



Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING

PRELIMINARY HYDROLOGY CALCULATIONS

FOR

FIRST MARCH BUILDING 2
NATWAR LANE
PERRIS, CALIFORNIA

PREPARED FOR

FIRST INDUSTRY REALTY TRUST, INC.
898 N. PACIFIC COAST HIGHWAY SUITE 175
EL SEGUNDO, CA 90245
PHONE: (310) 321-3813

MARCH 03, 2021

JOB NO. 3933

PREPARED BY

THIENES ENGINEERING
14349 FIRESTONE BLVD.
LA MIRADA, CALIFORNIA 90638
PHONE: (714) 521-4811
FAX: (714) 521-4173

**PRELIMINARY HYDROLOGY
CALCULATIONS**

FOR

FIRST MARCH BUILDING 2

PREPARED UNDER
THE SUPERVISION OF

REINHARD STENZEL
R.C.E. 56155
EXP. 12/31/2022

DATE:

INTRODUCTION

A: PROJECT LOCATION

The project site is located on the northeast side of Natwar Lane, west of Western Way, and north of Nandina Drive in the city of Perris, California. Interstate 215 is west of the site. See the following page for a vicinity map.

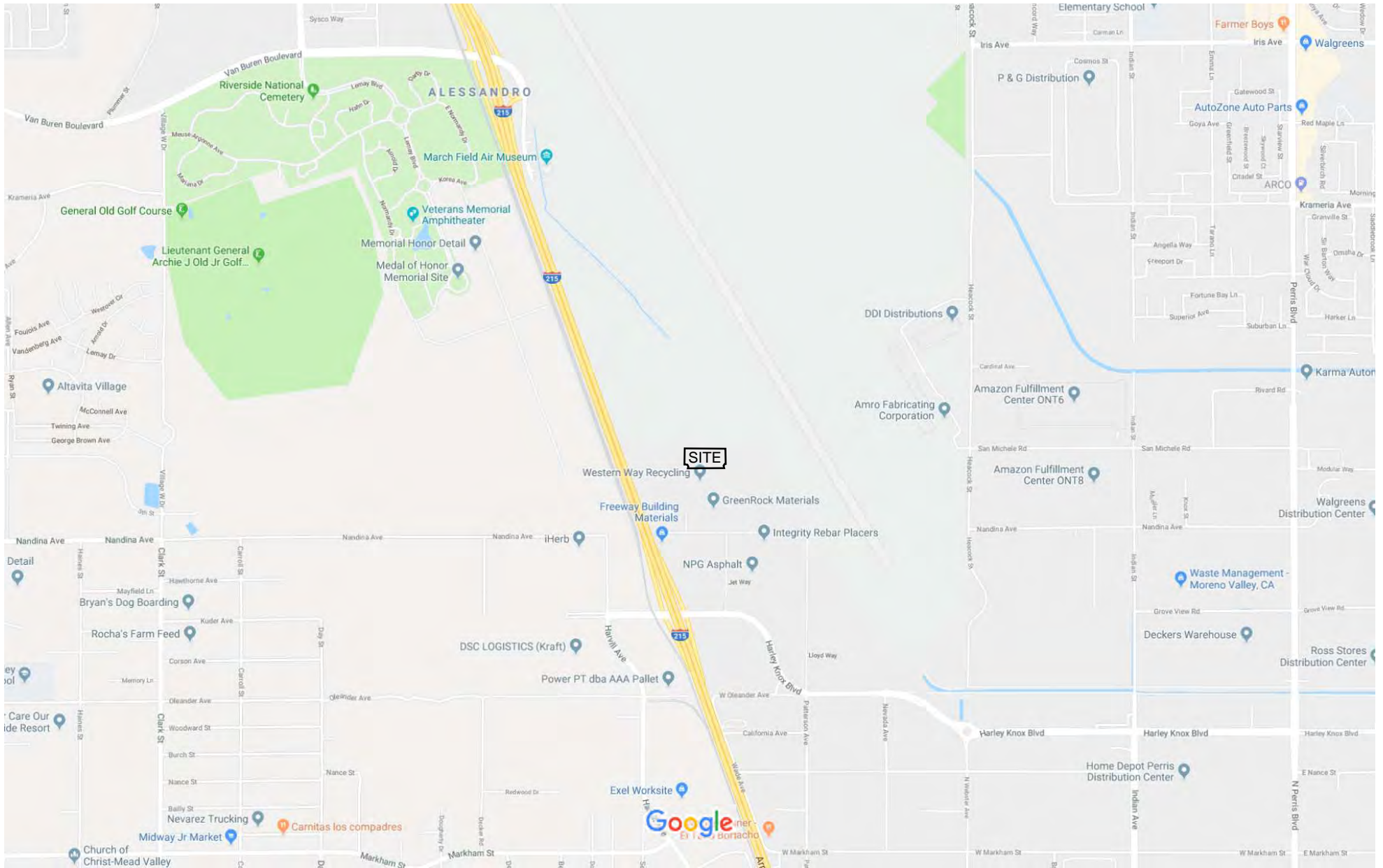
B: STUDY PURPOSE

The purpose of this study is to determine the existing and proposed condition 100-year peak flow rates for the project site that ultimately discharges into a proposed Master Plan storm drain that drains from west to east through the north portion of the site.

C: PROJECT STAFF:

Thienes Engineering staff involved in this study include:

Reinhard Stenzel
Brian Weil
Tony Nuñez



DISCUSSION

The project site encompasses approximately 6.40 acres. Proposed improvements to the site include a single commercial/warehouse type building that is approximately 138,713 square feet. There will be a truck dock and yard area on the southerly side of the building. Vehicle parking areas will be located on the easterly and westerly portions of the project site. There will be landscaped areas adjacent to Western Way and throughout the site.

Existing Condition

Under existing conditions, the site is a vacant lot covered in natural grasses and sparse vegetation. Runoff from the site generally drains from west to east toward Western Way. The existing condition 100-year peak flow rate currently draining to Western Way (nodes 200-201) is approximately 8.4 cfs.

