PRELIMINARY DRAINAGE STUDY
(HYDROLOGY AND HYDRAULICS)
FOR
McKAY-RAMONA
(PRELIMINARY ENGINEERING)

City Case #: DPR21-00011

Job Number 2010

January 12, 2022

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Exp. 09/30/2023

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1.0 INTRODUCTION

1.1 Project Description

This drainage study presents preliminary engineering hydrologic and hydraulic analyses for the proposed McKay-Ramona project (herein referred to as "the project"). The City Case No. is DPR 21-00011. The project is located in the City of Perris, bounded by Ramona Expressway to the south, Indian Avenue to the west, Perris Boulevard to the east, existing business (gas station) to the southeast, and existing parcels to the north. Refer to Figure 1.0 for a Vicinity Map of the project. The project APN is 302-060-041.

1.2 Project Features

The overall project parcel consists of approximately 17.7 acres, with approximately 14.8 acres of drainage area to be analyzed in the post-project condition. The proposed improvements will consist of a tilt-up warehouse building, associated parking areas, sidewalks, and landscape areas. The proposed warehouse building footprint is approximately 247,884 square feet and there will be a total of 415 parking spaces to be provided. The proposed impervious and pervious footprints are approximately 524,480 square feet and 120,708 square feet, respectively. Below are descriptions about the exiting drainage features surrounding the project as well as the proposed project's drainage related improvements.

Currently, there is an existing offsite flood control facility in Indian Avenue [i.e. – a reinforced concrete box culvert with the dimension of 14' (wide) by 7' (high)] that terminates at the southwesterly corner of the project, based on the storm drain plans titled, "Perris Valley MDP Line E Stage 4: PM 37457; Drawing No. 4-1145". With the invert elevation of the existing box culvert at approximately ~1452 (Inv.) and the existing ground elevation of ~1457 near the southwesterly corner of the project, the majority of the existing box culvert height (approximately 5') is below ground and an opening from the remaining top portion of the existing box (approximately 2') allows the offsite flows to outlet to the project. During a storm event, most of the offsite storm water flow appears to be held back (stored) temporarily within the bottom ~5' of the box. Based on Sheet 2 of the above referenced storm drain plans, there appears to be a low-flow sump pump on the upstream side of the box culvert that is designed to drain the standing storm water in the

existing box culvert to an existing concrete channel located along the southerly edge of the project (located within the City of Perris right-of-way, north of Ramona Expressway), based on Sheet 6 of the plans titled, "Perris Valley Logistics Center Street Improvement Plan; Parcel Map 36010; City File No. P8-1073". Based on this condition, the outlet of the existing offsite box culvert is essentially acting like a "bubbler" system during a larger storm event (i.e. – 100-year storm), allowing restricted flows from the top ~2' of the box opening onto the project site.

Prior to the start of this project, it was agreed and understood between the City of Perris and the project owner/applicant that the City of Perris would design and construct the flood control facility extension (i.e. – a portion of the Perris Valley MDP Line E), extending along the southerly edge of the project and around the existing business (gas station and car wash) located to the southeast of the project. This flood control facility extension would serve to fully convey the upstream offsite flows as well as the proposed project on-site flows. Ultimately, the City's plan is to have this flood control facility extended further downstream all the way to the existing Perris Valley Storm Drain Channel. However, the City of Perris is now directing the project to construct a portion of the MDP Line E flood control facility (i.e. – 14'(wide) x 7'(high) box culvert) along the southerly edge of the project to the easterly project property edge/boundary. With this being the situation, the project is proposing to provide an on-site permanent best management practice (BMP) near the easterly edge of the project, prior to discharging the on-site flows to the proposed MDP Line E flood control facility. During the interim condition, the runoff from the terminus of the MDP Line E flood control facility (by downstream end of the project) will connect an existing Perris Valley MDP Lateral Line E-11 in Perris Blvd, based on the plans titled, "Storm Drain Improvement Plans Perris Logistic Center DPR-05-0192 Lateral MDP E-11 (File Number P8-821)," via a proposed temporary low-flow pump and a lateral 30-inch diameter pipe from the flood control facility to the existing Line E-11 in Perris Blvd. Ultimately, it is our understanding that the City of Perris (and/or other responsible parties) will construct the downstream flood control facility all the way to the existing Perris Valley Storm Drain Channel. Once the immediately downstream portion of the Line E is constructed, it is anticipated that the proposed low-flow pump will be removed as there would be positive gravity flow at the point.

As indicated above, there is an existing concrete channel/swale along the southerly edge of the project (within the City right-of-way, north of Ramona Expressway) that conveys the offsite flows

in an easterly direction; however, it does not appear to have adequate capacity to convey the offsite flow draining in from the restricted culvert opening at the southwest corner of the site. Excess flows from the existing channel overtop onto the project site and/or outlet towards Ramona Expressway, as the downstream existing storm drain system in front of the adjacent business (gas station) does not appear to have adequate capacity to convey the offsite flows (restricted due to the headwater pipe entrance opening size). With most of the on-site flows to be routed to a proposed BMP near the easterly edge of the site and directly discharge into the proposed flood control facility in the post-project condition, it is anticipated that the on-site flows to the existing channel will be reduced or even eliminated, helping improve the existing channel capacity situation. As such, the project is planning to keep the configuration of the existing channel and maintain the offsite drainage flow characteristics. In order to accommodate the frontage proposed curb alignment along Ramona Expressway within the City right-of-way, the existing channel is expected to be re-aligned accordingly while maintaining similar existing channel capacity and a few sidewalk underdrain will be incorporated to allow excess flow from the channel to Ramona Expressway. Lastly, while the estimated timing of the flood control facility extension downstream of the project is unknown at this time, it is prudent that the City of Perris (and/or other responsible parties) construct the flood control facility extension all the way to the Perris Valley Storm Drain Channel before long, in order to help minimize the existing flooding concern that may already exist in this area and its vicinity. Refer to additional discussion in Section 1.3 below regarding pre-project and post-project drainage characteristics.

1.3 Drainage Characteristics

Pre-project Condition

In the pre-project (existing) condition, the site consists of open, undeveloped space, draining generally from northwest to southeast. Runoff from the majority of the project generally drains in a southeasterly direction in a sheet flow manner to a low point (localized sump) located near the southeast corner of the project. When the capacity of the local sump is exceeded, the excess flows generally spills into an existing channel/swale located along the southerly edge of the project (within the City of Perris right-of-way) and this existing concrete channel drains into an existing downstream storm drain system located at the frontage of the business (gas station) at the northwest corner of Ramona Expressway and Perris Blvd. Runoff from this storm drain system discharge into an existing earthen channel located downstream (northeast) of the intersection of Ramona

Expressway and Perris Blvd. Runoff from the remaining portion of the project (near the northeasterly area) drains towards Perris Blvd. via surface flow to an existing catch basin near the intersection of Ramona Expressway and Perris Blvd. The runoff gets conveyed via an existing storm drain system and outlets into the same downstream earthen channel located northeast of the intersection of Ramona Expressway and Perris Blvd. This earthen channel also receives flows from an existing Perris Valley MDP Lateral Line E-11 in Perris Blvd. From this point, runoff is conveyed via the existing channel in an easterly direction for approximately 0.74 mile until discharging into the existing Riverside County Flood Control District's Perris Valley Storm Drain Channel. The existing Perris Valley Storm Drain Channel eventually drains into San Jacinto River, Canyon Lake, and ultimately Lake Elsinore. As a note, there appears to be existing flooding issues near the intersection of Ramona Expressway and Perris Blvd. and its vicinity.

Aside from the existing offsite (upstream) culvert that was discussed in Section 1.2, there is an existing 18-inch storm drain pipe and headwall at the northwesterly corner of the project. Based on the survey information, this structure serves as inlet and connects into an existing 18-inch corrugated metal pipe that discharges westerly into an existing 96-inch MDP facility in Indian Avenue. Based on the existing topography and site visit, very minor drainage is getting to this existing pipe. There is a set of catch basins (sump inlets) near this location along Indian Avenue that collects street flows and connects into an existing 96-inch mainline pipe, which conveys the flows to the existing box culvert at the intersection of Ramona Express way and Indian Avenue. The existing 96-inch pipe and catch basin are based on the storm drain plans titled, "Perris Valley MDP Line E-3 Stage 1 (File No. P8-1164)".

Post-project Condition

In the post-project condition, the drainage characteristics will remain similar as compared to the pre-project condition. Runoff from the project will be collected via on-site private catch basins and conveyed via on-site private storm drain pipes to a proposed best management practice (BMP) / basin near the easterly edge of the project. As directed by the City, the project plans to construct a portion of the MDP Line E flood control facility as part of this project and also construct a 30-inch diameter lateral pipe that can connect into the existing Perris Valley MDP Lateral Line E-11 in Perris Blvd. The outlet pipe from the proposed on-site BMP will connect into the flood control facility and a proposed temporary low-flow pump will be used to direct the flows towards the

existing Perris Valley MDP Lateral Line E-11 via the 30-inch diameter lateral pipe. As indicated above, the runoff in the Perris Valley MDP Lateral Line E-11 will discharge into the same existing earthen channel located downstream at the northeast of the intersection of Ramona Expressway and Perris Blvd. Since majority of the on-site runoff that used to drain to the southeasterly corner of the project in the existing condition will now be directed northeasterly (around the existing business) to a proposed basin (BMP) and directly discharge into the proposed flood control facility, the project will reduce (or possibly eliminate) the on-site flows that is getting to the existing concrete channel (within the City right-of-way, north of Ramona Expressway) and help improve the existing channel capacity situation. Ultimately (as indicated above), once the immediately downstream portion of the MDP Line E were constructed by the City and/or other responsible parties, then the temporary low-flow pump will be removed as there would be positive gravity flow at the point.

Excerpts of the relevant storm drain plans (plan sheets) mentioned in Sections 1.2 and 1.3 above are included in Appendix E of this report for reference purpose. At the end of the reference plans, just to have a better understanding about the existing drainage condition for the project, take-off calculations were prepared to determine the allowable (restricted flow) through the existing headwall "bubbler" outlet opening at the terminus of the existing flood control box culvert at the southwest corner of the site, as well as the estimated capacity of the existing concrete trapezoidal channel along the southerly edge of the project (within the City right-of-way, north of Ramona Expressway). As can be seen from the take-off calculations, the existing trapezoidal channel appears to be undersized for the offsite flows contributing to it today. As mentioned above, with the incorporation of the proposed MDP Line E facility within the project limit, the project will reduce (or possibly eliminate) the on-site flows to the existing concrete channel, resulting in an improvement over the pre-project condition related to the southerly concrete channel capacity situation.

1.4 FEMA Flood Hazard Zone Information

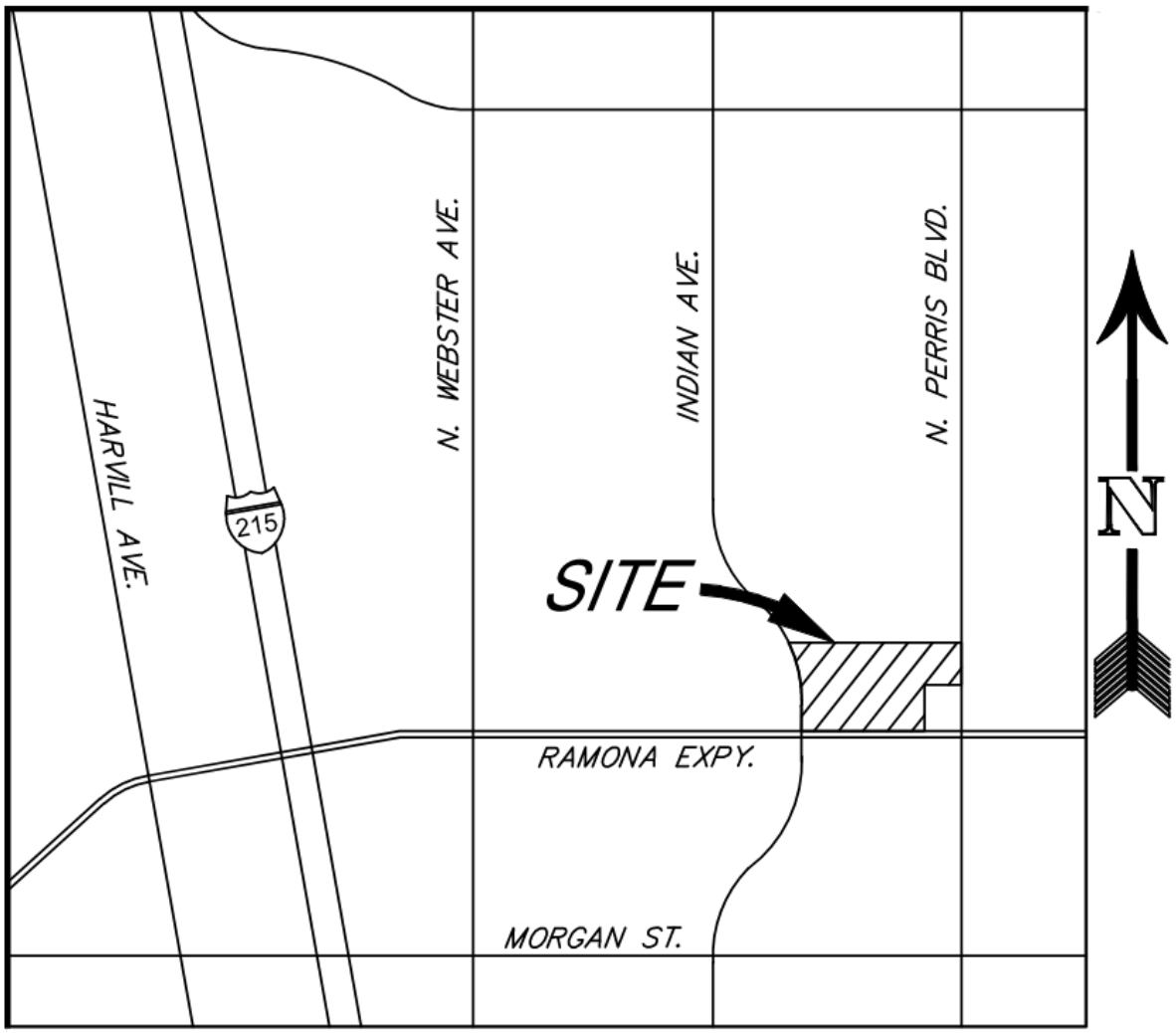
The water courses around the project have been identified by the Federal Emergency Management Agency (FEMA) as Zone X. The project is shown on the FEMA Flood Insurance Rate Map (FIRM) number 06065C1430H, effective August 18, 2014 and labeled as Zone X. No FEMA submittals are

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 order to comply with the City of Perris' ordinance and Riverside County Santa Ana Region storm water quality management requirements, the project includes construction of permanent storm water BMP near the easterly edge of the project. 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 McKay – Ramona," dated January 12, 2022, prepared by SDH & Associates, Inc. (Job Number 2010). The preliminary WQMP documents how the project addresses the requirements regarding permanent stormwater quality management, in accordance with the stormwater guidance document titled, "2010 Water Quality Management Plan for the Santa Ana Region of Riverside County."

Figure 1: Vicinity Map



2.0 HYDROLOGY

Preliminary hydrologic calculations were prepared in accordance with the Riverside County Flood Control and Water Conservation District - Hydrology Manual, dated April 1978 (manual) for preliminary on-site storm drain sizing purpose. The Hydrowin 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.

Drainage Area

Drainage boundaries were delineated to distinguish areas with similar flow characteristics and hydrologic properties as well as to determine peak flows at confluence points, existing and proposed storm drain facilities, and to 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 the AES to determine the intensity for the 10-year and 100-year storm events. The rainfall intensity was calculated in AES using the 10 and 60-minute intensity values for the project area using NOAA Atlas 14 Point Precipitation Frequency Estimates. A supporting 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 percentage of impervious area (i.e. land use) in each sub basin area was used to determine the land use entered within AES per Plate D-5.6 of the Hydrology Manual. Supporting information for parameters assigned to AES calculations is included with Appendix A of this report.

Hydrologic soil group data is available for the site through the Natural Resource Conservation Service (NRCS) Web Soil Survey, showing the site consisting primarily of types “B” and “C” soils along with a small pocket of type “A” soil at the northeast corner of the site. For the purpose of hydrologic calculations and on-site storm drain sizing for the proposed condition, a more conservative soil type C has been applied.

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 hydrologic results at key points of interest for the project can be found in Table 2.1. The summary shows the hydrologic results at the proposed on-site catch basin locations (major catch basin locations) and overall on-site peak flow at the project discharge (outlet) locations. 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]	Post-project[1]		
	Total Area (Acres)	Peak Flow Rate, Q_{10} (cfs)[2]	Peak Flow Rate, Q_{100} (cfs)[2]
102 (On-site Catch Basin - Surface)	0.6	1.3	2.3
110 (On-site Catch Basin - Surface)	2.4	5.0	8.6
120 (On-site Catch Basin - Surface)	1.0	1.8	3.1
140 (On-site Catch Basin - Surface)	1.0	1.7	2.9
170 (On-site Catch Basin - Surface)	0.6	1.0	1.8
180 (On-site – Discharge into Proposed BMP)	8.0	14.1	24.2
190 (On-site – Basin 100 Outlet)	**8.0**	**14.1**	**24.2**
205 (On-site Catch Basin - Surface)	0.6	1.3	2.2
210 (On-site Catch Basin - Surface)	0.3	0.6	1.0
220 (On-site Catch Basin - Surface)	1.8	3.2	5.4
240 (On-site Catch Basin - Surface)	0.4	0.7	1.1
250 (On-site – Basin 200 Outlet)	**4.4**	**8.6**	**14.6**
305 (On-site Catch Basin - Surface)	0.5	0.9	1.6
350 (On-site – Basin 300 Outlet)	**2.2**	**4.1**	**7.1**

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 and 100-year, 1-hour post-project peak flow rates were calculated. For the on-site private storm drain systems, the 10-year peak flow rates based on the Modified Rational Method (AES Rational Method) outputs are used to determine preliminary sizes.

3.2 Inlet Sizing

Inlet design calculation specific to the proposed surface catch basin and BMP overflow 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.

