEV. 1474.674', MVD 1928 DATUM

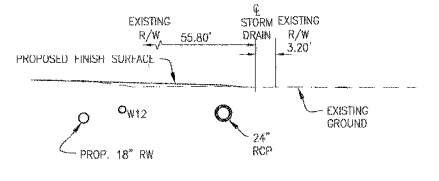
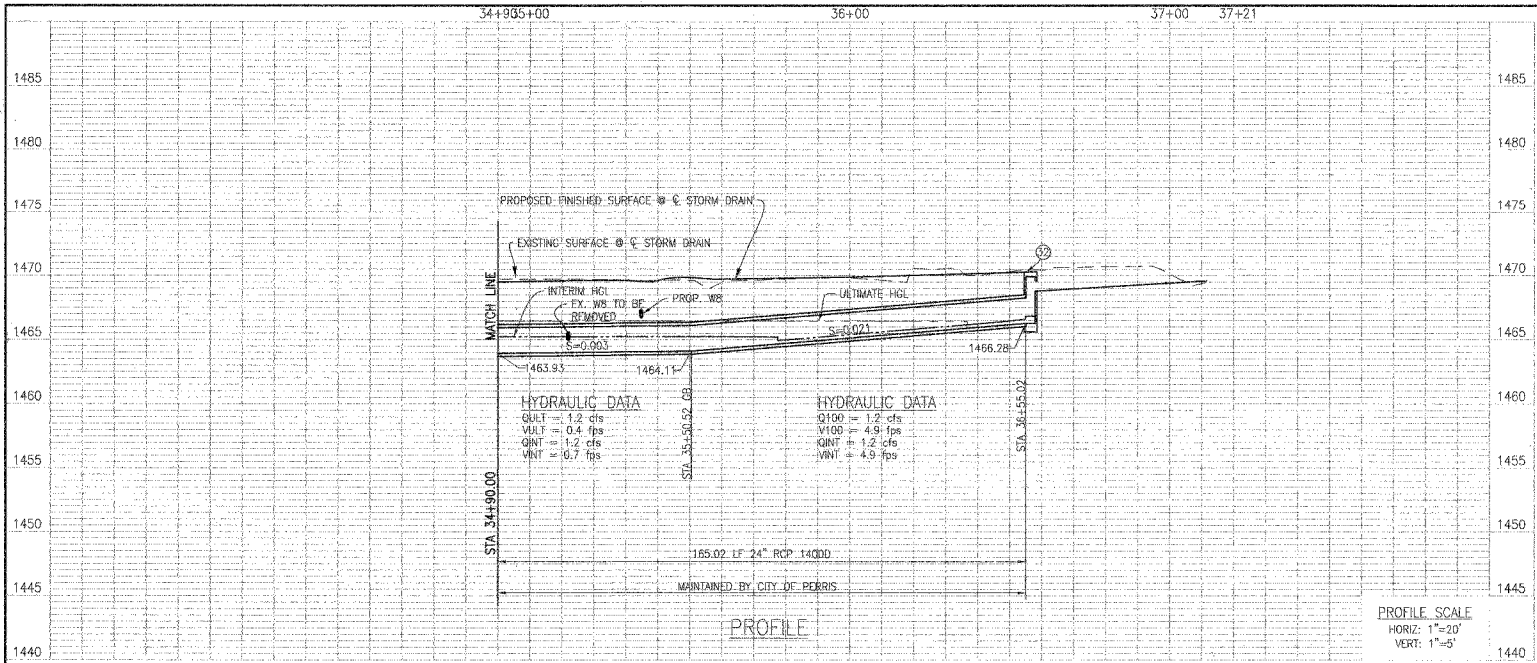
REV.	DESCRIPTION	APPR.	DATE
1	As-Built		

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL BY: *[Signature]*
DATE: 11/17/2015
APPROVED BY: *[Signature]*
DATE: 2/5/2015

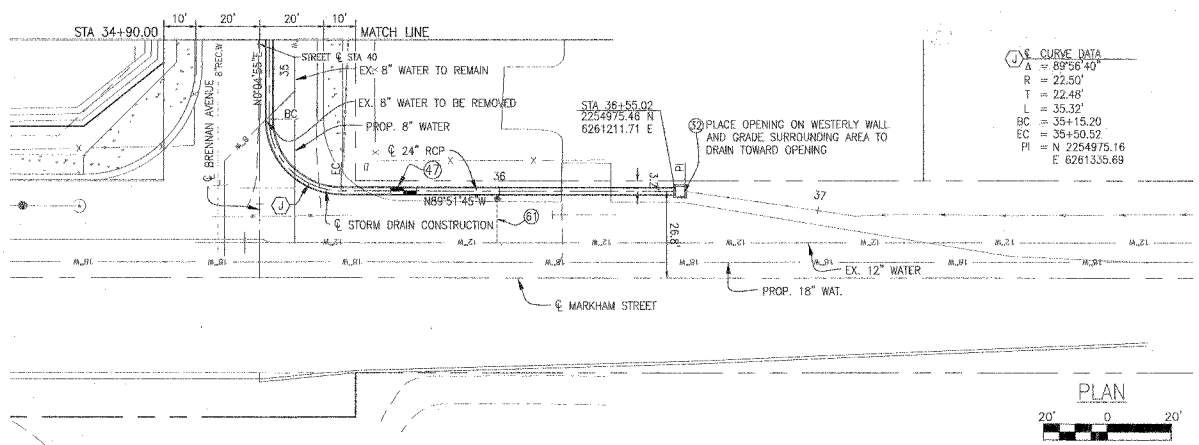
PERRIS VALLEY MDP
LATERAL "E-4", STAGE 1
STA 17+20.00 TO 20+90.00