Stormwater from the site will cross Western Way and continue southeasterly via an existing natural drainage course. An existing dirt berm and access road along the westerly property line of the March Air Reserve Base diverts runoff away from the base. Drainage is directed southeasterly to the Nandina Drive and Patterson Avenue intersection. Patterson Avenue is an unimproved dirt road and does not have positive drainage. Flows appear to drain easterly into an existing earthen channel that traverses from north to south through the March Air Reserve Base, east of the project site. The channel ultimately drains southeasterly and discharges to the Perris Valley Storm Channel, Line "B", at Heacock Avenue.

The project site is currently accepting offsite runoff from the property to the west. Flows surface drain from west to east and enter the site at the surface along the westerly property line. The existing condition 100-year peak flow rate from the neighboring property is approximately 9.3 cfs. The westerly property will be improved prior to the development of the project site and runoff will be directed away from the site, to a proposed public storm drain system.

See Appendix "B" for existing condition hydrology calculations and Appendix "C" for an existing condition hydrology map.

Proposed Master Plan Storm Drain

The project site is tabled to Lateral "B-7.2" per the Perris Valley Area Master Drainage Plan Hydrology Map. The upstream end of lateral "B-7.2" is adjacent to the southeast portion of the site and is located in Western Way. Lateral "B-7.2" drains to the south and confluences with Lateral "B-7" in Nandina Avenue. Lateral "B-7" continues easterly in Nandina Avenue, turns southerly in Patterson Avenue, and ultimately discharges to Line "B" in Old Oleander Road (now called Harley Knox Boulevard). The Master Drainage Plan shows that Line "B" conveys drainage, from areas north of the site and west of the

215 Freeway, southerly to Old Oleander Road. These Master Drainage Plan facilities have not been constructed at the time of this report.