As indicated in the introduction of this report, it was originally understood that the City of Perris was going to design and construct a flood control facility (box culvert) along the southerly edge of the project and around the southeasterly existing business (gas station). However, the City is now directing the project to construct the flood control facility within the project limit. Hence, in support of the storm drain improvement plans, a hydraulic calculation using the WSPGW software was prepared to determine the hydraulic grade line (HGL) and velocity for the proposed segment. A copy of the WSPGW output result is included in Appendix D, following the on-site preliminary storm drain sizing summary. For the WSPGW calculation, the 100-year peak flow rate of ~1,110

cfs was utilized as the hydrologic data. Based on Sheet 2 of the previously approved storm drain improvement plan (prepared by others) titled, "Perris Valley MDP Line E Stage 4" (Project No. 4-0-00488 / Drawing No. 4-1145 / PM 37457), the 100-year peak flow rate entering into the proposed project appears to be 1,064 cfs. The proposed project on-site 100-year peak flow rates at three discharge/outlet locations (Basin 100, Basin 200, and Basin 300) are approximately 24 cfs, 15 cfs, and 7 cfs, respectively. To keep this straight-forward (however it's a bit more conservative), the three on-site proposed flow rates were added to the upstream 100-year peak flow rates to obtain the resultant ~1,110 cfs. For the starting HGL, the previously estimated HGL based on Sheet 2 of the storm drain improvement plans titled, "Perris Valley Commercial Center Specific Plan – Preliminary Profile Perris Valley Master Plan Line E," was utilized, specifically near the easterly edge of the project boundary (at approximate Station 52+30 on the improvement plans).

Based on the WSPGW hydraulic calculations, HGL is near the top of the facility but it appears to be open channel flow, showing that the proposed 1-14'(w)x7'(h) box culvert should have adequate capacity to convey the peak flow rates. Due to relatively high HGLs, flap valves may be required for the proposed on-site storm drain pipes at the discharge/outlet points into the proposed MDP Line E flood control facility (i.e. – at Drainage Nodes 190, 250, and 350).

As a note, the project will have onsite best management practices (BMPs) to treat runoff from the proposed improvements and comply with the permanent storm water requirements of the Riverside County Santa Ana Region, prior to discharging into the proposed flood control facility. The project is proposing an aboveground bioretention facility, serving as the permanent BMP to treat the on-site runoff from Basin 100. At this time, the subsurface subdrain pipe (conveying storm water quality low-flows) is expected to be lower the flowline of the proposed MDP Line E flood control facility, which is expected to discharge into the downstream existing Perris Valley MDP Lateral Line E-11 in Perris Blvd. via a temporary outlet lateral pipe. Therefore, a low-flow mechanical pump will likely be needed to discharge the low-flows into the downstream storm drain system. The overflow outlet elevation of the bioretention facility is expected to be set at a higher elevation for the higher peak flows (i.e. – larger than the storm water quality low-flows) and it could gravity-flow to the proposed lateral pipe mentioned above. For Drainage Basins 200 and 300, due to the proposed MDP Line E flood control facility along the southerly edge of the project, it would be difficult to provide separate storm drain and convey flows from these two drainage areas to the same

aforementioned basin. Therefore, Basin 200 and Basin 300 each will have a proprietary Modular Wetland System (MWS) to treat on-site runoff and directly discharge into the proposed MDP Line E flood control facility.

4.0 CONCLUSION

This drainage study presents preliminary hydrologic and hydraulic analyses for the proposed McKay-Ramona 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, 1-hour storm events have been determined for the project. The relevant 10-year peak flow rates were used to determine the preliminary onsite private storm drain sizes. The proposed on-site private catch basin sizing will be provided at the time of the final drainage study (final engineering). Based on direction from the City of Perris, the project is proposing to construct a portion of the MDP Line E flood control facility along the southerly edge of the project within the project limit. A hydraulic calculation using the WSPGW software was conducted to determine the hydraulic grade line (HGL) and velocity through the proposed segment of the MDP Line E and the result has been incorporated in Appendix D. The project also proposes to construct a temporary lateral pipe connection from the flood control facility to the existing Perris Valley MDP Lateral Line E-11 in Perris Blvd., in order to drain the flows from the system. The project will have three (3) discharge/outlet locations into the proposed MDP Line E facility. The proposed basin (BMP) in the northeasterly area will have subsurface layers with a subdrain that may be lower than the proposed MDP Line E invert elevation. Therefore, a low-flow mechanical pump may be required to drain low-flows from the proposed basin. Since the proposed MDP Line E flood control facility will be design to accommodate the post-project un-detained peak flows from the proposed project, a flood control detention analysis (including increased runoff mitigation analysis) should not be required for this project. In summary, with incorporation of the proposed improvements, no adverse impacts are anticipated to the downstream drainage facilities as a result of this project.

Appendix A

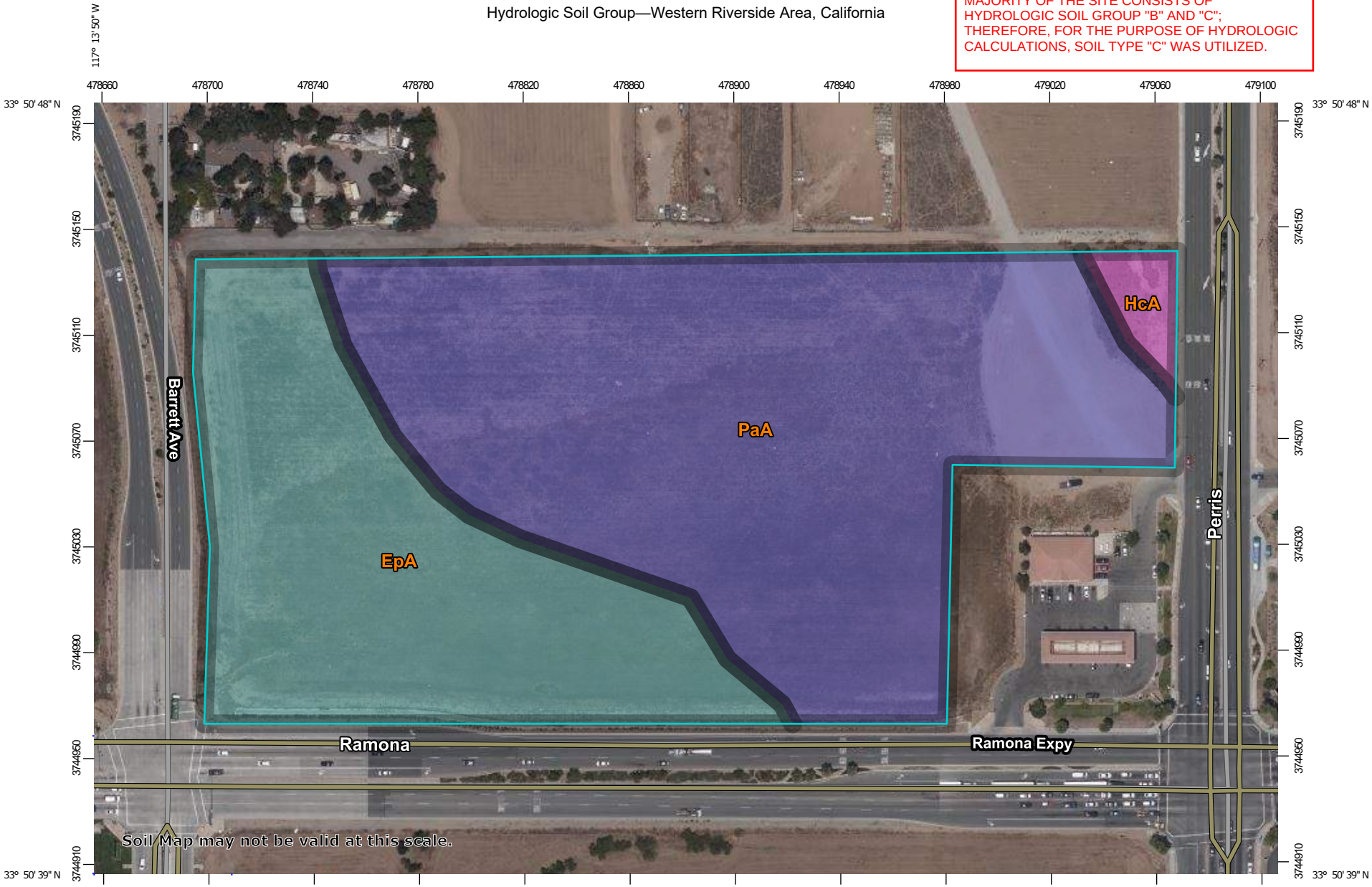
Hydrologic Backup Information

Includes:

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

SUPPORTING MATERIALS - HYDROLOGIC SOILS GROUP
MAJORITY OF THE SITE CONSISTS OF HYDROLOGIC SOIL GROUP "B" AND "C"; THEREFORE, FOR THE PURPOSE OF HYDROLOGIC CALCULATIONS, SOIL TYPE "C" WAS UTILIZED.

Hydrologic Soil Group—Western Riverside Area, California



Map Scale: 1:2,060 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 30 60 120 180

Feet: 0 100 200 400 600

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Western Riverside Area, California
Survey Area Data: Version 13, May 27, 2020

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

Date(s) aerial images were photographed: May 25, 2019—Jun 25, 2019

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
EpA	Exeter sandy loam, deep, 0 to 2 percent slopes	C	5.1	35.7%
HcA	Hanford coarse sandy loam, 0 to 2 percent slopes	A	0.3	2.0%
PaA	Pachappa fine sandy loam, 0 to 2 percent slopes	B	8.8	62.3%
Totals for Area of Interest			**14.2**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

SUPPORTING MATERIALS - NOAA ATALAS 14 - INTENSITY 10-YEAR AND 100-YEAR (10-MIN. & 60-MIN.)

NOAA Atlas 14, Volume 6, Version 2
Location name: Perris, California, USA*
Latitude: 33.8449°, Longitude: -117.2277°
Elevation: 1458.54 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	1.07 (0.888-1.30)	1.49 (1.24-1.80)	2.05 (1.70-2.48)	2.53 (2.09-3.10)	3.20 (2.56-4.06)	3.74 (2.92-4.85)	4.31 (3.28-5.72)	4.92 (3.62-6.73)	5.78 (4.08-8.26)	6.48 (4.42-9.60)
10-min	0.768 (0.642-0.924)	1.06 (0.888-1.29)	1.47 (1.22-1.78)	1.81 (1.49-2.21)	2.29 (1.83-2.91)	2.68 (2.09-3.47)	3.09 (2.35-4.10)	3.52 (2.60-4.82)	4.14 (2.93-5.92)	4.64 (3.17-6.88)
15-min	0.616 (0.516-0.748)	0.856 (0.716-1.04)	1.18 (0.984-1.44)	1.46 (1.20-1.79)	1.85 (1.48-2.34)	2.16 (1.68-2.80)	2.49 (1.89-3.31)	2.84 (2.10-3.89)	3.34 (2.36-4.77)	3.74 (2.55-5.54)
30-min	0.504 (0.420-0.608)	0.700 (0.584-0.846)	0.966 (0.804-1.17)	1.19 (0.982-1.46)	1.51 (1.20-1.91)	1.76 (1.37-2.28)	2.03 (1.54-2.70)	2.32 (1.71-3.17)	2.72 (1.92-3.89)	3.05 (2.08-4.52)
60-min	0.336 (0.281-0.406)	0.466 (0.389-0.564)	0.644 (0.536-0.781)	0.794 (0.655-0.971)	1.00 (0.801-1.27)	1.18 (0.916-1.52)	1.35 (1.03-1.80)	1.55 (1.14-2.11)	1.82 (1.28-2.59)	2.04 (1.39-3.01)
2-hr	0.252 (0.210-0.304)	0.335 (0.280-0.406)	0.446 (0.372-0.542)	0.538 (0.444-0.659)	0.666 (0.531-0.844)	0.766 (0.598-0.993)	0.870 (0.661-1.16)	0.978 (0.722-1.34)	1.13 (0.798-1.61)	1.25 (0.851-1.85)
3-hr	0.208 (0.174-0.251)	0.273 (0.228-0.330)	0.359 (0.298-0.435)	0.429 (0.354-0.525)	0.526 (0.420-0.667)	0.602 (0.470-0.780)	0.680 (0.516-0.903)	0.761 (0.561-1.04)	0.871 (0.616-1.25)	0.958 (0.653-1.42)
6-hr	0.147 (0.123-0.178)	0.191 (0.159-0.231)	0.249 (0.207-0.302)	0.296 (0.244-0.363)	0.360 (0.287-0.457)	0.410 (0.319-0.531)	0.460 (0.350-0.611)	0.512 (0.378-0.700)	0.582 (0.411-0.831)	0.636 (0.434-0.942)
12-hr	0.095 (0.079-0.114)	0.125 (0.104-0.151)	0.165 (0.137-0.200)	0.197 (0.162-0.241)	0.240 (0.191-0.304)	0.273 (0.213-0.353)	0.306 (0.232-0.407)	0.340 (0.251-0.465)	0.386 (0.273-0.551)	0.421 (0.287-0.624)
24-hr	0.060 (0.053-0.070)	0.082 (0.072-0.095)	0.110 (0.097-0.127)	0.132 (0.116-0.154)	0.163 (0.138-0.196)	0.186 (0.154-0.229)	0.209 (0.170-0.263)	0.233 (0.184-0.302)	0.265 (0.201-0.357)	0.290 (0.212-0.404)
2-day	0.035 (0.031-0.040)	0.048 (0.042-0.055)	0.065 (0.057-0.075)	0.079 (0.069-0.092)	0.098 (0.083-0.118)	0.113 (0.094-0.139)	0.128 (0.103-0.161)	0.143 (0.113-0.185)	0.163 (0.124-0.220)	0.179 (0.131-0.250)
3-day	0.025 (0.022-0.028)	0.034 (0.030-0.040)	0.047 (0.041-0.054)	0.057 (0.050-0.067)	0.072 (0.061-0.086)	0.083 (0.068-0.102)	0.094 (0.076-0.118)	0.105 (0.083-0.136)	0.121 (0.092-0.163)	0.134 (0.098-0.186)
4-day	0.020 (0.018-0.023)	0.028 (0.025-0.032)	0.038 (0.034-0.044)	0.047 (0.041-0.055)	0.059 (0.050-0.071)	0.068 (0.057-0.084)	0.078 (0.063-0.098)	0.088 (0.069-0.114)	0.101 (0.077-0.136)	0.112 (0.082-0.156)
7-day	0.012 (0.011-0.014)	0.017 (0.015-0.020)	0.024 (0.021-0.028)	0.030 (0.026-0.035)	0.038 (0.032-0.045)	0.044 (0.036-0.054)	0.050 (0.041-0.063)	0.057 (0.045-0.073)	0.066 (0.050-0.089)	0.073 (0.054-0.102)
10-day	0.009 (0.008-0.010)	0.012 (0.011-0.014)	0.018 (0.015-0.020)	0.022 (0.019-0.025)	0.028 (0.023-0.033)	0.032 (0.027-0.040)	0.037 (0.030-0.047)	0.042 (0.033-0.054)	0.049 (0.037-0.066)	0.055 (0.040-0.076)
20-day	0.005 (0.004-0.006)	0.007 (0.006-0.008)	0.010 (0.009-0.012)	0.013 (0.011-0.015)	0.017 (0.014-0.020)	0.019 (0.016-0.024)	0.023 (0.018-0.028)	0.026 (0.020-0.034)	0.031 (0.023-0.041)	0.034 (0.025-0.048)
30-day	0.004 (0.003-0.004)	0.005 (0.005-0.006)	0.008 (0.007-0.009)	0.010 (0.008-0.011)	0.013 (0.011-0.015)	0.015 (0.012-0.018)	0.017 (0.014-0.022)	0.020 (0.016-0.026)	0.024 (0.018-0.032)	0.027 (0.020-0.038)
45-day	0.003 (0.002-0.003)	0.004 (0.004-0.005)	0.006 (0.005-0.007)	0.007 (0.006-0.009)	0.010 (0.008-0.012)	0.012 (0.010-0.014)	0.014 (0.011-0.017)	0.016 (0.012-0.020)	0.019 (0.014-0.026)	0.022 (0.016-0.030)
60-day	0.002 (0.002-0.003)	0.003 (0.003-0.004)	0.005 (0.004-0.006)	0.006 (0.005-0.007)	0.008 (0.007-0.010)	0.010 (0.008-0.012)	0.011 (0.009-0.014)	0.013 (0.011-0.017)	0.016 (0.012-0.022)	0.019 (0.014-0.026)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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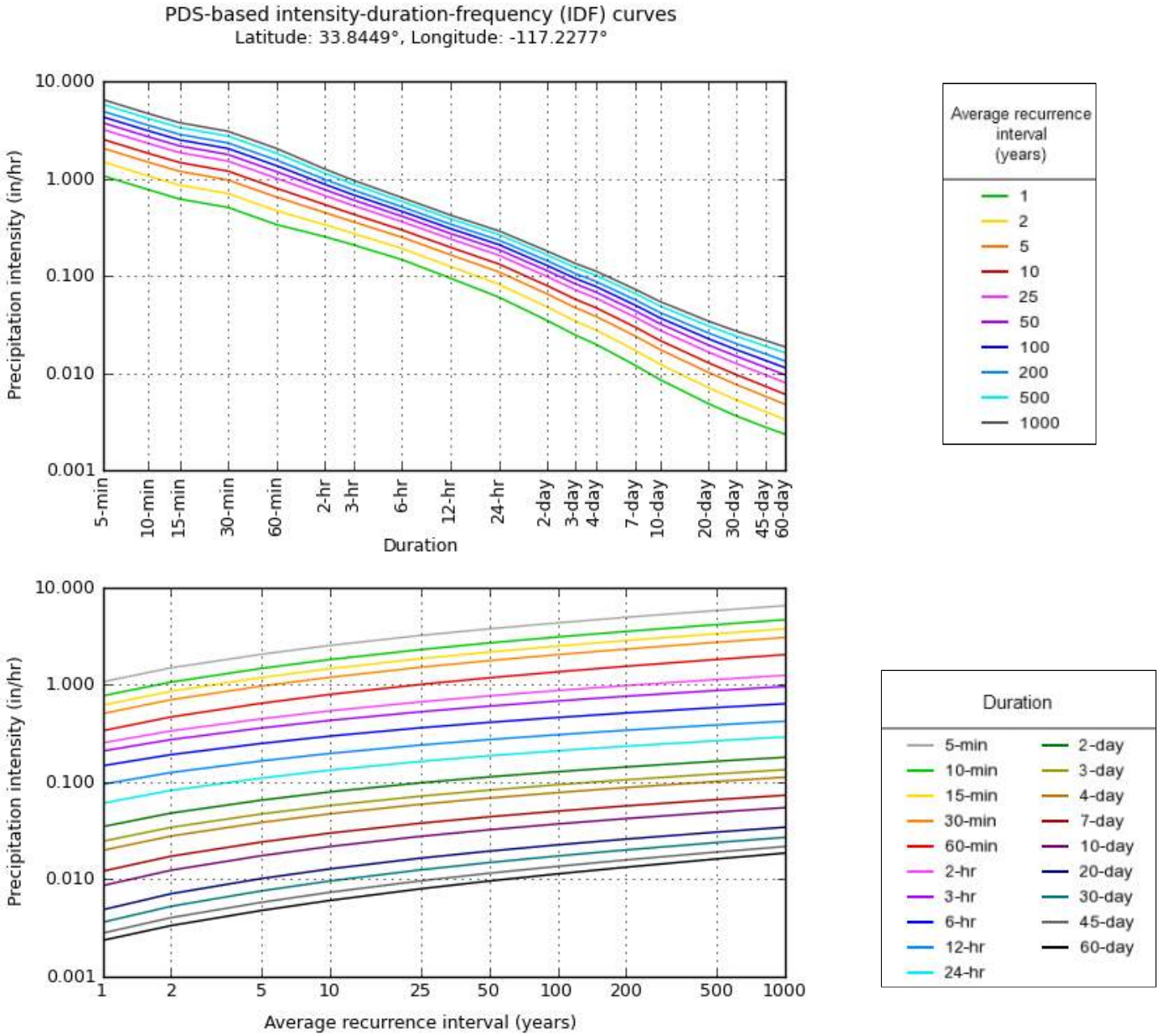
PF graphical



NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Thu Jul 22 22:43:59 2021

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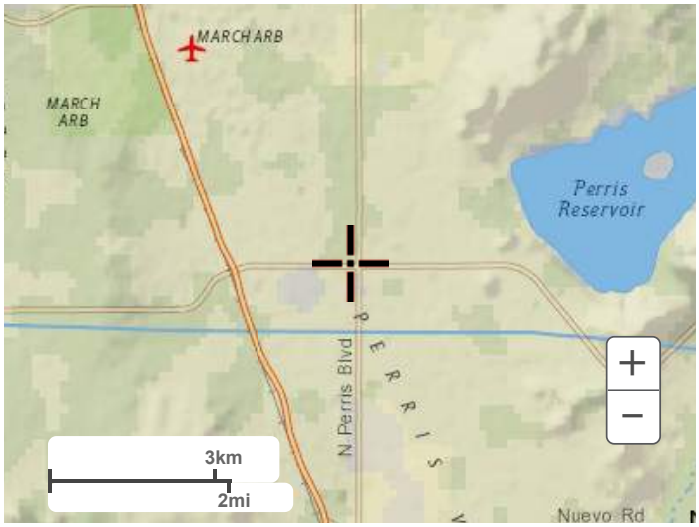
Maps & aerials

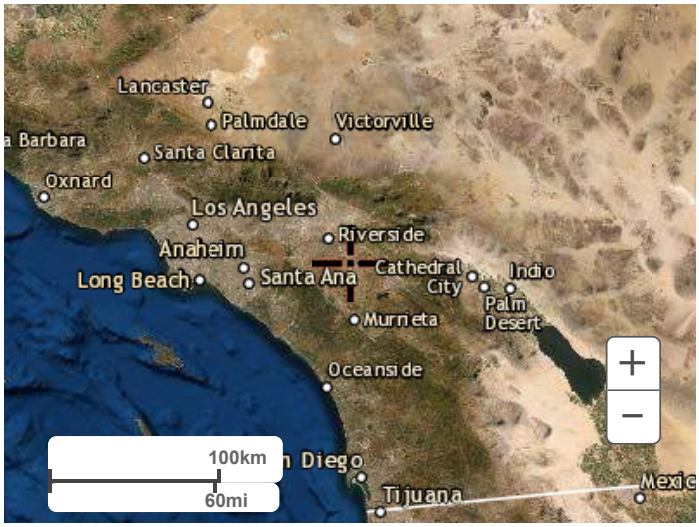
Small scale terrain



Large scale terrain

Large scale map

Large scale aerial



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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

NOTES TO USERS

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

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

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

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

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

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

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

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

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

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

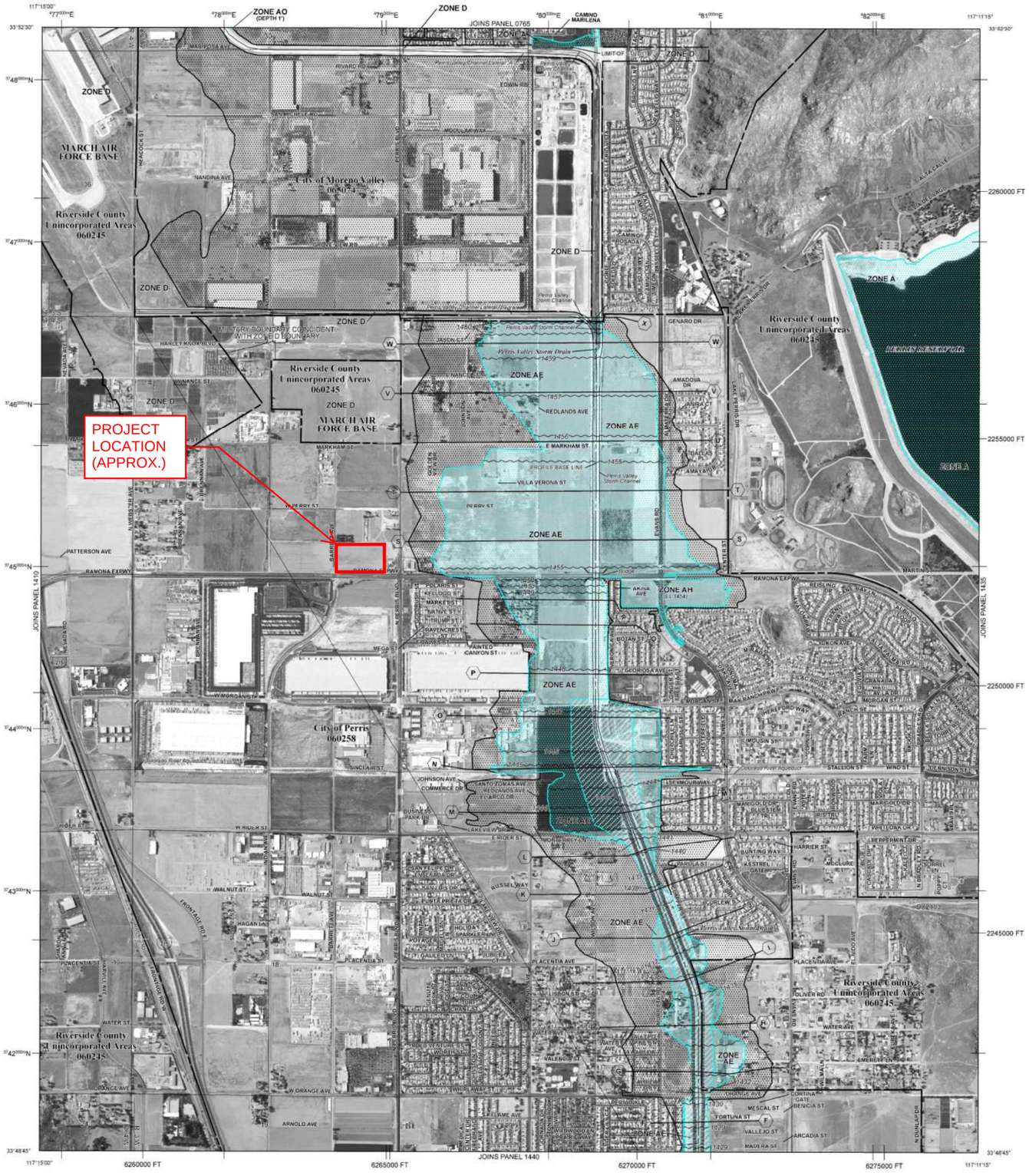
The **"profile base lines"** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the "profile base line", in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

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

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

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

THE PROJECT IS SITUATED IN FEMA ZONE X AREA. THEREFORE, ANY PROCESSING THROUGH FEMA AND RCFC&WCD SHOULD NOT BE REQUIRED.



LEGEND

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

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

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

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

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

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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

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

* Referenced to the North American Vertical Datum of 1988

- Cross section line
- Transect line
- 97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
- 4775000mE — 1000-meter Universal Transverse Mercator grid ticks, zone 11
- 6000000 FT — 5000-foot grid values: California State Plane coordinate system, Zone VI (FIPSZONE = 406), Lambert projection
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories List on Map Index

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

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

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

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

MAP SCALE 1" = 1000'

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

NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1430H

FIRM

FLOOD INSURANCE RATE MAP
RIVERSIDE COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 1430 OF 3805

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MORENO VALLEY, CITY OF	060074	1430	H
PERRIS, CITY OF	060258	1430	H
RIVERSIDE COUNTY UNINCORPORATED AREAS	060245	1430	H

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

MAP NUMBER
06065C1430H

MAP REVISED
AUGUST 18, 2014

Federal Emergency Management Agency

Appendix B

Modified Rational Method Results

Includes:

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

NOTE:
THERE IS AN EXISTING 18-INCH PIPE AND HEADWALL; HOWEVER, VERY MINIMAL FLOW IS CONTRIBUTING PER FIELD SURVEY INFORMATION AND TOPOGRAPHY.

NOTE:
THE EXISTING CATCH BASIN TO BE RE-LOCATED (OR MODIFIED) DUE TO THE PROPOSED DRIVEWAY ENTRY AT THIS LOCATION.

NOTE:
THE EXISTING OFF-SITE FLOOD CONTROL FACILITY (14'(W)X7'(H) BOX CULVERT) CURRENTLY TERMINATES HERE. REFER TO THE NOTE ON THIS EXHIBIT AS WELL AS DISCUSSION IN THE DRAINAGE STUDY.

NOTE:
THE EXISTING CONCRETE CHANNEL CONFIGURATION TO REMAIN WITH RE-ALIGNMENT DUE TO THE PROPOSED SIDEWALK/CURB IMPROVEMENT ALONG RAMONA EXPRESSWAY.

BASIN 1000 (OFF-SITE)
A=0.2 ACRES
Q10=0.1 CFS
Q100=0.2 CFS

BASIN 100 ON-SITE DETENTION BASIN

BASIN 100 (ON-SITE)
A=8.0 ACRES
Q10=14.1 CFS
Q100=24.2 CFS

BASIN 200 (ON-SITE)
A=4.4 ACRES
Q10=8.6 CFS
Q100=14.6 CFS

BASIN 300 (ON-SITE)
A=4.4 ACRES
Q10=4.1 CFS
Q100=7.1 CFS

52.30 F.F.
58.7 PAD

NOT A PART

℄ NOWAK AVE

℄ PERRIS BLVD.

℄ RAMONA EXPRESSWAY

NOTES:

1. THIS DRAINAGE STUDY MAP SUPPORTS THE HYDROLOGIC CALCULATION PERFORMED FOR THE PROJECT FOR THE PURPOSE OF PRELIMINARY ON-SITE STORM DRAIN SIZING.
2. BASED ON THE WEB SOIL SURVEY, THE EXISTING SITE CONSISTS OF MOSTLY NRCS HYDROLOGIC SOIL GROUP "B" AND "C" ALONG WITH A POCKET OF SOIL GROUP "A" AT THE NORTHEAST CORNER OF THE SITE. FOR THE PURPOSE OF ON-SITE HYDROLOGIC CALCULATION AND STORM DRAIN SIZING, SOIL GROUP "C" WAS UTILIZED (MORE CONSERVATIVE).
3. THE EXISTING SITE CONSISTS OF OPEN, UNDEVELOPED SPACE, DRAINING GENERALLY FROM NORTHWEST TO SOUTHEAST. IN THE POST-PROJECT CONDITION, RUNOFF FROM THE MAJORITY OF THE SITE (DRAINAGE BASIN 100) WILL BE CONVEYED TOWARDS A PROPOSED BMP/BASIN AT THE EASTERLY EDGE OF THE SITE, PRIOR TO CONNECTING INTO THE PROPOSED MDP LINE E AND EXISTING PERRIS VALLEY MDP LATERAL LINE E-11 IN PERRIS BLVD. VIA A PROPOSED TEMPORARY LATERAL CONNECTING PIPE. RUNOFF FROM THE REMAINING PORTION OF THE PROJECT (BASIN 200 AND BASIN 300) WILL BE DIRECTLY DISCHARGED INTO THE PROPOSED MDP LINE E FACILITY AT DIFFERENT OUTLET LOCATIONS.
4. IT WAS ORIGINALLY UNDERSTOOD AND AGREED (BETWEEN THE CITY OF PERRIS AND THE PROJECT OWNER/APPLICANT) THAT THE CITY OF PERRIS WOULD DESIGN AND CONSTRUCT A FLOOD CONTROL FACILITY (BOX CULVERT) EXTENSION ALONG THE SOUTHERLY EDGE OF THE PROJECT AND AROUND THE EXISTING BUSINESS (GAS STATION) THAT IS LOCATED TO THE SOUTHEAST OF THE PROJECT. HOWEVER, THE CITY IS NOW DIRECTING THE PROJECT TO CONSTRUCT THE FRONTAGE FLOOD CONTROL FACILITY ALONG THE SOUTHERLY EDGE OF THE SITE WITHIN THE PROJECT LIMIT. THEREFORE, THE PROJECT WILL CONSISTS OF THREE DRAINAGE BASINS (BASIN 100, BASIN 200, AND BASIN 300) AND RUNOFF FROM EACH DRAINAGE BASIN WILL DIRECTLY DISCHARGE INTO THE PROPOSED MDP LINE E AT THREE DIFFERENT OUTLET LOCATIONS. DURING THE INTERIM CONDITION, A TEMPORARY LATERAL PIPE WILL BE PROVIDED TO CONNECT THE FLOWS FROM THE MDP LINE E INTO THE EXISTING PERRIS VALLEY MDP LATERAL LINE E-11 IN PERRIS BLVD. WITH THE ON-SITE FLOWS TO BE ROUTED TO THE PROPOSED MDP FACILITY. IT IS ANTICIPATED THAT THE ON-SITE FLOWS TO THE EXISTING CHANNEL (ALONG THE SOUTHERLY EDGE OF THE SITE) WILL BE REDUCED OR EVEN ELIMINATED, HELPING IMPROVE THE EXISTING CHANNEL CAPACITY SITUATION. AS SUCH, THE PROJECT IS PLANNING TO KEEP THE CONFIGURATION OF THE EXISTING CHANNEL ALONG THE SOUTHERLY EDGE OF THE SITE (WITHIN THE CITY RIGHT-OF-WAY, NORTH OF RAMONA EXPRESSWAY). ULTIMATELY, IT IS UNDERSTOOD THAT THE CITY OF PERRIS (AND/OR OTHER RESPONSIBLE ENTITIES) WILL CONSTRUCT THE DOWNSTREAM MDP LINE E FLOOD CONTROL FACILITY EXTENSION ALL THE WAY TO THE PERRIS VALLEY STORM DRAIN CHANNEL. AS SOON AS THE IMMEDIATELY DOWNSTREAM EXTENSION SEGMENT IS CONSTRUCTED BY THE CITY OR OTHERS, THE TEMPORARY LATERAL PIPE TO THE MDP LATERAL LINE E-11 COULD BE REMOVED.
5. THE PROJECT IS SHOWN ON THE FEMA FIRM NUMBER 06065C1430H, EFFECTIVE AUGUST 18, 2014, AND SITUATED WITH THE FEMA "ZONE X" AREA. NO FEMA SUBMITTALS ARE ANTICIPATED TO BE REQUIRED FOR THIS PROJECT.