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

D:\2011\11-0112\PM6 & PRO\ASSIGN\11-0112-C-30.DWG 11/17/2015 8:52:29 PM



- 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. - 0-LOAD PER PLAN.
 - 61 REMOVE EXISTING FIRE HYDRANT PER WATER IMPROVEMENT PLANS.



Don't Dig...Until You Call:
 U.S.A. Toll Free:
 1-800-277-2600
 for the location
 of buried
 utility lines.
 Don't disrupt
 vital services.

PREPARED BY:
ALBERT A. WEBB ASSOCIATES
 ENGINEERING CONSULTANTS
 3785 MIDWAY STREET
 RIVERSIDE, CA 92506
 PH (951) 696-1070
 FAX (951) 788-1256



CITY OF PERRIS
 APPROVED BY:
 [Signature]
 DATE: 4/15/14

RIV. COUNTY BM 84-31: 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', NVD 1929 DATUM

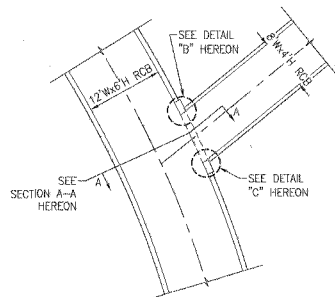
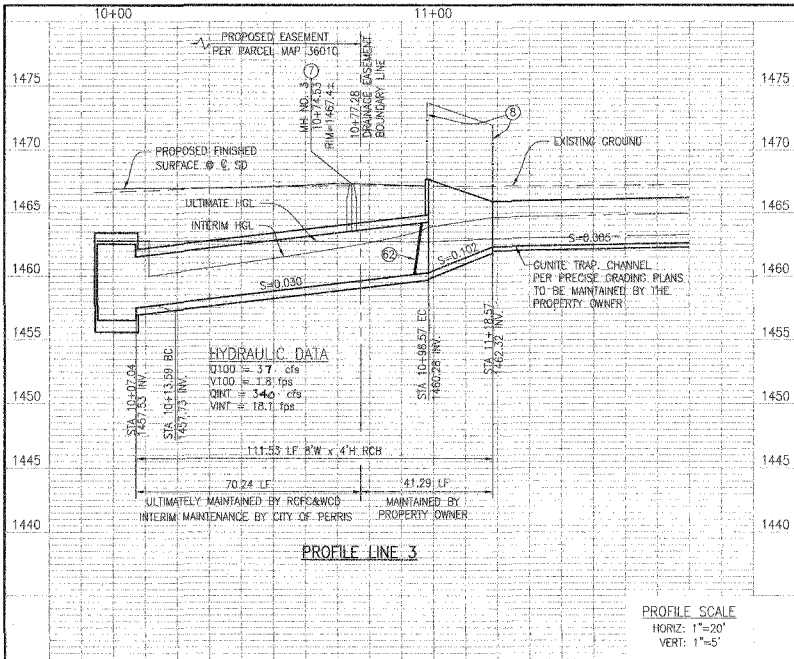
REV.	DESCRIPTION	APPR.	DATE

RIVERSIDE COUNTY FLOOD CONTROL
 AND
 WATER CONSERVATION DISTRICT
 RECOMMENDED FOR APPROVAL BY: [Signature]
 APPROVED BY: [Signature]
 DATE: 4/15/14

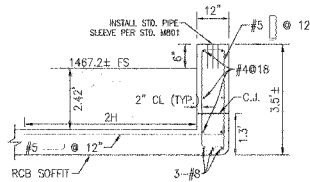
RECORD DRAWINGS
 APPROVED BY: [Signature]
 DATE: 4/15/14
 PROJECT NO. 36010
 PERRIS VALLEY MDP
 LATERAL "E-4", STAGE 1
 STA 34+90.00 TO END OF PROJECT