K & A Engineering has prepared preliminary plans for a future storm drain system that will convey stormwater from areas to the north, southeasterly past Nandina Avenue. The future reinforced concrete box will parallel the site's northerly property line and continue southeasterly around the easterly property line. The storm drain will be located adjacent to the March Air Reserve Base and within private property. The preliminary plans show Lateral "B-7" connecting to the future storm drain near the Nandina Avenue and Patterson Avenue intersection. The future storm drain construction schedule is unknown.

The Perris Valley MDP Line B storm drain plan by Albert A. Webb Associates (WEBB) proposes a storm drain system that conveys stormwater from an existing 96" RCP near the March Field Air Museum, north of the project site, to the southeast. The storm drain system will temporarily discharge into an existing earthen channel located east of the project site. The proposed storm drain system will ultimately continue southeasterly with the construction of the K & A Engineering future storm drain system or WEBB alternative 2 plan.

The First March Logistics Preliminary Hydrology Calculations report prepared by Thienes Engineering, Inc. shows a proposed public storm drain system that will convey runoff from areas west of the 215 freeway with the development of the westerly neighboring site. The proposed public storm drain system will drain from west to east, through the northerly portion of the site, and ultimately discharge into the K & A Engineering or WEBB alternative 2 future storm drain system.

See Appendix "A" for K & A Engineering, WEBB, and Thienes Engineering, Inc. reference plans.

Proposed Condition Hydrology

Runoff from the westerly parking stalls and drive aisle will surface drain to a catch basin within the northerly portion of the parking lot (nodes 100-101). Flow from the building, truck yard, and southeasterly parking lot will surface drain to catch basins located in the truck yard area (nodes 110-121). A proposed onsite storm drain system, Line A, will convey stormwater from the northwest parking to the south, turn east around the building, and confluence with flows from the building and truck yard. Line A will continue east, turn north around the southeast corner of the building and collect runoff from the northeasterly parking lot that will surface drain to a catch basin on the east side of the building (nodes 130-131). The drive aisle north of the building will surface drain to several catch basins adjacent to the northerly face of the building (nodes 140-171). A proposed storm drain system, Line B, will convey flow to the east and confluence with Line A (at node 172). Line A continues north and ultimately discharges to the proposed public storm drain (at node 173). The proposed condition 100-year peak flow rate for the majority of the project site is approximately 18.8 cfs.

Drainage from the landscaping along the easterly property line and a portion of the driveway will surface drain directly into Western Avenue (nodes 180-181). The proposed condition 100-year peak flow rate from the street adjacent landscaping is approximately 0.9 cfs.

The total proposed condition 100-year peak flow rate from the project site is approximately 19.7 cfs (direct sum of the individual areas).

See Appendix “B” for proposed condition hydrology calculations and Appendix “C” for a proposed condition hydrology map.

Methodology

Riverside County Rational Method Program, by AES Software, was used for the hydrology calculations. The soil type is “B” per the Riverside County Hydrology Manual.

See Appendix “A” for reference material from the Hydrology Manual.

Conclusion

The existing condition 100-year peak flow rate is approximately 8.4 cfs. The proposed improvements will increase the 100-year peak flow to approximately 19.7 cfs. A proposed onsite storm drain system will discharge into a future public storm drain line that will drain from west to east through the northerly portion of the site. This future public storm drain and the downstream master storm drain facilities are designed for a 100-year storm frequency. Runoff from the project site to Western Way and the subsequent easterly properties is decreased from 8.4 cfs to 0.9 cfs. Therefore the proposed improvements will not negatively impact downstream facilities.