LEGEND

- TRACT BOUNDARY
- MAJOR DRAINAGE BOUNDARY
- SUB BASIN BOUNDARY
- FLOW PATH
- DRAINAGE ACREAGE — X.X AC.
- BASIN NODE ID — XXX
- DISCHARGE LOCATION

N

0 25 50 100 150 200
SCALE 1"=50'

DRAINAGE STUDY MAP FOR McKAY-RAMONA (POST-PROJECT)

JN 2010 DATE: 1/12/2022

NOT FOR CONSTRUCTION – EXHIBIT FOR PRELIMINARY DRAINAGE STUDY ONLY

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**************************************************************************
          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 *************************
* MCKAY - RAMONA (JN 2010)                                              *
* POST-PROJECT CONDITION - 10-YEAR, 1-HOUR STORM EVENT                  *
* BASIN 100                                                             *
 ************************************************************************

  FILE NAME: MR1HP10.RAT
  TIME/DATE OF STUDY: 15:57 01/10/2022
--------------------------------------------------------------------------
  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) =  1.810
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.794
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  3.090
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.350
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4598822
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4621526
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   10.00   1-HOUR INTENSITY(INCH/HOUR) =   0.802
  SLOPE OF INTENSITY DURATION CURVE = 0.4599
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0160

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
```

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

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 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) =   130.00
  UPSTREAM ELEVATION(FEET) =     60.70
  DOWNSTREAM ELEVATION(FEET) =     54.52
  ELEVATION DIFFERENCE(FEET) =      6.18
  TC = 0.303*[(  130.00**3)/(     6.18)]**.2 =    3.906
  COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.514
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8827
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      1.33
  TOTAL AREA(ACRES) =      0.60   TOTAL RUNOFF(CFS) =      1.33

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    110.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    52.52  DOWNSTREAM(FEET) =    51.60
  FLOW LENGTH(FEET) =   175.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.38
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.33
  PIPE TRAVEL TIME(MIN.) =   0.86    Tc(MIN.) =    5.86
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    110.00 =     305.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.337
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8816
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    1.80   SUBAREA RUNOFF(CFS) =    3.71
```

```
  TOTAL AREA(ACRES) =        2.4   TOTAL RUNOFF(CFS) =       5.04
  TC(MIN.) =    5.86

****************************************************************************
  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) =    51.60  DOWNSTREAM(FEET) =    51.10
  FLOW LENGTH(FEET) =   255.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.35
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.04
  PIPE TRAVEL TIME(MIN.) =   1.81    Tc(MIN.) =    7.67
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    120.00 =     560.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.065
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8798
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    1.00   SUBAREA RUNOFF(CFS) =    1.82
  TOTAL AREA(ACRES) =        3.4   TOTAL RUNOFF(CFS) =       6.86
  TC(MIN.) =    7.67

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    150.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    51.10  DOWNSTREAM(FEET) =    50.72
  FLOW LENGTH(FEET) =   189.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.38
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.86
  PIPE TRAVEL TIME(MIN.) =   1.32    Tc(MIN.) =    9.00
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    150.00 =     749.00 FEET.

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

```
 FLOW PROCESS FROM NODE    140.00 TO NODE    150.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.919
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8786
 SOIL CLASSIFICATION IS "C"
 SUBAREA AREA(ACRES) =    1.00   SUBAREA RUNOFF(CFS) =    1.69
 TOTAL AREA(ACRES) =        4.4   TOTAL RUNOFF(CFS) =       8.54
 TC(MIN.) =    9.00

****************************************************************************
 FLOW PROCESS FROM NODE    150.00 TO NODE    160.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    50.72  DOWNSTREAM(FEET) =    50.43
 FLOW LENGTH(FEET) =   143.00   MANNING'S N =  0.012
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.39
 (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
  AT DEPTH = 0.82 * DIAMETER)
 GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       8.54
 PIPE TRAVEL TIME(MIN.) =   1.00    Tc(MIN.) =    9.99
 LONGEST FLOWPATH FROM NODE    101.00 TO NODE    160.00 =     892.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    160.00 TO NODE    175.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    50.43  DOWNSTREAM(FEET) =    50.31
 FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.012
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.37
 (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
  AT DEPTH = 0.82 * DIAMETER)
 GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       8.54
 PIPE TRAVEL TIME(MIN.) =   0.42    Tc(MIN.) =   10.41
 LONGEST FLOWPATH FROM NODE    101.00 TO NODE    175.00 =     952.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    175.00 TO NODE    175.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    167.00 TO NODE    170.00 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) =   400.00
  UPSTREAM ELEVATION(FEET) =     59.10
  DOWNSTREAM ELEVATION(FEET) =     55.90
  ELEVATION DIFFERENCE(FEET) =      3.20
  TC = 0.303*[(  400.00**3)/(     3.20)]**.2 =    8.746
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.944
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8788
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      1.03
  TOTAL AREA(ACRES) =      0.60   TOTAL RUNOFF(CFS) =      1.03

****************************************************************************
  FLOW PROCESS FROM NODE    170.00 TO NODE    170.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.944
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8788
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    1.40   SUBAREA RUNOFF(CFS) =    2.39
  TOTAL AREA(ACRES) =        2.0   TOTAL RUNOFF(CFS) =       3.42
  TC(MIN.) =    8.75

****************************************************************************
  FLOW PROCESS FROM NODE    170.00 TO NODE    175.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    53.90  DOWNSTREAM(FEET) =    50.31
  FLOW LENGTH(FEET) =    22.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   3.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.31
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.42
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    8.77
  LONGEST FLOWPATH FROM NODE    167.00 TO NODE    175.00 =     422.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    175.00 TO NODE    175.00 IS CODE =  11
----------------------------------------------------------------------------
```

```
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
================================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        3.42     8.77       1.942        2.00
  LONGEST FLOWPATH FROM NODE    167.00 TO NODE    175.00 =     422.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        8.54    10.41       1.794        4.40
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    175.00 =     952.00 FEET.

 ****************************************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.
 ************************************************************************************

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      10.61       8.77        1.942
      2      11.70      10.41        1.794

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      11.70   Tc(MIN.) =   10.41
  TOTAL AREA(ACRES) =        6.4

********************************************************************************
  FLOW PROCESS FROM NODE    175.00 TO NODE    175.00 IS CODE =  12
--------------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
================================================================================

********************************************************************************
  FLOW PROCESS FROM NODE    175.00 TO NODE    180.00 IS CODE =  41
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    50.31  DOWNSTREAM(FEET) =    50.00
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  13.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.43
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.70
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   10.53
```

```
 LONGEST FLOWPATH FROM NODE    101.00 TO NODE    180.00 =     997.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    180.00 TO NODE    185.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     50.00  DOWNSTREAM(FEET) =     49.90
 CHANNEL LENGTH THRU SUBAREA(FEET) =    50.00   CHANNEL SLOPE =  0.0020
 CHANNEL BASE(FEET) =   40.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   5.00
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.724
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8768
 SOIL CLASSIFICATION IS "C"
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.91
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.00
 AVERAGE FLOW DEPTH(FEET) =   0.32   TRAVEL TIME(MIN.) =   0.83
 Tc(MIN.) =   11.36
 SUBAREA AREA(ACRES) =     1.60       SUBAREA RUNOFF(CFS) =    2.42
 TOTAL AREA(ACRES) =        8.0         PEAK FLOW RATE(CFS) =      14.12

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.33   FLOW VELOCITY(FEET/SEC.) =   1.04
 LONGEST FLOWPATH FROM NODE    101.00 TO NODE    185.00 =    1047.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    185.00 TO NODE    190.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    48.75  DOWNSTREAM(FEET) =    48.50
 FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  14.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.99
 GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      14.12
 PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   11.50
 LONGEST FLOWPATH FROM NODE    101.00 TO NODE    190.00 =    1097.00 FEET.

+----------------------------------------------------------------------------+
| NODE 1001 TO 1005                                                          |
| NOTE: THIS SUBAREA REPRESENTS THE OFFSITE PERIMETER RUN-ON FLOW            |
| A PROPOSED SWALE/DITCH IS PROPOSED TO CONVEY THE FLOW EASTERLY             |
+----------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE   1001.00 TO NODE   1005.00 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) =   670.00
  UPSTREAM ELEVATION(FEET) =     58.00
  DOWNSTREAM ELEVATION(FEET) =     57.20
  ELEVATION DIFFERENCE(FEET) =      0.80
  TC = 0.303*[(  670.00**3)/(     0.80)]**.2 =   15.726
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.485
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8741
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      0.26
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.26
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.2  TC(MIN.) =     15.73
  PEAK FLOW RATE(CFS)   =       0.26
==============================================================================
==============================================================================
  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.
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                              (951) 683-3691

 ************************* DESCRIPTION OF STUDY *************************
* MCKAY - RAMONA (JN 2010)                                               *
* POST-PROJECT CONDITION - 10-YEAR, 1-HOUR STORM EVENT                   *
* BASIN 200                                                              *
 **************************************************************************

  FILE NAME: MR2HP10.RAT
  TIME/DATE OF STUDY: 15:58 01/10/2022
--------------------------------------------------------------------------
  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) =  1.810
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.794
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  3.090
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.350
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4598822
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4621526
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   10.00   1-HOUR INTENSITY(INCH/HOUR) =   0.802
  SLOPE OF INTENSITY DURATION CURVE = 0.4599
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0160

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
```

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

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    205.00 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) =   145.00
  UPSTREAM ELEVATION(FEET) =     60.30
  DOWNSTREAM ELEVATION(FEET) =     58.20
  ELEVATION DIFFERENCE(FEET) =      2.10
  TC = 0.303*[(  145.00**3)/(     2.10)]**.2 =    5.176
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.475
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8825
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      1.31
  TOTAL AREA(ACRES) =      0.60   TOTAL RUNOFF(CFS) =      1.31

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    205.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.475
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8825
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    1.30   SUBAREA RUNOFF(CFS) =    2.84
  TOTAL AREA(ACRES) =        1.9   TOTAL RUNOFF(CFS) =       4.15
  TC(MIN.) =    5.18

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    210.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    56.02  DOWNSTREAM(FEET) =    55.70
  FLOW LENGTH(FEET) =   159.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.38
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =       4.15
  PIPE TRAVEL TIME(MIN.) =   1.11    Tc(MIN.) =    6.29
  LONGEST FLOWPATH FROM NODE    201.00 TO NODE    210.00 =     304.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    208.00 TO NODE    210.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.263
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8812
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    0.30   SUBAREA RUNOFF(CFS) =    0.60
  TOTAL AREA(ACRES) =        2.2   TOTAL RUNOFF(CFS) =       4.75
  TC(MIN.) =    6.29

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    220.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    55.70  DOWNSTREAM(FEET) =    55.14
  FLOW LENGTH(FEET) =   281.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.37
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.75
  PIPE TRAVEL TIME(MIN.) =   1.97    Tc(MIN.) =    8.26
  LONGEST FLOWPATH FROM NODE    201.00 TO NODE    220.00 =     585.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    220.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.996
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8792
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    1.80   SUBAREA RUNOFF(CFS) =    3.16
  TOTAL AREA(ACRES) =        4.0   TOTAL RUNOFF(CFS) =       7.91
  TC(MIN.) =    8.26

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    240.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    55.14  DOWNSTREAM(FEET) =    54.75
  FLOW LENGTH(FEET) =   197.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.36
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.91
  PIPE TRAVEL TIME(MIN.) =   1.39    Tc(MIN.) =    9.65
  LONGEST FLOWPATH FROM NODE    201.00 TO NODE    240.00 =     782.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    235.00 TO NODE    240.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.858
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8781
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    0.40   SUBAREA RUNOFF(CFS) =    0.65
  TOTAL AREA(ACRES) =        4.4   TOTAL RUNOFF(CFS) =       8.56
  TC(MIN.) =    9.65

****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    250.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    54.75  DOWNSTREAM(FEET) =    50.30
  FLOW LENGTH(FEET) =    54.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.97
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.56
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    9.71
  LONGEST FLOWPATH FROM NODE    201.00 TO NODE    250.00 =     836.00 FEET.
==========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        4.4  TC(MIN.) =      9.71
  PEAK FLOW RATE(CFS)   =       8.56
==========================================================================
==========================================================================
  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 *************************
* MCKAY - RAMONA (JN 2010)                                              *
* POST-PROJECT CONDITION - 10-YEAR, 1-HOUR STORM EVENT                  *
* BASIN 300                                                             *
 ************************************************************************

  FILE NAME: MR3HP10.RAT
  TIME/DATE OF STUDY: 16:00 01/10/2022
------------------------------------------------------------------------
  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) =  1.810
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.794
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  3.090
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.350
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4598822
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4621526
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   10.00   1-HOUR INTENSITY(INCH/HOUR) =   0.802
  SLOPE OF INTENSITY DURATION CURVE = 0.4599
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0160

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
```

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

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    305.00 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) =   190.00
  UPSTREAM ELEVATION(FEET) =     58.50
  DOWNSTREAM ELEVATION(FEET) =     57.55
  ELEVATION DIFFERENCE(FEET) =      0.95
  TC = 0.303*[(  190.00**3)/(     0.95)]**.2 =    7.133
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.135
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8803
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      0.94
  TOTAL AREA(ACRES) =      0.50   TOTAL RUNOFF(CFS) =      0.94

****************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    305.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.135
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8803
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    1.70   SUBAREA RUNOFF(CFS) =    3.20
  TOTAL AREA(ACRES) =        2.2   TOTAL RUNOFF(CFS) =       4.14
  TC(MIN.) =    7.13

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    350.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    55.55  DOWNSTREAM(FEET) =    50.20
  FLOW LENGTH(FEET) =   235.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.69
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.14
  PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =    7.64
```

```
  LONGEST FLOWPATH FROM NODE    301.00 TO NODE    350.00 =     425.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =         2.2  TC(MIN.) =      7.64
  PEAK FLOW RATE(CFS)   =       4.14
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
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       RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
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                        Analysis prepared by:

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

 ************************* DESCRIPTION OF STUDY *************************
* MCKAY - RAMONA (JN 2010)                                               *
* POST-PROJECT CONDITION - 100-YEAR, 1-HOUR STORM EVENT                  *
* BASIN 100                                                              *
 **************************************************************************

  FILE NAME: MR1HP00.RAT
  TIME/DATE OF STUDY: 15:55 01/10/2022
--------------------------------------------------------------------------
  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) =  1.810
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.794
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  3.090
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.350
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4598822
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4621526
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.350
  SLOPE OF INTENSITY DURATION CURVE = 0.4622
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0160

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
```

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

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 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) =   130.00
  UPSTREAM ELEVATION(FEET) =     60.70
  DOWNSTREAM ELEVATION(FEET) =     54.52
  ELEVATION DIFFERENCE(FEET) =      6.18
  TC = 0.303*[(  130.00**3)/(     6.18)]**.2 =    3.906
  COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.257
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8889
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      2.27
  TOTAL AREA(ACRES) =      0.60   TOTAL RUNOFF(CFS) =      2.27

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    110.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    52.52  DOWNSTREAM(FEET) =    51.60
  FLOW LENGTH(FEET) =   175.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.80
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.27
  PIPE TRAVEL TIME(MIN.) =   0.77    Tc(MIN.) =    5.77
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    110.00 =     305.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.985
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8882
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    1.80   SUBAREA RUNOFF(CFS) =    6.37
```

```
  TOTAL AREA(ACRES) =        2.4   TOTAL RUNOFF(CFS) =       8.64
  TC(MIN.) =    5.77

****************************************************************************
  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) =    51.60  DOWNSTREAM(FEET) =    51.10
  FLOW LENGTH(FEET) =   255.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.35
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.64
  PIPE TRAVEL TIME(MIN.) =   1.81    Tc(MIN.) =    7.58
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    120.00 =     560.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.513
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8869
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    1.00   SUBAREA RUNOFF(CFS) =    3.12
  TOTAL AREA(ACRES) =        3.4   TOTAL RUNOFF(CFS) =      11.76
  TC(MIN.) =    7.58

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    150.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    51.10  DOWNSTREAM(FEET) =    50.72
  FLOW LENGTH(FEET) =   189.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.38
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.76
  PIPE TRAVEL TIME(MIN.) =   1.32    Tc(MIN.) =    8.90
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    150.00 =     749.00 FEET.

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

```
 FLOW PROCESS FROM NODE    140.00 TO NODE    150.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.261
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8860
 SOIL CLASSIFICATION IS "C"
 SUBAREA AREA(ACRES) =    1.00   SUBAREA RUNOFF(CFS) =    2.89
 TOTAL AREA(ACRES) =        4.4   TOTAL RUNOFF(CFS) =      14.65
 TC(MIN.) =    8.90

****************************************************************************
 FLOW PROCESS FROM NODE    150.00 TO NODE    160.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    50.72  DOWNSTREAM(FEET) =    50.43
 FLOW LENGTH(FEET) =   143.00   MANNING'S N =  0.012
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.39
 (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
  AT DEPTH = 0.82 * DIAMETER)
 GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      14.65
 PIPE TRAVEL TIME(MIN.) =   1.00    Tc(MIN.) =    9.90
 LONGEST FLOWPATH FROM NODE    101.00 TO NODE    160.00 =     892.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    160.00 TO NODE    175.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    50.43  DOWNSTREAM(FEET) =    50.31
 FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.012
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.37
 (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
  AT DEPTH = 0.82 * DIAMETER)
 GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      14.65
 PIPE TRAVEL TIME(MIN.) =   0.42    Tc(MIN.) =   10.32
 LONGEST FLOWPATH FROM NODE    101.00 TO NODE    175.00 =     952.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    175.00 TO NODE    175.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    167.00 TO NODE    170.00 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) =   400.00
  UPSTREAM ELEVATION(FEET) =     59.10
  DOWNSTREAM ELEVATION(FEET) =     55.90
  ELEVATION DIFFERENCE(FEET) =      3.20
  TC = 0.303*[(  400.00**3)/(     3.20)]**.2 =    8.746
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.287
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8861
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      1.75
  TOTAL AREA(ACRES) =      0.60   TOTAL RUNOFF(CFS) =      1.75

****************************************************************************
  FLOW PROCESS FROM NODE    170.00 TO NODE    170.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.287
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8861
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    1.40   SUBAREA RUNOFF(CFS) =    4.08
  TOTAL AREA(ACRES) =        2.0   TOTAL RUNOFF(CFS) =       5.83
  TC(MIN.) =    8.75

****************************************************************************
  FLOW PROCESS FROM NODE    170.00 TO NODE    175.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    53.90  DOWNSTREAM(FEET) =    50.31
  FLOW LENGTH(FEET) =    22.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   5.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.70
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.83
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    8.77
  LONGEST FLOWPATH FROM NODE    167.00 TO NODE    175.00 =     422.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    175.00 TO NODE    175.00 IS CODE =  11
----------------------------------------------------------------------------
```

```
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
================================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        5.83     8.77       3.284        2.00
  LONGEST FLOWPATH FROM NODE    167.00 TO NODE    175.00 =     422.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       14.65    10.32       3.046        4.40
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    175.00 =     952.00 FEET.

 ****************************************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.
 ************************************************************************************

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      18.27       8.77        3.284
      2      20.05      10.32        3.046

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      20.05   Tc(MIN.) =   10.32
  TOTAL AREA(ACRES) =        6.4

********************************************************************************
  FLOW PROCESS FROM NODE    175.00 TO NODE    175.00 IS CODE =  12
--------------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
================================================================================

********************************************************************************
  FLOW PROCESS FROM NODE    175.00 TO NODE    180.00 IS CODE =  41
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    50.31  DOWNSTREAM(FEET) =    50.00
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.00
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =      20.05
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   10.42
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    180.00 =     997.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    180.00 TO NODE    185.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     50.00  DOWNSTREAM(FEET) =     49.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =    50.00   CHANNEL SLOPE =  0.0020
  CHANNEL BASE(FEET) =   40.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   5.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.945
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8848
  SOIL CLASSIFICATION IS "C"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      22.13
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.24
  AVERAGE FLOW DEPTH(FEET) =   0.43   TRAVEL TIME(MIN.) =   0.67
  Tc(MIN.) =   11.10
  SUBAREA AREA(ACRES) =     1.60       SUBAREA RUNOFF(CFS) =    4.17
  TOTAL AREA(ACRES) =        8.0         PEAK FLOW RATE(CFS) =      24.22

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.45   FLOW VELOCITY(FEET/SEC.) =   1.29
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    185.00 =    1047.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    185.00 TO NODE    190.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    48.75  DOWNSTREAM(FEET) =    48.50
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.76
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      24.22
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   11.22
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    190.00 =    1097.00 FEET.