PROJECT NO. 36010
 DRAWING NO. 4-0-0460
 SHEET NO. 16 OF 20

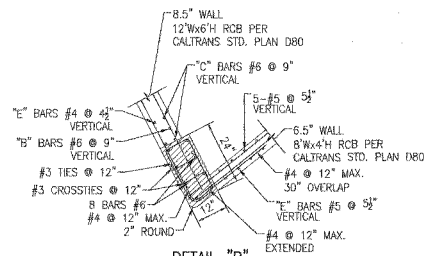
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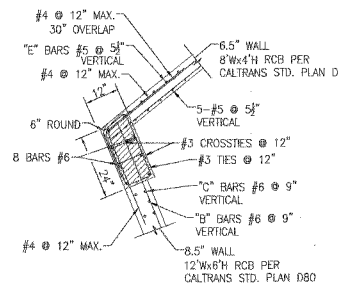
JUNCTION STRUCTURE RCB TO RCB DETAIL "A"
NTS



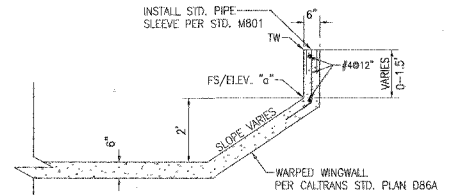
PARAPET WALL DETAIL
NTS



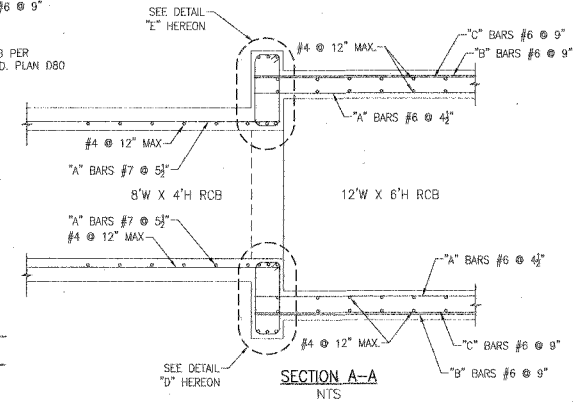
DETAIL "B"
NTS



DETAIL "C"
NTS



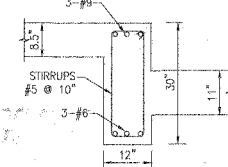
SECTION B-B
SEE BLOW UP DETAIL HEREON



SECTION A-A
NTS

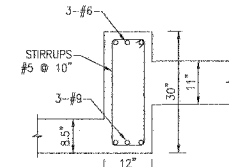
RECORD DRAWINGS

APPROVED BY: *[Signature]*
DATE: 4/5/12



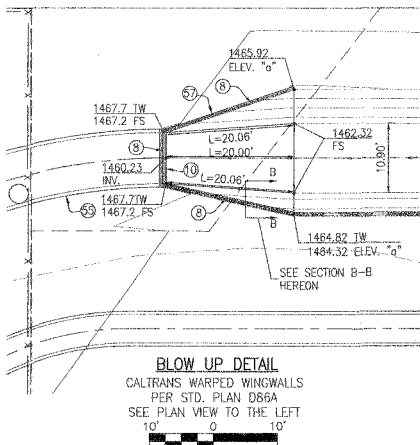
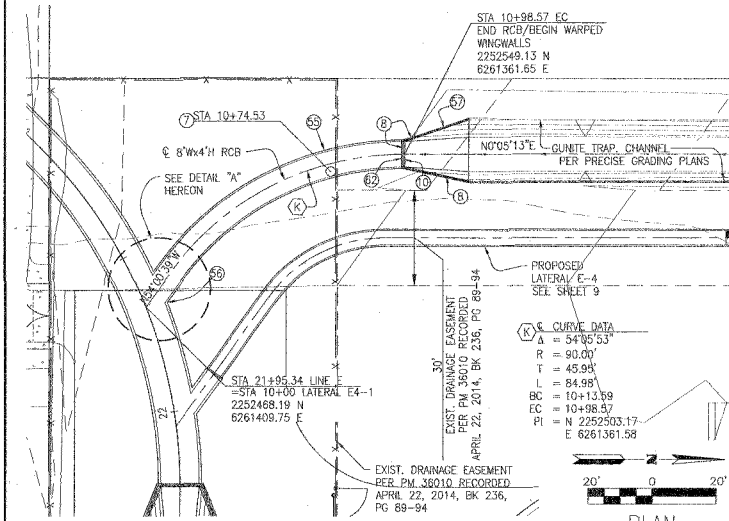
EDGE BEAM SHALL BE CONSTRUCTED LONGITUDINALLY ALONG THE MAIN LINE FOR ENTIRE WIDTH OF BOX OPENING PLUS 1.5 FEET ON EACH SIDE.

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.

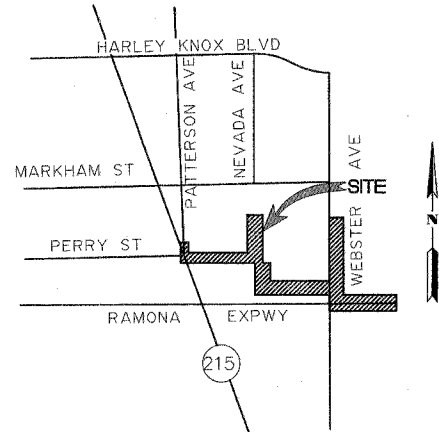
DETAIL "E" TOP EDGE BEAM
NTS



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

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.	PREPARED BY: ALBERT A. WEBB ASSOCIATES ENGINEERING CONSULTANTS 3785 MCCRAY STREET RIVERSIDE, CA 92504 PH: (951) 684-1070 FAX: (951) 789-1256 DATE: 4/15/12	CITY OF PERRIS APPROVED BY: <i>[Signature]</i> DATE: 4/23/12	RIV. COUNTY BLDG. #M-31: 3 1/4" ALUM. DISK LOCATED FUSH AT THE SNO. OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB AT CROSSING OF PERRIS BLVD & RIV. CO. #1000 CONTROL CHANNEL. ELEV. 1474.674', NGVD 1929 DATUM	REVISIONS		RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT		PROJECT NO. 4-0-0488 DRAWING NO. 4-1070 SHEET NO. 17 OF 20
				RECOMMENDED FOR APPROVAL BY: <i>[Signature]</i> DATE: 2/17/2012	APPROVED BY: <i>[Signature]</i> DATE: 2/15/2015	PERRIS VALLEY MDP LINE "E", STAGE 2 LINE 3		

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

GENERAL NOTES:

- THE CONTRACTOR SHALL CONSTRUCT THE FLOOD CONTROL IMPROVEMENTS SHOWN ON THE DRAWINGS IN CONFORMANCE WITH THE REQUIREMENTS OF THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT'S 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.
- 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.
- 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.
- ALL STATIONING REFERS TO CENTERLINE OF CONSTRUCTION UNLESS OTHERWISE NOTED.
- STATIONING FOR LATERALS AND CONNECTOR PIPE REFER TO THE CENTERLINE INTERSECTION STATIONS.
- FORTY-EIGHT HOURS BEFORE EXCAVATION, CALL UNDERGROUND SERVICE ALERT 1.800.227.2600 OR 811.
- ALL ELEVATIONS SHOWN ARE IN FEET AND DECIMALS THEREOF BASED ON THE NORTH AMERICAN VERTICAL DATUM (NAVD 88).
- 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.
- ALL CROSS SECTIONS ARE TAKEN LOOKING DOWNSTREAM.
- ELEVATIONS OF UTILITIES ARE APPROXIMATE UNLESS OTHERWISE NOTED.
- 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.
- 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.
- PIPE CONNECTED TO THE MAINLINE PIPE SHALL CONFORM TO JUNCTION STRUCTURE NO. 4 (JS229) UNLESS OTHERWISE NOTED.
- PIPE BEDDING SHALL CONFORM TO RCFC&WCD STANDARD DRAWING NO. M815 EXCEPT FOR COVER <2 FEET. FOR COVER <2 FEET, CONCRETE SLURRY (2000 PSF) SHALL BE USED. THE ENTIRE TRENCH SHALL BE SLURRY EXTENDING 4 INCHES MINIMUM AND 12 INCHES MAXIMUM ABOVE THE TOP OF PIPE.
- INDICATES SOIL BORING LOCATIONS BASED ON THE SOILS REPORT DATED MAY 9, 2016. LOCATIONS SHOWN ARE APPROXIMATE.
- "V" IS THE DEPTH OF CATCH BASINS MEASURED FROM THE TOP OF CURB TO INVERT OF CONNECTOR PIPE.
- ALL CURB INLET STATIONING REPRESENTS THE LOCATION WHERE THE PROPOSED STORM DRAIN INTERSECTS THE INSIDE OF THE CURB INLET.
- CATCH BASINS SHALL BE LOCATED SO THAT LOCAL DEPRESSION SHALL BEGIN AT EXISTING CURB RETURN JOINT, UNLESS OTHERWISE SPECIFIED.
- 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.
- STANDARD DRAWINGS CALLED FOR ON THE PLAN AND PROFILE SHALL CONFORM TO DISTRICT STANDARD DRAWINGS UNLESS NOTED OTHERWISE.
- THE CONTRACTOR IS REQUIRED TO CALL ALL UTILITY AGENCIES REGARDING TEMPORARY SHORING AND SUPPORT REQUIREMENTS FOR THE VARIOUS UTILITY LINES SHOWN ON THESE PLANS.
- 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.
- 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.
- THE CONTRACTOR OR DEVELOPER SHALL SECURE ALL REQUIRED ENCROACHMENT AND/OR STATE AND FEDERAL REGULATORY PERMITS PRIOR TO THE COMMENCEMENT OF ANY WORK.
- 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.
- CONSTRUCTION JOINTS FOR CALTRANS STANDARD REINFORCED CONCRETE BOX SHALL BE PLACED ACCORDING TO RCFC&WCD STANDARD DRAWING NO. BX401.
- ALL STATION OFFSETS ARE TAKEN LOOKING UPSTREAM UNLESS OTHERWISE NOTED.