+--------------------------------------------------------------------------+
| NODE 1001 TO 1005                                                        |
| NOTE: THIS SUBAREA REPRESENTS THE OFFSITE PERIMETER RUN-ON FLOW          |
| A PROPOSED SWALE/DITCH IS PROPOSED TO CONVEY THE FLOW EASTERLY           |
+--------------------------------------------------------------------------+

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

```
  FLOW PROCESS FROM NODE   1001.00 TO NODE   1005.00 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) =   670.00
  UPSTREAM ELEVATION(FEET) =     58.00
  DOWNSTREAM ELEVATION(FEET) =     57.20
  ELEVATION DIFFERENCE(FEET) =      0.80
  TC = 0.303*[(  670.00**3)/(     0.80)]**.2 =   15.726
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.507
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8826
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      0.44
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.44
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.2  TC(MIN.) =     15.73
  PEAK FLOW RATE(CFS)   =       0.44
============================================================================
============================================================================
  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 *************************
* MCKAY - RAMONA (JN 2010)                                               *
* POST-PROJECT CONDITION - 100-YEAR, 1-HOUR STORM EVENT                  *
* BASIN 200                                                              *
 **************************************************************************

  FILE NAME: MR2HP00.RAT
  TIME/DATE OF STUDY: 15:41 01/10/2022
--------------------------------------------------------------------------
  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) =  1.810
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.794
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  3.090
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.350
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4598822
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4621526
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.350
  SLOPE OF INTENSITY DURATION CURVE = 0.4622
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0160

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
```

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

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    205.00 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) =   145.00
  UPSTREAM ELEVATION(FEET) =     60.30
  DOWNSTREAM ELEVATION(FEET) =     58.20
  ELEVATION DIFFERENCE(FEET) =      2.10
  TC = 0.303*[(  145.00**3)/(     2.10)]**.2 =    5.176
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.189
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8887
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      2.23
  TOTAL AREA(ACRES) =      0.60   TOTAL RUNOFF(CFS) =      2.23

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    205.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.189
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8887
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    1.30   SUBAREA RUNOFF(CFS) =    4.84
  TOTAL AREA(ACRES) =        1.9   TOTAL RUNOFF(CFS) =       7.07
  TC(MIN.) =    5.18

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    210.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    56.02  DOWNSTREAM(FEET) =    55.70
  FLOW LENGTH(FEET) =   159.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.38
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =       7.07
  PIPE TRAVEL TIME(MIN.) =   1.11    Tc(MIN.) =    6.29
  LONGEST FLOWPATH FROM NODE    201.00 TO NODE    210.00 =     304.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    208.00 TO NODE    210.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.829
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8878
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    0.30   SUBAREA RUNOFF(CFS) =    1.02
  TOTAL AREA(ACRES) =        2.2   TOTAL RUNOFF(CFS) =       8.09
  TC(MIN.) =    6.29

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    220.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    55.70  DOWNSTREAM(FEET) =    55.14
  FLOW LENGTH(FEET) =   281.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.37
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.09
  PIPE TRAVEL TIME(MIN.) =   1.97    Tc(MIN.) =    8.26
  LONGEST FLOWPATH FROM NODE    201.00 TO NODE    220.00 =     585.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    220.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.375
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8864
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    1.80   SUBAREA RUNOFF(CFS) =    5.39
  TOTAL AREA(ACRES) =        4.0   TOTAL RUNOFF(CFS) =      13.48
  TC(MIN.) =    8.26

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    240.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    55.14  DOWNSTREAM(FEET) =    54.75
  FLOW LENGTH(FEET) =   197.00   MANNING'S N =  0.012
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.36
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.48
  PIPE TRAVEL TIME(MIN.) =   1.39    Tc(MIN.) =    9.65
  LONGEST FLOWPATH FROM NODE    201.00 TO NODE    240.00 =     782.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    235.00 TO NODE    240.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.141
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8856
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    0.40   SUBAREA RUNOFF(CFS) =    1.11
  TOTAL AREA(ACRES) =        4.4   TOTAL RUNOFF(CFS) =      14.59
  TC(MIN.) =    9.65

****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    250.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    54.75  DOWNSTREAM(FEET) =    50.30
  FLOW LENGTH(FEET) =    54.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.26
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.59
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    9.70
  LONGEST FLOWPATH FROM NODE    201.00 TO NODE    250.00 =     836.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        4.4  TC(MIN.) =      9.70
  PEAK FLOW RATE(CFS)   =      14.59
============================================================================
============================================================================
  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 *************************
* MCKAY - RAMONA (JN 2010)                                               *
* POST-PROJECT CONDITION - 100-YEAR, 1-HOUR STORM EVENT                  *
* BASIN 300                                                              *
 **************************************************************************

  FILE NAME: MR3HP00.RAT
  TIME/DATE OF STUDY: 15:52 01/10/2022
--------------------------------------------------------------------------
  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) =  1.810
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.794
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  3.090
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.350
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4598822
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4621526
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.350
  SLOPE OF INTENSITY DURATION CURVE = 0.4622
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   20.0     15.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0160

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
```

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

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    305.00 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) =   190.00
  UPSTREAM ELEVATION(FEET) =     58.50
  DOWNSTREAM ELEVATION(FEET) =     57.55
  ELEVATION DIFFERENCE(FEET) =      0.95
  TC = 0.303*[(  190.00**3)/(     0.95)]**.2 =    7.133
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.612
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8872
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      1.60
  TOTAL AREA(ACRES) =      0.50   TOTAL RUNOFF(CFS) =      1.60

****************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    305.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.612
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8872
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    1.70   SUBAREA RUNOFF(CFS) =    5.45
  TOTAL AREA(ACRES) =        2.2   TOTAL RUNOFF(CFS) =       7.05
  TC(MIN.) =    7.13

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    350.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    55.55  DOWNSTREAM(FEET) =    50.20
  FLOW LENGTH(FEET) =   235.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.88
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.05
  PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =    7.57
```

```
  LONGEST FLOWPATH FROM NODE    301.00 TO NODE    350.00 =     425.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =         2.2  TC(MIN.) =      7.57
  PEAK FLOW RATE(CFS)   =       7.05
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Appendix C

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 Sizing

Includes:

1. On-site preliminary storm drain sizing
2. WSPG calculation in support of the proposed MDP Line E flood control facility

McKay-Ramona
Job # 2010
January 2022

Preliminary Storm Drain Size

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

Manning's n: 0.012 HDPE or equivalent

Preliminary Sizing Bump-up (%): 30

			Preliminary Sizes per Varying Slopes						
		Slope at:	0.2%		0.5%		1.0%		
Node ID's:	**Q_{10} (cfs[1])**	**Q_{100} with Sizing Factor (cfs[1])**	**Minimum Pipe Size[2] (feet)**	**Suggested Pipe Size (inches)**	**Minimum Pipe Size[2] (feet)**	**Suggested Pipe Size (inches)**	**Minimum Pipe Size [2] (feet)**	**Suggested Pipe Size (inches)**	**PRELIMINARY RECOMMENDATIONS[3]**
102 - 110	1.3	1.7	0.99	12"	0.83	10"	0.73	10"	**Use 12" HDPE @ 0.2% MIN.**
110 - 150	6.9	9.0	1.85	24"	1.56	24"	1.37	18"	**Use 2-12" HDPEs @ 0.2% MIN.**
150 - 175	8.5	11.1	2.00	24"	1.69	24"	1.48	18"	**Use 24" HDPE @ 0.2% MIN.**
170 - 175	3.4	4.4	1.42	18"	1.20	18"	1.05	18"	**Use 18" HDPE @ 0.2% MIN.**
175 - 180	11.7	15.2	2.26	30"	1.90	24"	1.67	24"	**Use 30" HDPE @ 0.2% MIN.**
185 - 190	14.1	18.3	2.42	30"	2.04	30"	1.79	24"	**Use 30" HDPE @ 0.2% MIN.**
205 - 210	4.2	5.5	1.54	24"	1.30	18"	1.14	18"	**Use 2-12" HDPEs @ 0.2% MIN.**
210 - 220	4.8	6.2	1.62	24"	1.36	18"	1.20	18"	**Use 2-12" HDPEs @ 0.2% MIN.**
220 - 240	7.9	10.3	1.95	24"	1.64	24"	1.44	18"	**Use 2-12" HDPEs @ 0.2% MIN.**
240 - 250	8.6	11.2	2.01	24"	1.70	24"	1.49	18"	**Use 24" HDPE @ 0.2% MIN.**
305 - 350	4.1	5.3	1.52	24"	1.28	18"	1.13	18"	**Use 24" HDPE @ 0.2% MIN.**

Note:

1. "cfs" = cubic feet per second.
2. Minimum pipe sizes are calculated using the Manning's equation and are based on the flow rates with "bump up factor" to account for potential head losses through the storm drain pipes.
3. The on-site storm drain systems are private and the normal depth calculations should suffice for pipe sizing purpose.
   The preliminary recommendations may differ slightly from the pipe sizing summary table above. Detailed calculations may be performed on an as-needed basis during final engineering to validate the required sizes.

```
T1 MCKAY-RAMONA (JN 2010)                                                    0
T2 PERRIS VALLEY MDP LINE E - PROJECT FRONTAGE FLOOD CONTROL FACILITY
T3 Q100=1,110 CFS; A PROPOSED BOX CULVERT DIMENSION 1-14'(W)X7'(H)
SO   1000.0001447.780  1                          1454.340
R    1267.0001448.330  1      .013                                .000    .000 0
R    1346.0001448.490  1      .013                             -90.000       -50.000
R    1597.0001449.000  1      .013                                .000    .000 0
R    1676.0001449.160  1      .013                              90.000        50.000
R    2438.0001450.660  1      .013                                .000    .000 0
R    2477.0001450.730  1      .013                              45.000        50.000
R    2478.0001450.740  1      .013                                .000    .000 0
R    2517.0001450.820  1      .013                             -45.000       -50.000
R    2538.0001450.830  1      .013                                .000    .000 0
SH   2538.0001450.830  1                          1450.830
CD   1  3   0    .000   7.000   14.000  .000  .000   .00
Q          1110.000   .0
```

PROPOSED MDP LINE E SEGMENT
HYDRAULIC ANALYSIS VIA WSPGW

Program Package Serial Number: 7353

WATER SURFACE PROFILE LISTING Date: 1-12-2022 Time: 2:25:20

MCKAY-RAMONA (JN 2010)
PERRIS VALLEY MDP LINE E - PROJECT FRONTAGE FLOOD CONTROL FACILITY
Q100=1,110 CFS; A PROPOSED BOX CULVERT DIMENSION 1-14'(W)X7'(H)

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope				SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
1000.000	1447.780	6.560	1454.340	1110.00	12.09	2.27	1456.61	.00	5.80	14.00	7.000	14.000	.00	0 .0
267.000	.0021				.0021	.57	6.56	.83	6.72	.013		.00	.00	BOX
		WARNING - Flow depth near top of box conduit												
1267.000	1448.330	6.644	1454.974	1110.00	11.93	2.21	1457.19	7.00	5.80	14.00	7.000	14.000	.00	0 .0
79.000	.0020				.0021	.17	7.00	.82	6.76	.013		.00	.00	BOX
		WARNING - Flow depth near top of box conduit												
1346.000	1448.490	6.665	1455.155	1110.00	11.90	2.20	1457.35	.00	5.80	14.00	7.000	14.000	.00	0 .0
251.000	.0020				.0021	.52	6.67	.81	6.76	.013		.00	.00	BOX
		WARNING - Flow depth near top of box conduit												
1597.000	1449.000	6.707	1455.707	1110.00	11.82	2.17	1457.88	7.00	5.80	14.00	7.000	14.000	.00	0 .0
79.000	.0020				.0021	.16	7.00	.80	6.76	.013		.00	.00	BOX
		WARNING - Flow depth near top of box conduit												
1676.000	1449.160	6.716	1455.876	1110.00	11.80	2.16	1458.04	.00	5.80	14.00	7.000	14.000	.00	0 .0
762.000	.0020				.0020	1.51	6.72	.80	6.84	.013		.00	.00	BOX
		WARNING - Flow depth near top of box conduit												

FILE: MDP_LineE.WSW W S P G W - CIVILDESIGN Version 14.11 PAGE 2

Program Package Serial Number: 7353

WATER SURFACE PROFILE LISTING Date: 1-12-2022 Time: 2:25:20

MCKAY-RAMONA (JN 2010)
PERRIS VALLEY MDP LINE E - PROJECT FRONTAGE FLOOD CONTROL FACILITY
Q100=1,110 CFS; A PROPOSED BOX CULVERT DIMENSION 1-14'(W)X7'(H)

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope				SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	

```
        |         |       |         |         |               |         |       |       |       |       |       |      |
 2438.000  1450.660    6.824  1457.484   1110.00   11.62    2.10  1459.58    7.00    5.80    14.00    7.000   14.000   .00   0   .0
       -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-     -|-     -|-     |-
   39.000    .0018                                  .0020      .08     7.00     .78    7.00    .013       .00   .00  BOX
                     -------------------- WARNING - Flow depth near top of box conduit --------------------
        |         |       |         |         |               |         |       |       |       |       |       |      |
 2477.000  1450.730    6.842  1457.572   1110.00   11.59    2.09  1459.66     .00    5.80    14.00    7.000   14.000   .00   0   .0
       -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-     -|-     -|-     |-
    1.000    .0100                                  .0020      .00     6.84     .78    3.80    .013       .00   .00  BOX
                     -------------------- WARNING - Flow depth near top of box conduit --------------------
        |         |       |         |         |               |         |       |       |       |       |       |      |
 2478.000  1450.740    6.821  1457.561   1110.00   11.62    2.10  1459.66    7.00    5.80    14.00    7.000   14.000   .00   0   .0
       -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-     -|-     -|-     |-
   39.000    .0021                                  .0020      .08     7.00     .78    6.73    .013       .00   .00  BOX
                     -------------------- WARNING - Flow depth near top of box conduit --------------------
        |         |       |         |         |               |         |       |       |       |       |       |      |
 2517.000  1450.820    6.815  1457.635   1110.00   11.63    2.10  1459.74     .00    5.80    14.00    7.000   14.000   .00   0   .0
       -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-     -|-     -|-     |-
   21.000    .0005                                  .0019      .04     6.81     .79    7.00    .013       .00   .00  BOX
                     -------------------- WARNING - Flow depth near top of box conduit --------------------
```


MCKAY-RAMONA (JN 2010)

PERRIS VALLEY MDP LINE E - PROJECT FRONTAGE FLOOD CONTROL FACILITY

Q100=1,110 CFS; A PROPOSED BOX CULVERT DIMENSION 1-14'(W)X7'(H)