INDEX

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LINE E STA 17+00 TO STA 244+32.56	3
LINE F STA 10+00 TO STA 16+00	4
LINE F STA 16+00 TO STA 22+00	5
LINE F STA 22+00 TO STA 27+50	6
LINE F STA 27+50 TO STA 33+50	7
LINE F STA 33+50 TO STA 41+00	8
LINE F STA 41+00 TO 46+50	9
LINE F STA 46+50 TO 50+75.06	10
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LINE F5 STA 10+00 TO STA 17+00	12
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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:

- RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT STANDARD DRAWINGS (REVISED FEBRUARY 2011)
- CALIFORNIA DEPARTMENT OF TRANSPORTATION REVISION 1 OF "CALIFORNIA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (2014 EDITION)
- STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION, STANDARD SPECIFICATIONS (2015 EDITION)
- STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION, STANDARD PLANS (2015 EDITION)
- RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT'S M.O.U. STANDARD SPECIFICATIONS (DATED JUNE 2008)
- COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, COUNTY ROAD IMPROVEMENT STANDARDS AND SPECIFICATIONS, FILED DECEMBER, 2007.
- 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 PAVING CAPPING OR CONCRETING.

CITY OF PERRIS

APPROVED BY: *[Signature]*
CITY ENGINEER DATE: 11/17/17

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 300, SAN DIEGO, CA 92101
TEL (619) 234-9411



DIAL TOLL FREE 811
AT LEAST TWO DAYS BEFORE YOU DIG
UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA

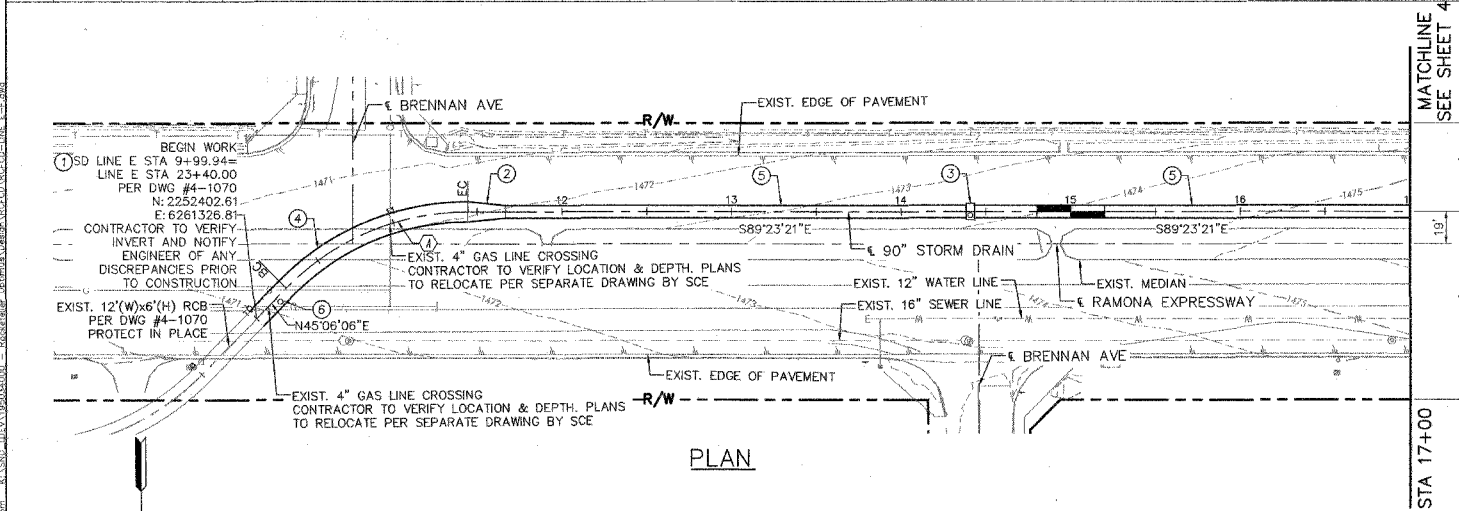
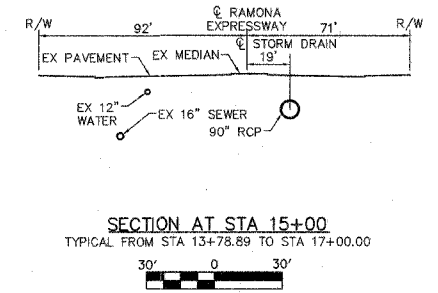
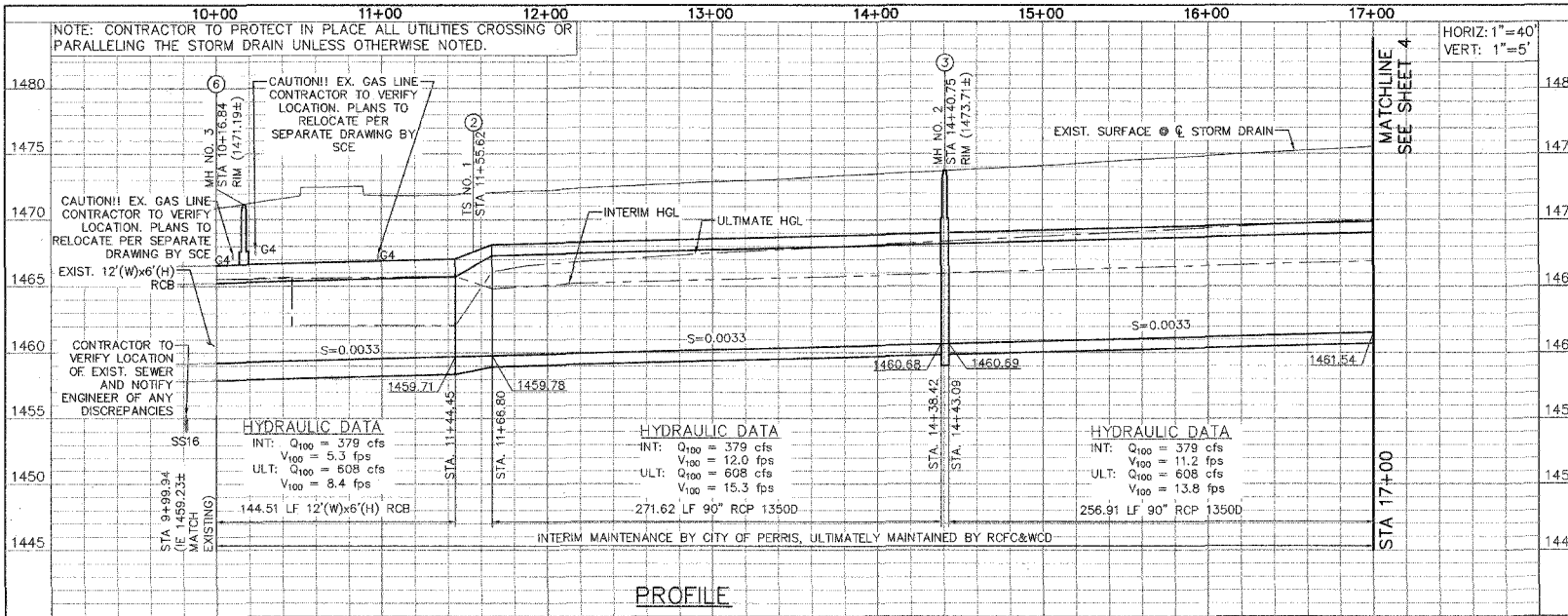
BENCHMARK: COUNTY BENCHMARK 600-40-55 APPEARS TO HAVE BEEN DESTROYED BY THE CONSTRUCTION OF THE METROLINK TRACK. BENCHMARK UTILIZED IS NGS PID: D05442. LOCATED A BRASS DISK SET IN TOP OF CURB MARKED "B.M. 435 METROPOLITAN WATER DISTRICT", LOCATED 300' WEST OF THE INTERSECTION OF HARVILL AVENUE AND RIDER STREET, PERRIS, CA. ELEVATION: 1015.12 FEET DATUM: NAVD 88

REF.	DESCRIPTION	APPR.	DATE

RECOMMENDED FOR APPROVAL BY:		APPROVED BY:	
<i>[Signature]</i>	PLANNING ENGINEER	<i>[Signature]</i>	CITY ENGINEER
DATE: 8-9-2017		DATE: 8-9-2017	

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
**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

CITY FILE NO. P8-1226
PROJECT NO. 4-0-00448, 4-0-00449, 4-0-00450
DRAWING NO. 4-1117
SHEET NO. 1 OF 20



CURVE DATA						
CURVE	DELTA	RADIUS	LENGTH	BC	EC	PI NORTHING
A	45°30'33"	150.00'	119.14'	STA 10+25.31	STA 11+44.45	2252340.30
						8261264.28