```
**********************************************************************************************************************
        | Invert  |  Depth |  Water  |    Q    |  Vel     Vel  |  Energy | Super |Critical|Flow Top|Height/|Base Wt|      |No Wth
 Station |  Elev   |  (FT)  |  Elev   |  (CFS)  | (FPS)    Head |  Grd.El.|  Elev | Depth  | Width  |Dia.-FT|or I.D.|  ZL  |Prs/Pip
       -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-     -|-     -|-    -|
 L/Elem  |Ch Slope |        |         |         SF Ave|    HF   |SE Dpth|Froude N|Norm Dp |  "N"  | X-Fall|  ZR  |Type Ch
*********|*********|********|*********|*********|*******|*******|*********|*******|********|********|*******|*******|***** |*******
        |         |        |         |                 |       |         |       |        |        |       |       |      |
 2538.000  1450.830    6.894  1457.724   1110.00   11.50    2.05  1459.78     .00    5.80    14.00    7.000   14.000   .00   0   .0
       -|-       -|-      -|-       -|-       -|-     -|-     -|-       -|-     -|-      -|-      -|-     -|-     -|-     |-
```

Appendix E

Reference Materials – Relevant Plans (Excerpts)

Includes:

1. Excerpt – Perris Valley MDP Line E Stage 4; PM 37457; Drawing No. 4-1145 (Sheet 2 of 9)
2. Excerpt – City of Perris Storm Drain Improvement Plans Perris Logistic Center DPR-05-0192 Lateral MDP E-11; City File No. P8-821 (Sheet 2A of 6)
3. Excerpt – Perris Valley MDP Line E-3 Stage 1; City File No. P8-1164 (Sheet 3 of 20)
4. Excerpt – City of Perris, California Perris Valley Logistics Center Street Improvement Plan; Parcel Map 36010; City File No. P8-1073 (Sheet 6 of 13)
5. Excerpt – Perris Valley Commercial Center Specific Plan – Preliminary Profile Perris Valley Master Drainage Plan Line E (Sheet 2 of 5)
6. Supporting Capacity Calculations for Existing Headwall "Bubbler" at the southwest corner and Existing Trapezoidal Channel along southerly edge (Informational Purpose Only)

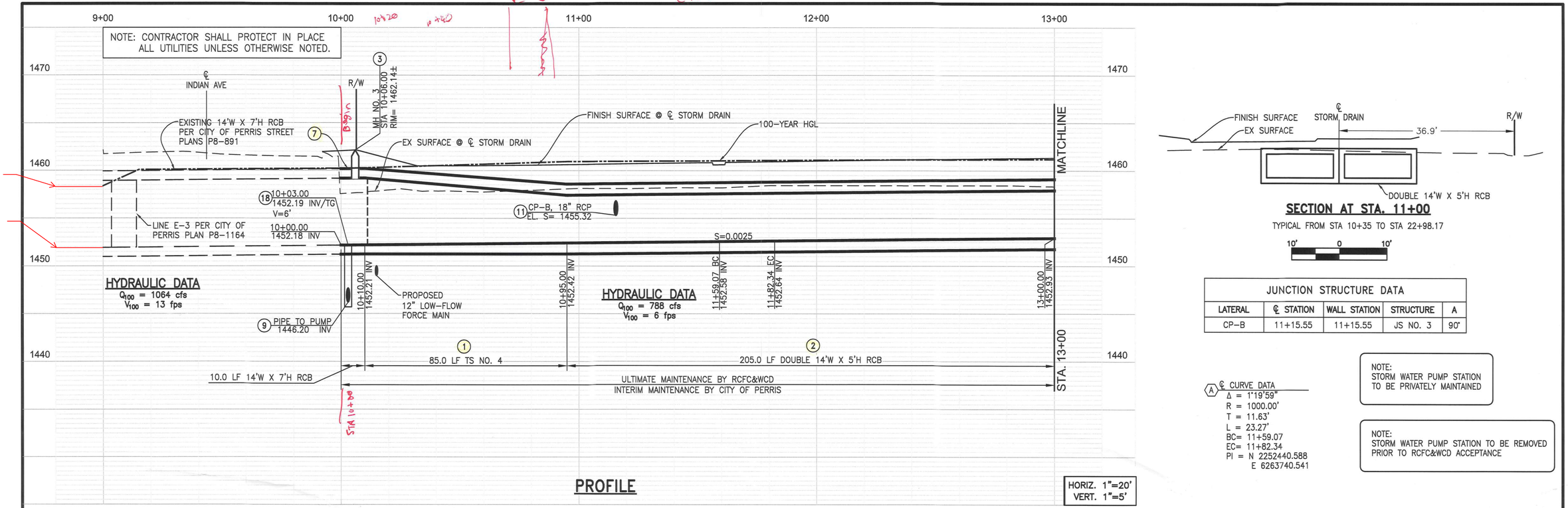
EXCERPT 1

need more vertical line for horizontal x-axis to be clear

NOTE: CONTRACTOR SHALL PROTECT IN PLACE ALL UTILITIES UNLESS OTHERWISE NOTED.

HGL ~1458.3 IMMEDIANTELY DOWNSTREAM OF INDIAN AVE.

INV. ~1452 IMMEDIANTELY DOWNSTREAM OF INDIAN AVE.



PROFILE

HORIZ. 1"=20'
VERT. 1"=5'

SECTION AT STA. 11+00

TYPICAL FROM STA 10+35 TO STA 22+98.17

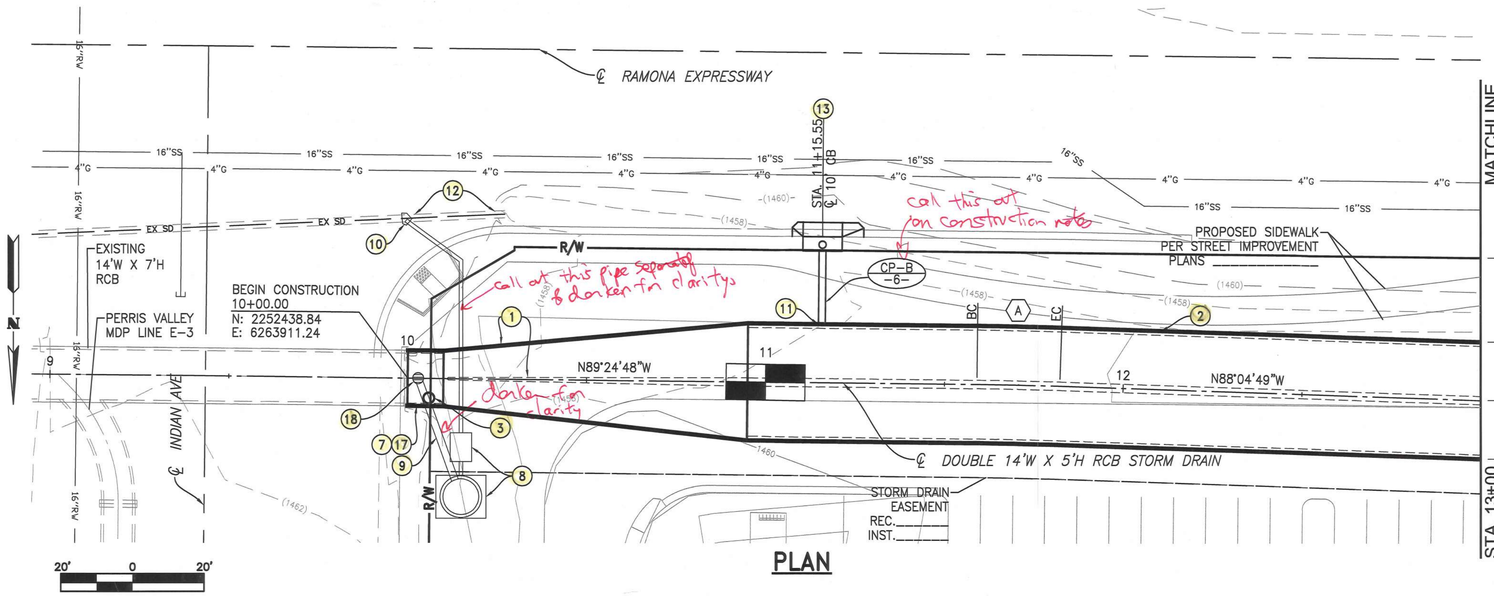
10' 0 10'

JUNCTION STRUCTURE DATA				
LATERAL	℄ STATION	WALL STATION	STRUCTURE	A
CP-B	11+15.55	11+15.55	JS NO. 3	90°

Ⓐ ℄ CURVE DATA
Δ = 1°19'59"
R = 1000.00'
T = 11.63'
L = 23.27'
BC= 11+59.07
EC= 11+82.34
PI = N 2252440.588
E 6263740.541

NOTE:
STORM WATER PUMP STATION TO BE PRIVATELY MAINTAINED

NOTE:
STORM WATER PUMP STATION TO BE REMOVED PRIOR TO RCFC&WCD ACCEPTANCE



PLAN

CONSTRUCTION NOTES

1. CONSTRUCT TRANSITION STRUCTURE NO. 4 PER RCFCWCD STD. DWG. NO. TS304, LINEARLY TAPER PIER WIDTH FROM 8" TO 28"
2. INSTALL DOUBLE 14'W X 5'H PRECAST RCB PER APWA STD. NO. 390-0 AND DETAILS ON SHEET 9
3. CONSTRUCT MANHOLE NO. 3 PER RCFCWCD STD. DWG. NO. MH253
7. CONSTRUCT SINGLE 14'W X 7'H RCB PER CALTRANS STD. PLAN D80, CONNECT TO EXISTING 14'W X 7'H RCB PER TRANSVERSE EXPANSION JOINT DETAIL B ON SHEET 7
8. INSTALL LOW FLOW PUMP LIFT STATION PER DETAILS ON SHEET 8
9. INSTALL 18" RCP, ELEVATIONS PER PLAN
10. CONNECT 12" DUCTILE IRON PIPE FROM PUMP TO EXISTING CULVERT WITH CONCRETE COLLAR PER RCFCWCD STD. DWG. NO. M803
11. CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFCWCD STD. DWG. NO. JS228
12. REMOVE EXISTING HEADWALL AND CULVERT UPSTREAM OF CONCRETE COLLAR CONSTRUCTED THIS PLAN
13. CONSTRUCT LOCAL DEPRESSION AND CATCH BASIN PER RCTD STD. DWG. NO. 300 & 311 AND DETAILS ON SHEET 6
17. REMOVE INTERFEREING EXISTING INLET STRUCTURE UPSTREAM OF EXISTING 7'H X 14'W RCB
18. CONSTRUCT INLET TYPE X PER RCFCWCD STD. DWG. NO. CB108, OMIT OPENINGS AND MATCH GRADE OF PROPOSED RCB

PM 37457

FOR REVIEW ONLY

H:\2019\19-0008\DRAWINGS\PLAN SHEETS\19-0008-SD SHEETS.DWG 3/25/2020 1:17:25 PM

Don't Dig...Until You Call:
U.S.A. Toll Free: 1-800-422-4133 for the location of buried utility lines. Don't disrupt vital services.
TWO WORKING DAYS BEFORE YOU DIG

REGISTERED PROFESSIONAL ENGINEER JOSEPH C. CALDWELL NO. C67239 CIVIL STATE OF CALIFORNIA

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

ENGINEER, RCE C67239 DATE:

DESIGNED BY:	JCC
DRAWN BY:	CCS
DATE:	11/2019
CHECKED BY:	JCC

CITY OF PERRIS
APPROVED BY:
CITY ENGINEER DATE

PERMANENT BENCH MARK
#40Y
SEE TITLE SHEET
EL.= 1496.35 (NAVD88)

REF.	REVISIONS	APPR.	DATE

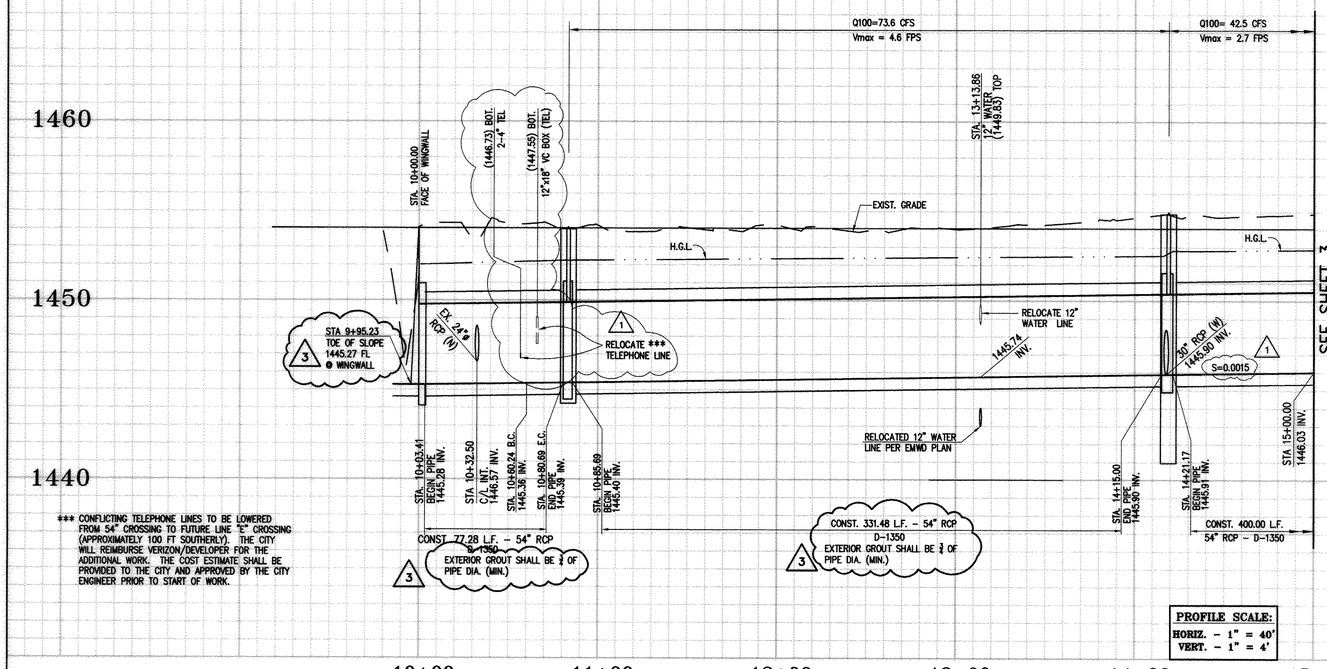
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED FOR APPROVAL: DATE:
APPROVED BY: DATE:

PERRIS VALLEY MDP LINE E STAGE 4

PLAN & PROFILE
STA. 10+00 TO 13+00

PROJECT NO.	4-0-00488
DRAWING NO.	4-1145
SHEET NO.	2 OF 9

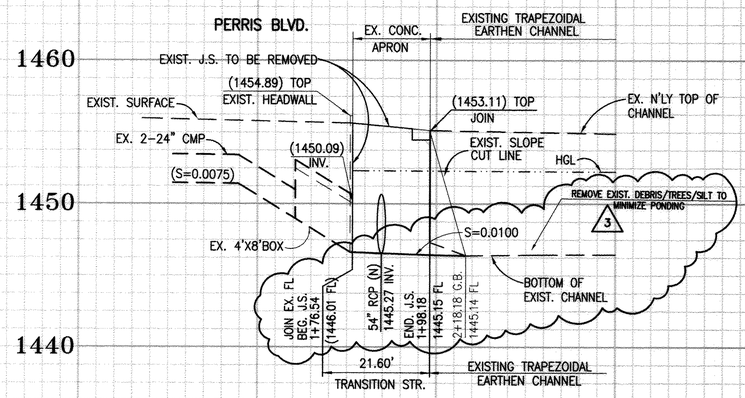
EXCERPT 2



*** CONFLICTING TELEPHONE LINES TO BE LOWERED FROM 54" CROSSING TO FUTURE LINE "E" CROSSING (APPROXIMATELY 100 FT SOUTHERLY). THE CITY WILL REIMBURSE VERIZON/DEVELOPER FOR THE ADDITIONAL WORK. THE COST ESTIMATE SHALL BE PROVIDED TO THE CITY AND APPROVED BY THE CITY ENGINEER PRIOR TO START OF WORK.

PROFILE SCALE:
HORIZ. - 1" = 40'
VERT. - 1" = 4'

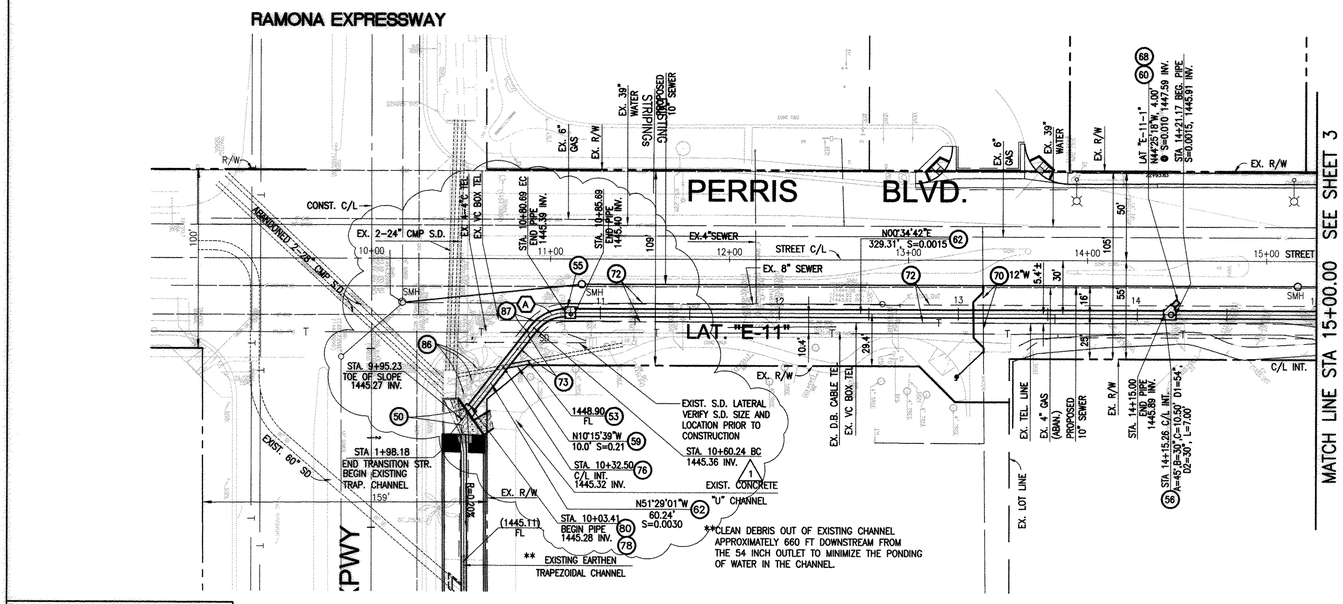
* PROTECT IN PLACE EXISTING UTILITY LINES, FIELD VERIFY EXISTING INVERT ELEV. FOR GAS LINES PRIOR TO CONSTRUCTION, RELOCATE GAS LINES IF REQUIRED. PROVIDE 12" MIN. CLEARANCE BETWEEN PIPES.



TRANSITION STRUCTURE PROFILE

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

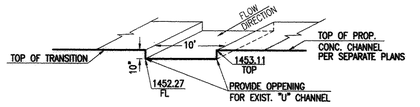
NOTE:
CONTRACTOR SHALL PROTECT IN PLACE ALL UTILITIES CROSSING OR PARALLELING THE CHANNEL UNLESS OTHERWISE NOTED.



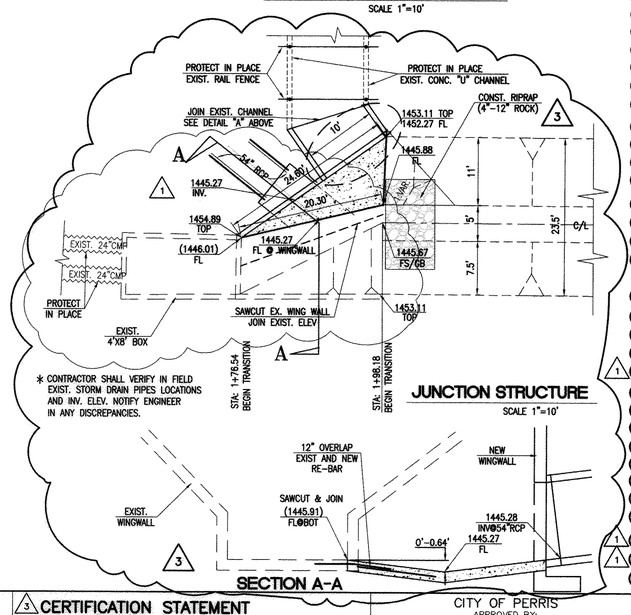
CURVE DATA				
	Δ	R	T	L
A	52°03'43"	22.50'	10.99	20.44

NOTE:
CONTRACTOR TO PROVIDE FULLTIME ACCESS TO ALL INTERSECTIONS AND DRIVEWAYS AND SUBMIT TRAFFIC CONTROL PLANS.

0 20 40 80 120
SCALE:1"=40'



DETAIL "A"
EXIST. "U" CHANNEL SECTION
SCALE 1"=10'



* CONTRACTOR SHALL VERIFY IN FIELD EXIST. STORM DRAIN PIPES LOCATIONS AND INV. ELEV. NOTIFY ENGINEER IN ANY DISCREPANCIES.

JUNCTION STRUCTURE
SCALE 1"=10'

SECTION A-A

STORM DRAIN CONSTRUCTION NOTES

50. REMOVE EXISTING TRANSITION AND JUNCTION STRUCTURE
51. CONSTRUCT CATCH BASIN NO. 1 PER R.C.F.C. & W.C.D. STD. DRAWING CB100, W=7.00'.
52. CONSTRUCT LOCAL DEPRESSION PER R.C.T.D. STD. DRAWING 311, CASE PER PLAN.
53. CONSTRUCT CONCRETE COLLAR PER R.C.F.C. & W.C.D. STD DWG. MB03.
54. CONSTRUCT MANHOLE NO.1 PER R.C.F.C. & W.C.D. STD. DWG. MH251.
55. CONSTRUCT MANHOLE NO.2 PER R.C.F.C. & W.C.D. STD. DWG. MH252.