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

Kimley-Horn
 401 B STREET, SUITE 600, SAN DIEGO, CA 92101
 TEL (619) 224-9441

PREPARED BY: *Ham Danner*
 KATHRYN DANERER R.C.E. 81398 DATE: 7/20/17

PROFESSIONAL ENGINEER
 CIVIL
 No. 81398
 STATE OF CALIFORNIA

811
 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 PCD: D95442, BEING A BRASS DISK SET IN TOP OF CURB MARKED "S.M. ASS METROPOLITAN WATER DISTRICT", LOCATED 300' WEST OF THE INTERSECTION OF MARVEL AVENUE AND RIDER STREET, PERRIS, CA. ELEVATION: 1515.12 FEET DATUM: NAVD 88

REF.	DESCRIPTION	APPR.	DATE

REVISIONS

RECOMMENDED FOR APPROVAL BY: *Andrew deCherrier*
 DATE: 8/9/17

APPROVED BY: *Steve ETKW*
 DATE: 8-9-2017

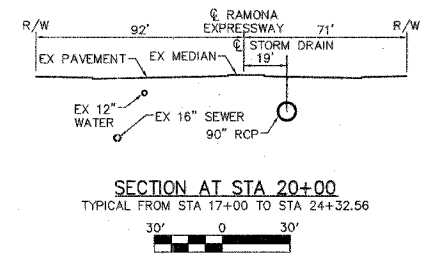
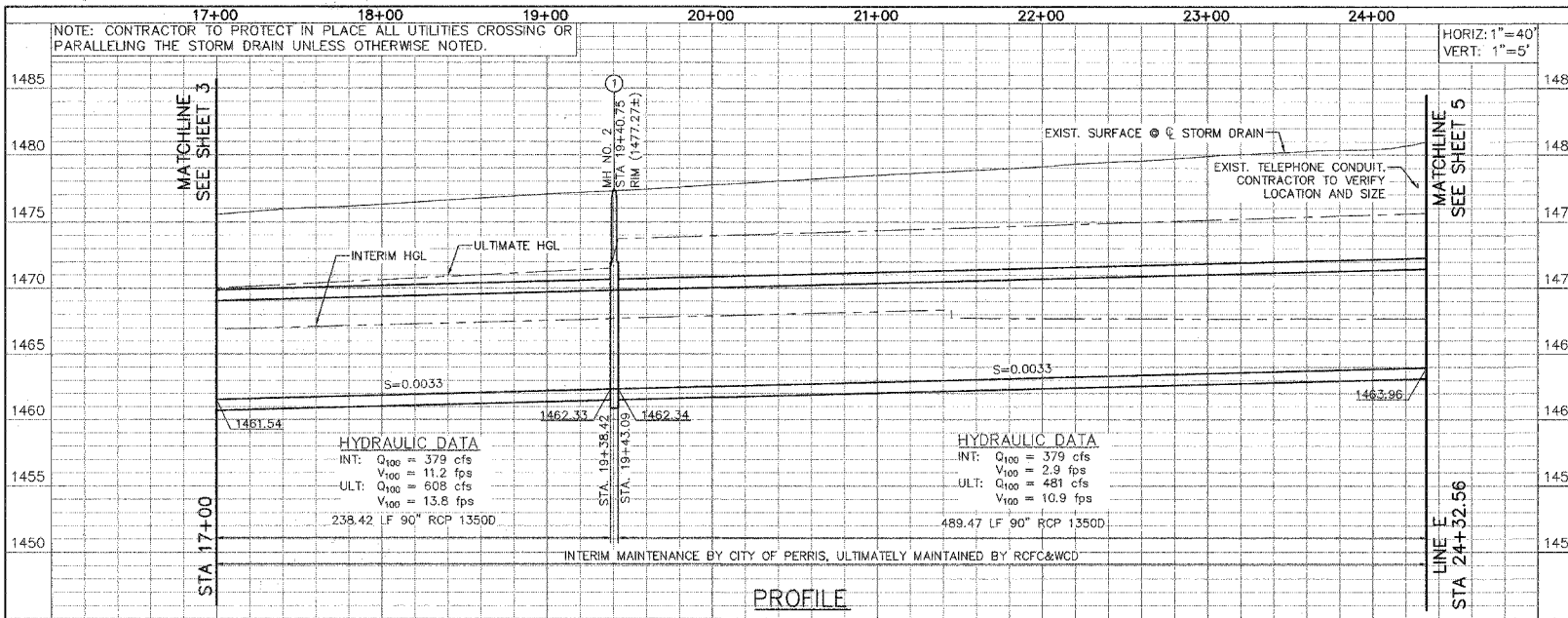
PROJECT NO. 4-0-00488
 DRAWING NO. 4-1117
 SHEET NO. 3 OF 20

CITY FILE NO. P8-1226

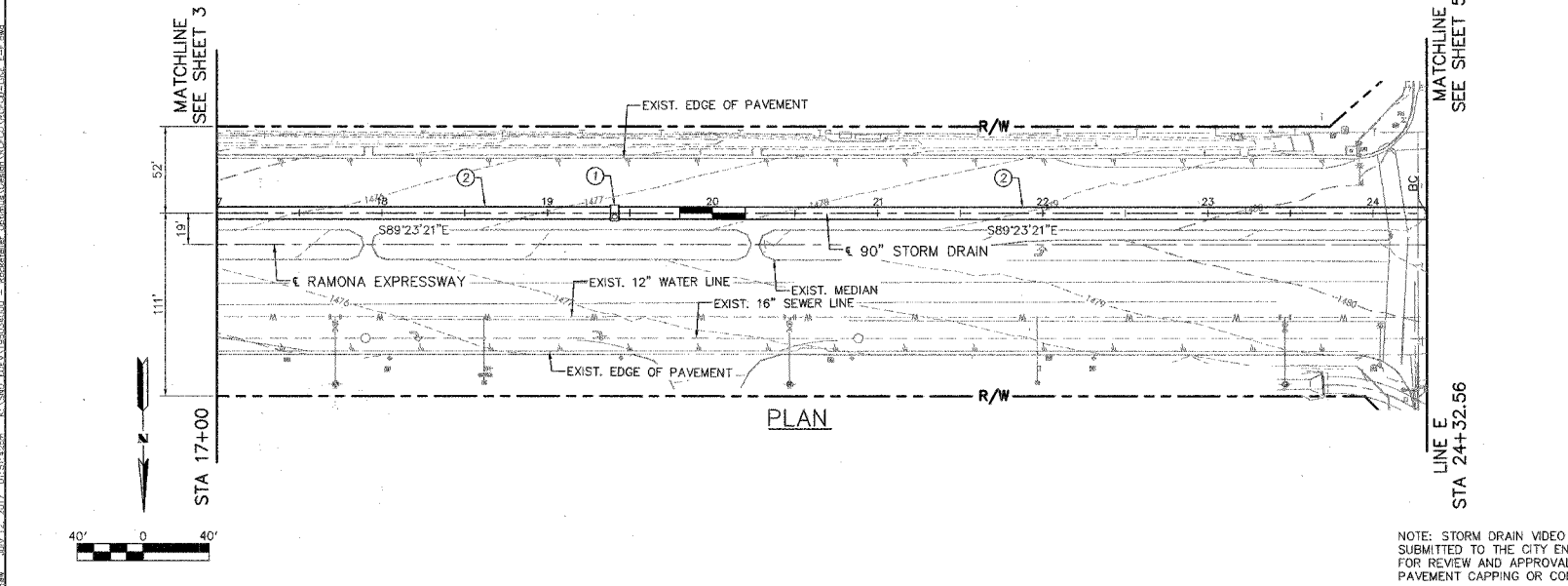
PM 36512, PM 36582

PERRIS VALLEY MDP LINE E STAGE 3

LINE E STA 9+99.94 TO STA 17+00



- NOTES**
- CONSTRUCT MANHOLE NO. 2 PER RCFC&WCD MH252 D1=90", D2=90"
 - 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.

Kimley»Horn 401 R STREET, SUITE 600, SAN DIEGO, CA 92101 TEL (619) 234-9411 PREPARED BY: <i>K. Daneker</i> KATHRYN DANEKER R.C.E. 81398 DATE: 1/20/17			BENCHMARK: COUNTY BENCHMARK 60C-40-66 APPEARS TO HAVE BEEN DESTROYED BY THE CONSTRUCTION OF THE METROLINK TRACK BENCHMARK UTILIZED IS NGS P.D. D03442, BEING A BRASS DISK SET IN TOP OF CURB MARKED "B.M. 430 METROPOLITAN WATER DISTRICT", LOCATED 300' WEST OF THE INTERSECTION OF HARVILL AVENUE AND RIDER STREET, PERRIS, CA. ELEVATION: 1515.12 FEET DATUM: NAVD 83	REVISIONS <table border="1"> <tr><th>REF.</th><th>DESCRIPTION</th><th>APPR.</th><th>DATE</th></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> </table>	REF.	DESCRIPTION	APPR.	DATE													RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT RECOMMENDED FOR APPROVAL BY: <i>Robert de Chazotte</i> DATE: 8/8/17 APPROVED BY: <i>Shane E. Hill</i> DATE: 8-9-2017	CITY FILE NO. P8-1226 PROJECT NO. 4-0-00488 DRAWING NO. 4-1117 SHEET NO. 4 OF 20
				REF.	DESCRIPTION	APPR.	DATE															
PM 36512, PM 36582 PERRIS VALLEY MDP LINE E STAGE 3 LINE E STA 17+00 TO STA 24+32.56																						