56. CONSTRUCT MANHOLE NO.4 PER R.C.F.C. & W.C.D. STD. DWG. MH254.
57. INSTALL 48" R.C.P. 1350D.
58. INSTALL 18" R.C.P. CLASS IV.
59. INSTALL 24" R.C.P. CLASS IV.
60. INSTALL 30" R.C.P. 2000D.
61. INSTALL 42" R.C.P. 1350D.
62. INSTALL 54" R.C.P. 1350D.
63. CONSTRUCT SPECIAL CONNECTION TO CATCH BASIN PER R.C.F.C. & W.C.D. STD. DWG. CB109.
64. INSTALL 3 X 10" DUCTILE IRON PIPE.
65. CONSTRUCT TRANSITION STRUCTURE NO.3 PER R.C.F.C. & W.C.D. STD. DWG. TS303.
67. CONSTRUCT FALSE BOTTOM IN CATCH BASIN PER DETAIL ON SHT. NO. 5.
68. CONSTRUCT CONCRETE BULKHEAD AT END OF PIPE PER R.C.F.C. & W.C.D. STD. DWG. MB16.
69. CONSTRUCT HEADWALL PER DETAIL ON SHT. NO. 1.
70. RELOCATED WATER MAIN PER E.M.W.D. PLANS, PIPE SIZE PER PLAN.
71. FIELD VERIFY INVERT ELEV. OF EXISTING 2" GAS LINE, RELOCATE IF REQUIRED.
72. SAWCUT, REMOVE AND REPLACE EXISTING A.C. PAVEMENT WITH 4"MIN. A.C. OVER 12"MIN. A.B. (PER STREET PLANS) CASE 3 PIPE BEDDING PER L.A. COUNTY DPW STD. 3080-2 AND TRENCH BACKFILL CASE 2 PER RIVERSIDE COUNTY ROAD STD. 818.
1 73. REMOVE AND REPLACE EXISTING CONCRETE GUTTER AND SIDEWALK.
74. CONSTRUCT RIPRAP PER DETAIL ON SHT. NO. 1.
75. INSTALL 18" HDPE PIPE.
76. CONSTRUCT JUNCTION STRUCTURE NO.4 PER R.C.F.C. & W.C.D. STD. DWG. JS229.
1 77. REMOVE EXIST. 24" RCP AND CONSTRUCT CONCRETE SEAL PER SPPWC STD. NO. 381-2.
78. CONSTRUCT TRANSITION STRUCTURE PER R.C.F.C. & W.C.D. STD. DWG. CH329
79. CONSTRUCT 24" CMP
80. CONSTRUCT JUNCTION STRUCTURE No.6 PER R.C.F.C. & W.C.D. STD. DWG. JS 231
81. INSTALL 12" R.C.P. CLASS IV.
82. INSTALL 12" HDPE PIPE.
83. INSTALL 36" R.C.P. 1350D.
84. FILL PIPE OR CATCH BASIN WITH CLEAN SAND
85. CONSTRUCT MANHOLE NO. 2 PER R.C.F.C. & W.C.D. STD. DWG. MH252, MODIFIED PER DETAIL ON SHT. NO. 4.
1 86. REMOVE AND RE-PLANT EXISTING PALM TREE
1 87. RELOCATE EXISTING TELEPHONE CONDUIT/BOX PER TELEPHONE COMPANY
88. CONSTRUCT MODIFIED CATCH BASIN NO. 1 PER R.C.F.C. & W.C.D. STD. DRAWING CB100, "W" PER PLAN.

Don't Dig...Until You Call U.S.A. Toll Free
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BENCH MARK
COUNTY OF RIVERSIDE BENCHMARK NO. "M-31"
COUNTY OF RIVERSIDE BENCHMARK - 3 1/4" ALUMINUM DISK MARKED "M-31", LOCATED FLUSH AT THE SOUTH WEST CORNER OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB LOCATED AT THE CROSSING OF PERRIS BLVD. AND RIV. CO. FLOOD CONTROL CHANNEL (PERRIS LATERAL 'E-7') 43FT. WEST OF CENTERLINE OF PERRIS BLVD. AND 4.5 FT. EAST OF CONCRETE BRIDGE BARRIER. (EDGE OF BRIDGE)
ELEVATION = 1474.674' (NGVD '29 / 1996 ADJ.)

REF.	REVISIONS	ENGINEER APPR.	ENGINEER DATE	RCFC/ APPR.	RCFC/ DATE
1	REVISED CONNECTION AT THE CHANNEL, REVISED SLOPE, SUPERSEDED APPROVED S.D. PLANS DATED 8/19/11				
2	MOVED 12" RCP LATERAL MOVED CB AND LAT "E-11-3",SHT 4A 1/27/12				
3	AS-BUILT PLAN 11/29/12 SUPERSEDED APPROVED SD PLANS DATED 10/19/11				

DESIGNED BY: B.W.
DRAWN BY: B.W./E.T.
DATE DRAWN: 03-17-2011

APPROVED BY:
Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173
HAIDOOK AGHAIAN RCE NO. 43293 Date: 2/11/13

REGISTERED PROFESSIONAL ENGINEER HAIDOOK I. AGHAIAN R.C.E. NO. 43293 Exp. 3-31-14 CIVIL STATE OF CALIFORNIA

3 CERTIFICATION STATEMENT
AS-BUILT: THE UNDERSIGNED STATES THAT ALL IMPROVEMENTS SHOWN HEREON HAVE BEEN CONSTRUCTED IN SUBSTANTIAL CONFORMANCE WITH THE DIMENSIONS, LINES, AND ELEVATIONS INDICATED.
HAIDOOK AGHAIAN RCE NO. 43293 DATE: 2/11/13

CITY OF PERRIS APPROVED BY:
CITY ENGINEER DATE:
RECOMMENDED DATE:

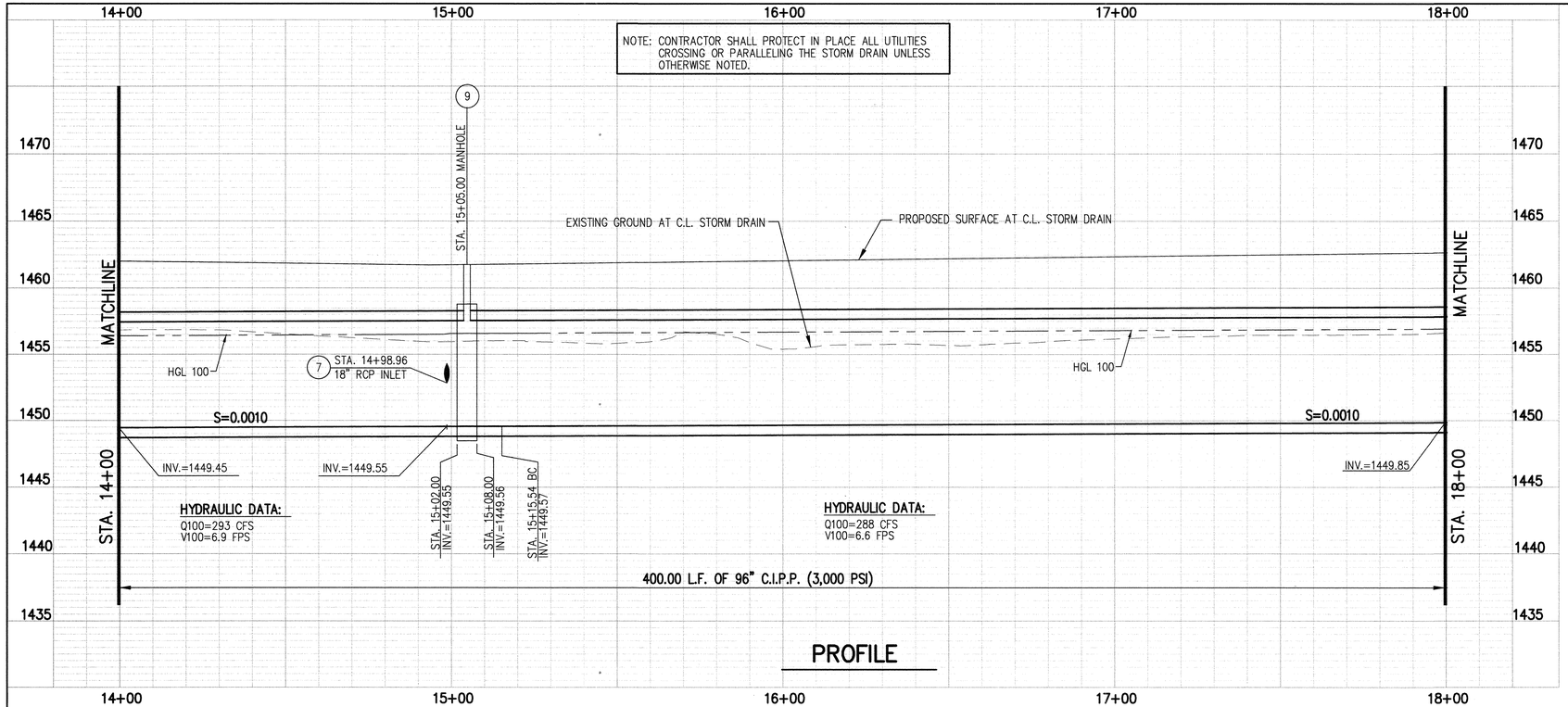
CITY OF PERRIS
STORM DRAIN IMPROVEMENT PLANS
PERRIS LOGISTIC CENTER DPR-05-0192
LATERAL MDP E-11
STA. 10+00.00 TO STA. 15+00.00

FILE NO. P8-821
PROJECT NO. 0-0-0000
DRAWING NO. W-XYZ
SHEET NO. 2A OF 6

Last Update: 11/28/12
L:\2430\2430o\2430C-SD-02-EX-CH.dwg

EXCERPT 3

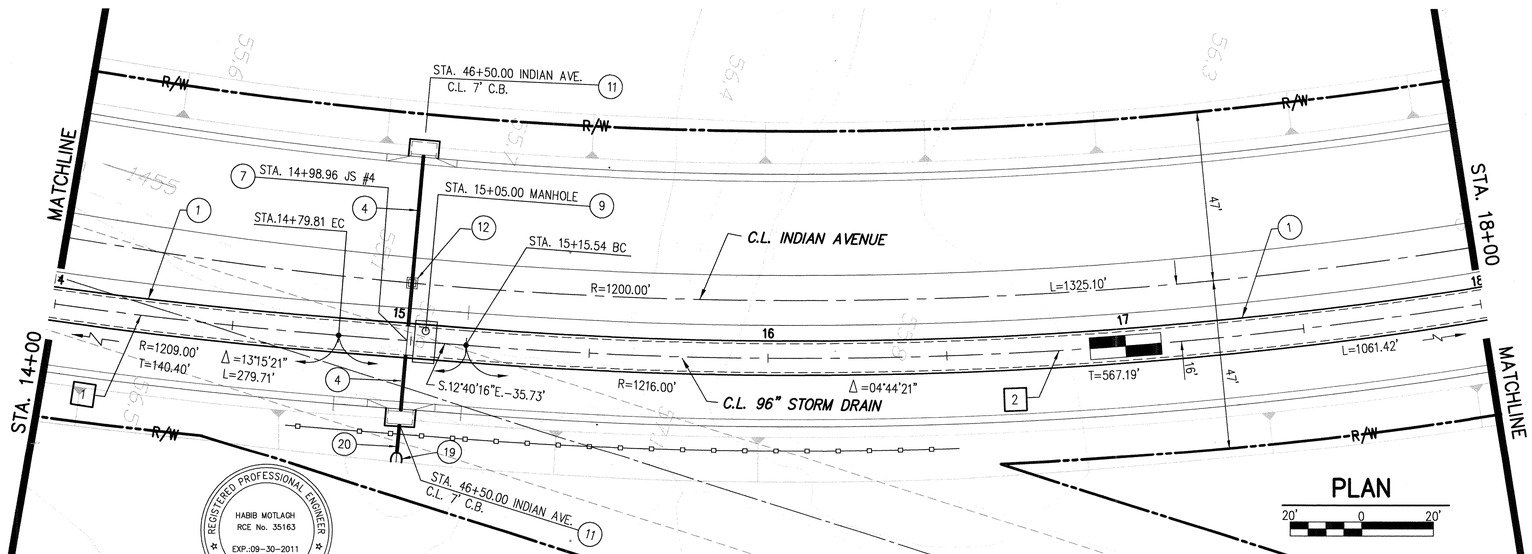
NOTE: CONTRACTOR SHALL PROTECT IN PLACE ALL UTILITIES CROSSING OR PARALLELING THE STORM DRAIN UNLESS OTHERWISE NOTED.



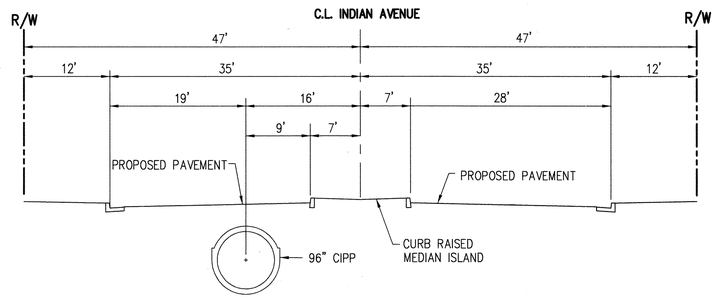
PROFILE

CONSTRUCTION NOTES:

1. CONSTRUCT 96" CONCRETE CAST-IN-PLACE PIPE (PIPE STRENGTH SHOWN ON PROFILE).
2. CONSTRUCT 84" CONCRETE CAST-IN-PLACE PIPE (PIPE STRENGTH SHOWN ON PROFILE).
3. CONSTRUCT 72" CONCRETE CAST-IN-PLACE PIPE (PIPE STRENGTH SHOWN ON PROFILE).
4. CONSTRUCT 18" R.C.P. (D-LOAD SHOWN ON PROFILE).
5. CONSTRUCT 36" R.C.P. (D-LOAD SHOWN ON PROFILE).
6. CONSTRUCT TRANSITION STRUCTURE NO. 1 PER RCFC STD. DWG. TS301.
7. CONSTRUCT JUNCTION STRUCTURE NO. 4 PER RCFC STD. DWG. JS229.
8. CONSTRUCT MANHOLE NO. 4 PER RCFC STD. DWG. MH254 (SEE PLAN FOR VALUES).
9. CONSTRUCT MANHOLE FOR C.I.P.P. PER DETAIL "D" ON SHEET 20.
10. CONSTRUCT JUNCTION STRUCTURE PER DETAIL "A" ON SHEET 20.
11. CONSTRUCT CATCH BASIN NO. 1 PER RCFC STD. DWG. CB100.
12. CONSTRUCT 24"X24"X24" DEEP GRATED INLET WITH 12" VERTICAL PVC PIPE (SDR35).
13. CONSTRUCT CONCRETE BULKHEAD PER RCFC STD. DWG. M816.
14. EXISTING WATERLINE (SIZE NOTED ON PLAN) TO BE RELOCATED TO MISS STORM DRAIN.
15. EXISTING WATERLINE ELEVATION AT STORM DRAIN CROSSING TO BE FIELD VERIFIED PRIOR TO START OF STORM DRAIN CONSTRUCTION. RELOCATE WATERLINE IF THERE IS A CONFLICT WITH THE EXISTING WATERLINE AND THE NEW STORM DRAIN.
16. CONSTRUCT CATCH BASIN OPENING AT BACK OF CATCH BASIN (12"WIDE X 6"HIGH). SEE PROFILE FOR CATCH BASIN OPENING ELEVATION
17. CONSTRUCT INLET TYPE X PER RCFC STD. DWG CB108 (MODIFIED W/ ONE OPENING ONLY).
18. CONSTRUCT M.H. NO. 2 PER RCFC STD. DWG. MH252.
19. CONSTRUCT METAL FLARED END SECTION PER CALTRANS STD. DWG. D94A (TYPE III).
20. CONSTRUCT 18" C.M.P. (14 GA. MINIMUM).
21. CAP END OF EXISTING 8" PVC RAW WATER LINE (PVC CAP).
22. REMOVE EXISTING 8" PVC RAW WATER LINE (SEE PLAN FOR LIMITS). VERIFY LOCATION OF WATER LINE NOTIFY ENGINEER IF THERE IS A CONFLICT (MANHOLE TO BE CENTERERED AT EXISTING).
23. SLURRY BACKFILL PER DETAIL "B" ON SHEET 19.



PLAN



SECTION AT STA. 16+00
TYPICAL FROM STA. 14+00 TO STA. 18+00

10' 0 10'

PLAN 20' 0 20'

STORM DRAIN C.L. CURVE DATA:

1
R=1000.00'
Δ=13°15'21"
T=140.40'
L=279.71'
B.C. STA=12+00.10
E.C. STA=14+79.81

2
R=1216.00'
Δ=04°44'21"
T=567.19'
L=1061.42'
B.C. STA=15+15.54
P.R.C. STA=25+76.96

Underground Service Alert
811
TWO WORKING DAYS BEFORE YOU DIG

CITY OF PERRIS FILE NO.
P8-1164

SEAL
REGISTERED PROFESSIONAL ENGINEER
TERESITO N. TABIOLO
RCE No. 38826
Exp. 3-31-13
CIVIL
STATE OF CALIFORNIA

KCT CONSULTANTS, INC.
Civil Engineers - Surveyors - Planners
P.O. Box 5705 Riverside, CA 92517-5705
4344 Latham St., Suite 200, Riverside, CA 92501
Phone: 951-341-6840 Fax: 951-341-6845
e-mail: kctinc@kctconsultants.com

PREPARED UNDER THE SUPERVISION OF:
TERESITO N. TABIOLO, R.C.E. NO. 38826 DATE 6-10-11

CITY OF PERRIS
ENGINEERING DEPARTMENT
APPROVED BY:
CITY ENGINEER
DATE: RCE

BENCH MARK: Z-6843
1 1/2" BRASS DISK AT INT. OF RAMONA EXPWY. AND PERRIS BOULEVARD.
ELEVATION=1454.258

REF.	REVISIONS	APPR	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

DESIGNED BY:
DRAWN BY:
DATE DRAWN:

RECOMMENDED FOR APPROVAL BY:
CHIEF, DESIGN & CONSTRUCTION
DATE: RCE NO 30539

APPROVED BY:
CHIEF ENGINEER
DATE: RCE NO 32336

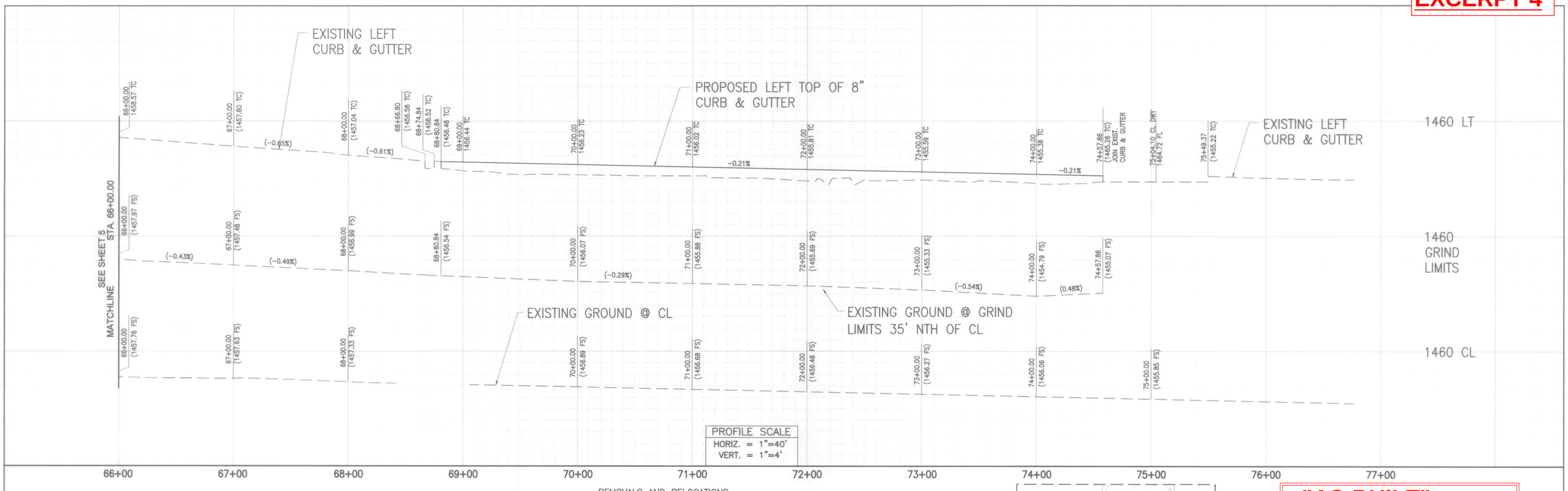
PERRIS VALLEY MDP
LINE E-3
STAGE 1

STA. 14+00 TO STA. 18+00

PROJECT NO.
DRAWING NO.
SHEET NO. 3 OF 20

H:\13861\03 - Indian Avenue\Perris - SD\Engr\Stormdrain\03-sd-indian.dwg
Plot Date: June 10, 2011 - 10:24am | Terry

EXCERPT 4



PROFILE SCALE
HORIZ. = 1"=40'
VERT. = 1"=4'

— PAVEMENT REMOVAL

— NEW A.C. / A.B. SECTION

— A.C. COLD PLANE AND OVERLAY

REMOVALS AND RELOCATIONS

(30) REMOVE EXISTING PAVEMENT

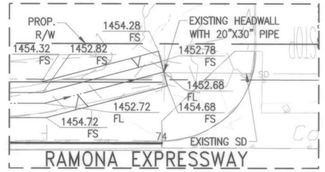
CONSTRUCTION NOTES

(5) CONSTRUCT CONCRETE CURB AND GUTTER TYPE A-8 PER COUNTY OF RIVERSIDE STANDARD NO. 201

(9) CONSTRUCT 0.15' GRIND & AC OVERLAY TO JOIN EXISTING (SEE DETAIL ON SHEET 2)

(10) SAWCUT EXISTING PAVEMENT (SEE DETAIL ON SHEET 2)

(28) INSTALL 6' X 10' LIGHT WEIGHT GROUTED RIP RAP.



RAMONA EXPRESSWAY
DETAIL
SCALE=1"=20'

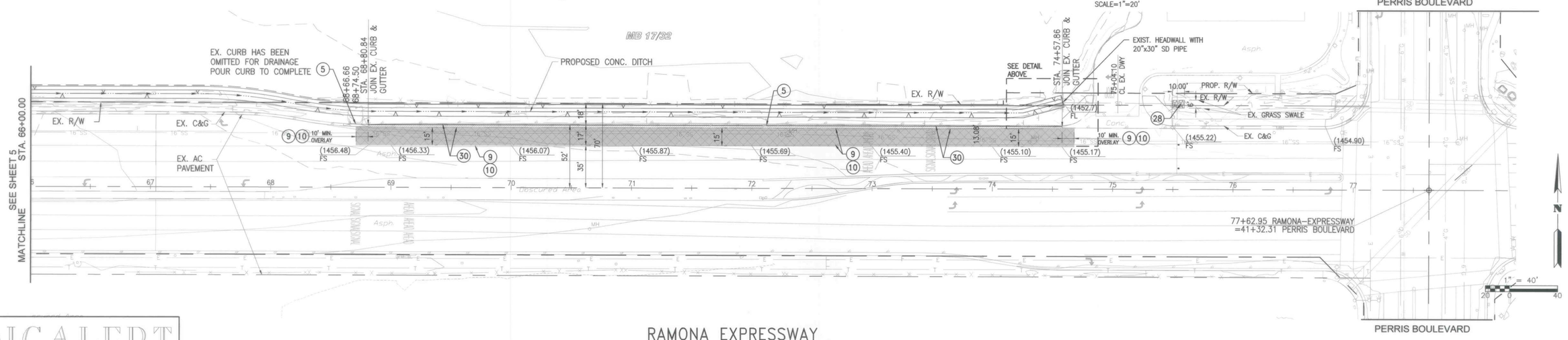
"AS-BUILT" DRAWING

THESE "AS-BUILT" DRAWINGS REFLECT THE ORIGINAL APPROVED DESIGN AND APPROVED REVISIONS THERTO, ALONG WITH ALL FIELD MODIFICATIONS REPORTED BY THE CONTRACTOR

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

SIGNATURE

01/25/2018
DATE



RAMONA EXPRESSWAY

DIGALERT — CALL BEFORE YOU DIG
DIAL BEFORE YOU DIG — TWO WORKING DAYS BEFORE YOU DIG
TOLL FREE 1-800-227-2600
A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

SEAL — ENGINEER

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

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

PREPARED BY:
R.C.E. NO.: 71508
DATE: 1/26/15

MARK	BY	DATE	REVISIONS	APPR.	DATE
				ENGINEER	
				CITY	

CITY OF PERRIS
APPROVED BY:
DATE: 1-28-15
CITY ENGINEER

BASIS OF BEARING:
THE BASIS OF BEARINGS IS THE CENTERLINE OF PERRY STREET, TAKEN AS NORTH 89°53'21" WEST PER PM 213/9-10.

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

PARCEL MAP 36010
CITY OF PERRIS, CALIFORNIA
PERRIS VALLEY LOGISTICS CENTER
STREET IMPROVEMENT PLAN
RAMONA EXPRESSWAY STA. 66+00.00 TO PERRIS BOULEVARD

SHEET NO. 6 OF 13

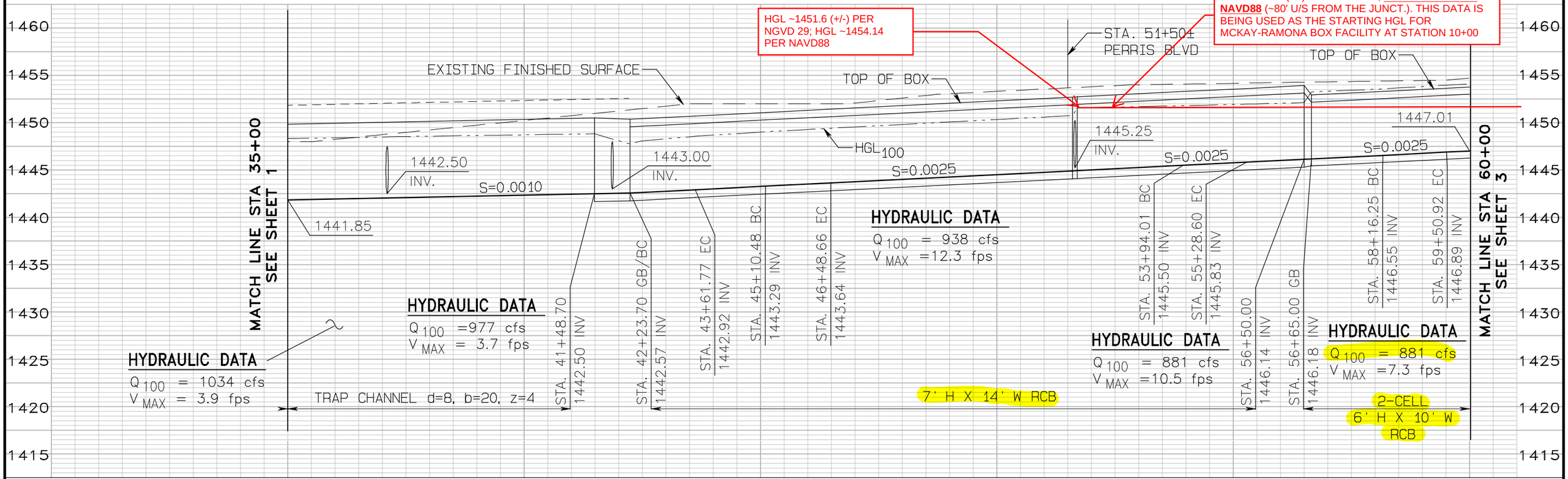
FOR: HOWARD INDUSTRIAL PARTNERS
W.O. 2011-0112
CITY FILE: P8-1073

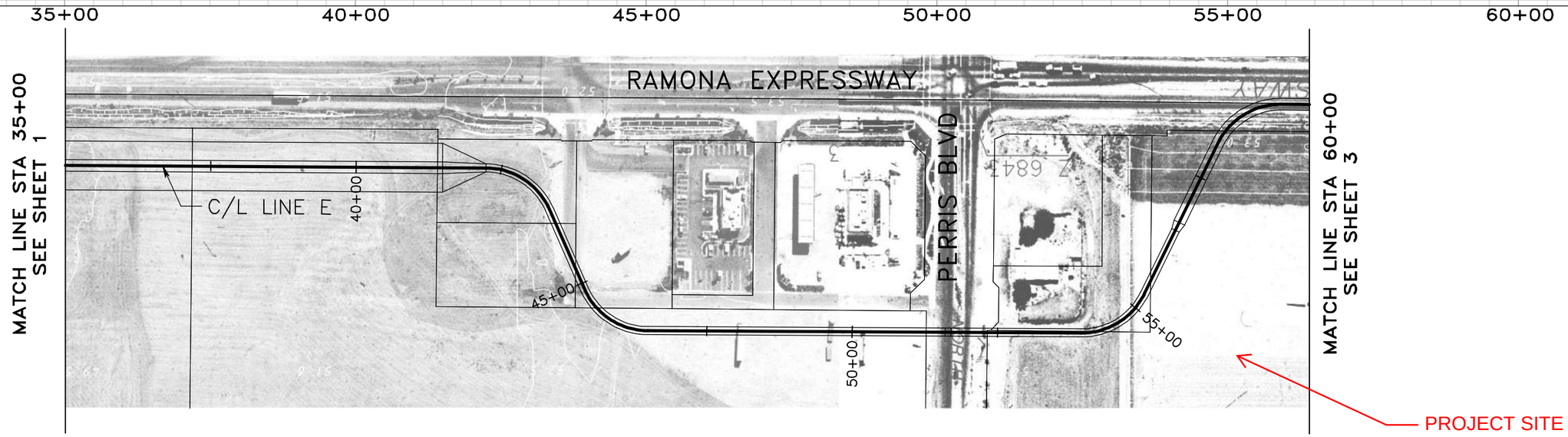
G:\2011\11-0112\DWG & PRO\DESIGN\11-0112-C-ST.DWG 12/22/2014 4:07:26 PM

EXCERPT 5

HGL ~1451.8 (+/-) PER NGVD 29; **HGL ~1454.34 PER NAVD88** (~80' U/S FROM THE JUNCT.). THIS DATA IS BEING USED AS THE STARTING HGL FOR MCKAY-RAMONA BOX FACILITY AT STATION 10+00

HGL ~1451.6 (+/-) PER NGVD 29; HGL ~1454.14 PER NAVD88





PROFILE
HORIZ 1" =200'
VERT 1" = 10'

PLAN 1" = 200'

LEGEND

APN= 300-180-000

GRAPHIC SCALE 1"=200'

0 200 400

VERTICAL DATUM: NGVD 29

UNDERGROUND SERVICE ALERT
CALL: TOLL FREE
1-800
227-2600
TWO WORKING DAYS BEFORE YOU DIG

PERRIS VALLEY COMMERCIAL CENTER SPECIFIC PLAN

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

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

APPROVED BY: DATE:
R.C.E. NO. C44762 EXP. DATE: 3/31/2010

DESIGNED BY: JCC
DRAWN BY: MLA
CHECKED BY: SRH

REVISIONS			
REF.	DESCRIPTION	APPR.	DATE

PRELIMINARY PROFILE
PERRIS VALLEY
MASTER
DRAINAGE PLAN
LINE E
STA 35+00.00 to STA 60+00.00

PROJECT NO.
DRAWING NO.
SHEET NO. 2 OF 5

CALCULATIONS TO DETERMINE THE ALLOWABLE (RETRICTED) FLOW THROUGH THE EXISTING HEADWALL "BUBBLER" OUTLET OPENING AT THE SOUTHWEST CORNER OF THE PROJECT AT THE TERMINUS OF THE EXISTING BOX CULVERT (FROM INDIAN AVENUE)

1-MR_Exist_SouthwestBubbler_AllowableFlow

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.013
Channel Slope	0.002 ft/ft
Normal Depth	32.0 in
Left Side Slope	0.750 H:V
Right Side Slope	0.750 H:V
Bottom Width	8.00 ft

THIS IS THE APPROXIMATE DIMENSION OF THE EXISTING HEADWALL "BUBBLER" OUTLET OPENING AT THE TERMINUS OF THE EXISTING FLOOD CONTROL BOX CULVERT AT THE SOUTHWEST CORNER OF THE SITE (COMING IN FROM INDIAN AVENUE).

Results

Discharge	203.06 cfs
Flow Area	26.7 ft²
Wetted Perimeter	14.7 ft
Hydraulic Radius	21.8 in
Top Width	12.00 ft
Critical Depth	30.0 in
Critical Slope	0.002 ft/ft
Velocity	7.61 ft/s
Velocity Head	0.90 ft
Specific Energy	3.57 ft
Froude Number	0.901
Flow Type	Subcritical

APPROXIMATELY UP TO ~203 CFS OF RESTRICTED FLOW COULD BE ALLOWED. THE FLOW IS CURRENTLY BEING DIRECTED TOWARDS AN EXISTING CHANNEL ALONG THE SOUTHERLY EDGE OF THE PROJECT (WITHIN THE CITY OF PERRIS RIGHT-OF-WAY, NORTH OF RAMONA EXPRESSWAY).

GVF Input Data

Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	32.0 in
Critical Depth	30.0 in
Channel Slope	0.002 ft/ft
Critical Slope	0.002 ft/ft

NORMAL DEPTH CALCULATION FOR THE EXISTING SOUTHERLY CONCRETE TRAPEZOIDAL CHANNEL (WITHIN THE CITY RIGHT-OF-WAY, NORTH OF RAMONA EXPRESSWAY)

2-MR_Exist_SouthTrapChannel_Capacity

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013
Channel Slope	0.002 ft/ft
Left Side Slope	2.000 H:V
Right Side Slope	2.000 H:V
Bottom Width	3.00 ft
Discharge	43.50 cfs

THIS IS THE APPROXIMATE DIMENSION OF THE EXISTING CONCRETE TRAP CHANNEL ALONG THE SOUTHERLY EDGE OF THE PROJECT (WITHIN THE CITY OF RIGHT-OF-WAY, NORTH OF RAMONA EXPRESSWAY).

Results

Normal Depth	18.0 in
Flow Area	9.0 ft²
Wetted Perimeter	9.7 ft
Hydraulic Radius	11.1 in
Top Width	8.98 ft
Critical Depth	16.6 in
Critical Slope	0.003 ft/ft
Velocity	4.85 ft/s
Velocity Head	0.37 ft
Specific Energy	1.86 ft
Froude Number	0.856
Flow Type	Subcritical

FROM THE EXISTING "BUBBLER" OUTLET OPENING AT THE SOUTHWEST CORNER, APPROXIMATELY ~203 CFS COULD BE ALLOWED. IN THE EXISTING CONDITION, THE SOUTHERLY CONCRETE TRAPH CHANNEL MAY RECEIVE THE OFFSITE FLOW THROUGH THIS OUTLET OPENING, A LOW-FLOW FROM THE UPSTREAM MECHANICAL PUMP SYSTEM, AND RUNOFF FROM THE McKAY-RAMONA PROJECT SITE. AS CAN BE SEEN FROM THE NORMAL DEPTH CALCULATION, THE SOUTHERLY EXISTING TRAP CHANNEL CAN ONLY HANDLE APPROXIMATLY ~43 CFS BEFORE THE FLOW STARTS TO OVERTOP THE CHANNEL ONTO THE PROJECT SITE AND SPILLS OUT TO RAMONA EXPRESSWAY.

IN THE POST-PROJECT CONDITION, THE ON-SITE FLOWS WILL BE ROUTED NORTHEASTERLY TO A PROPOSED FLOOD CONTROL FACILITY FOR MITIGATION PURPOSES AND AS SUCH REDUCING (OR POSSIBLY ELIMINATING) THE ON-SITE FLOWS TO THE EXISTING TRAP CHANNEL, HELPING IMPROVE THE EXISTING CHANNEL CAPACITY SITUATION.

GVF Input Data

Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	18.0 in
Critical Depth	16.6 in
Channel Slope	0.002 ft/ft
Critical Slope	0.003 ft/ft