APPENDIX

DESCRIPTION

A

REFERENCE MATERIAL

B

HYDROLOGY CALCULATIONS

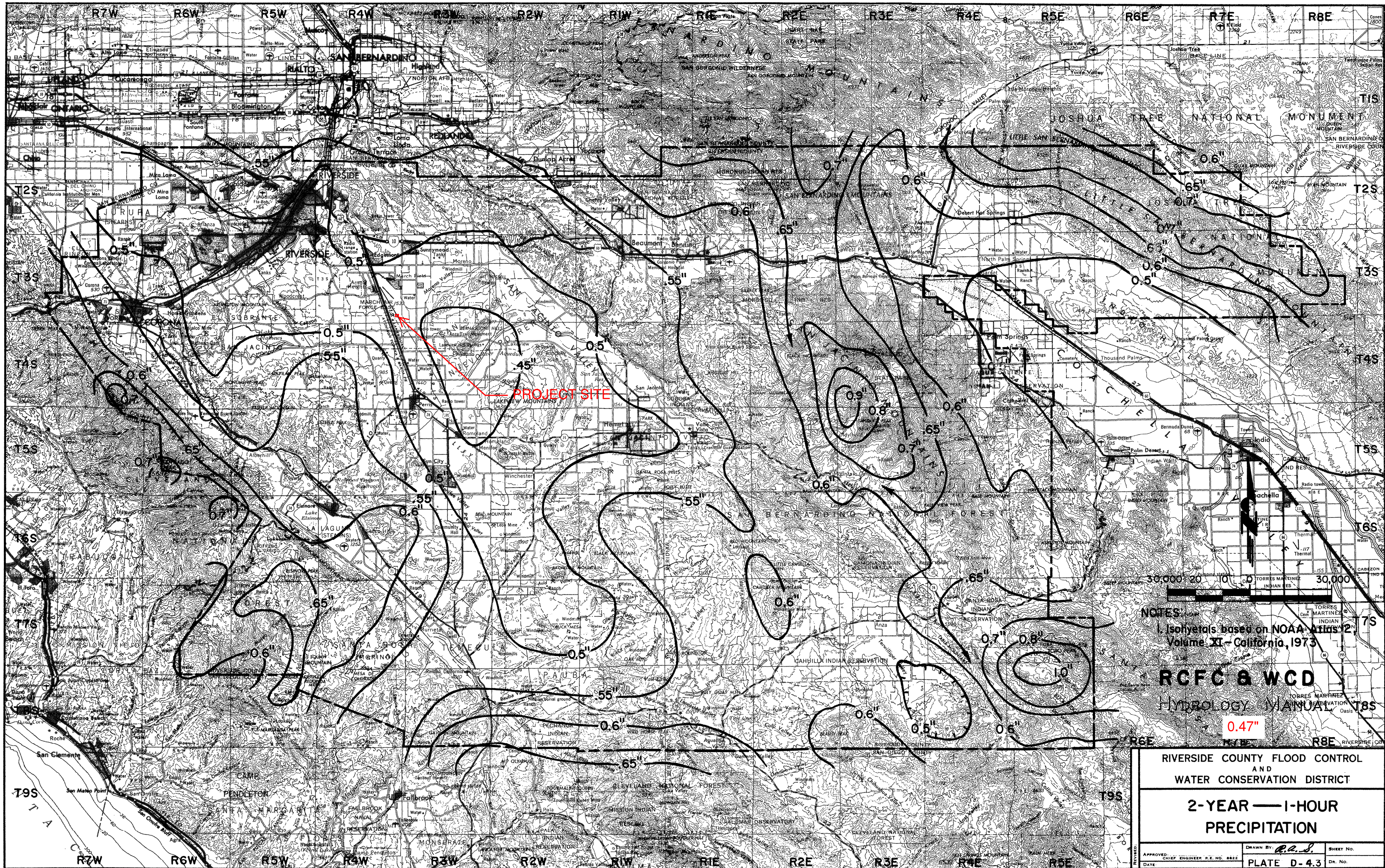
C

HYDROLOGY MAPS

APPENDIX A

REFERENCE MATERIAL

HYDROLOGY MANUAL REFERENCE MATERIAL

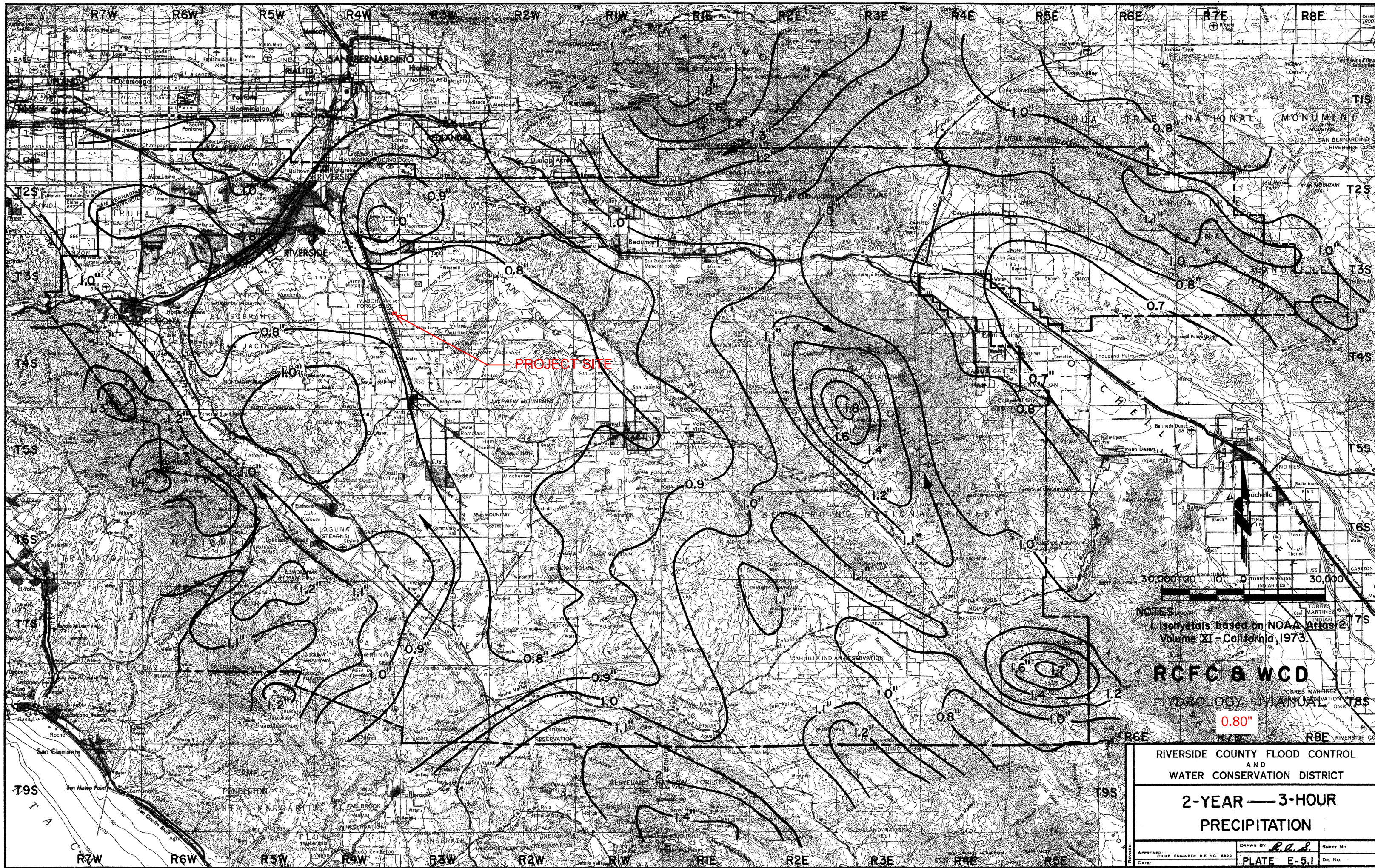


NOTES:
 Isohyets based on NOAA Atlas 2,
 Volume XI - California, 1973

RCFC & WCD
 HYDROLOGY MANUAL

0.47"

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT		
2-YEAR — 1-HOUR PRECIPITATION		
APPROVED	DRAWN BY	SHEET NO.
DATE	CHIEF ENGINEER R.E. NO. 8832	DR. NO.
PLATE D-43		



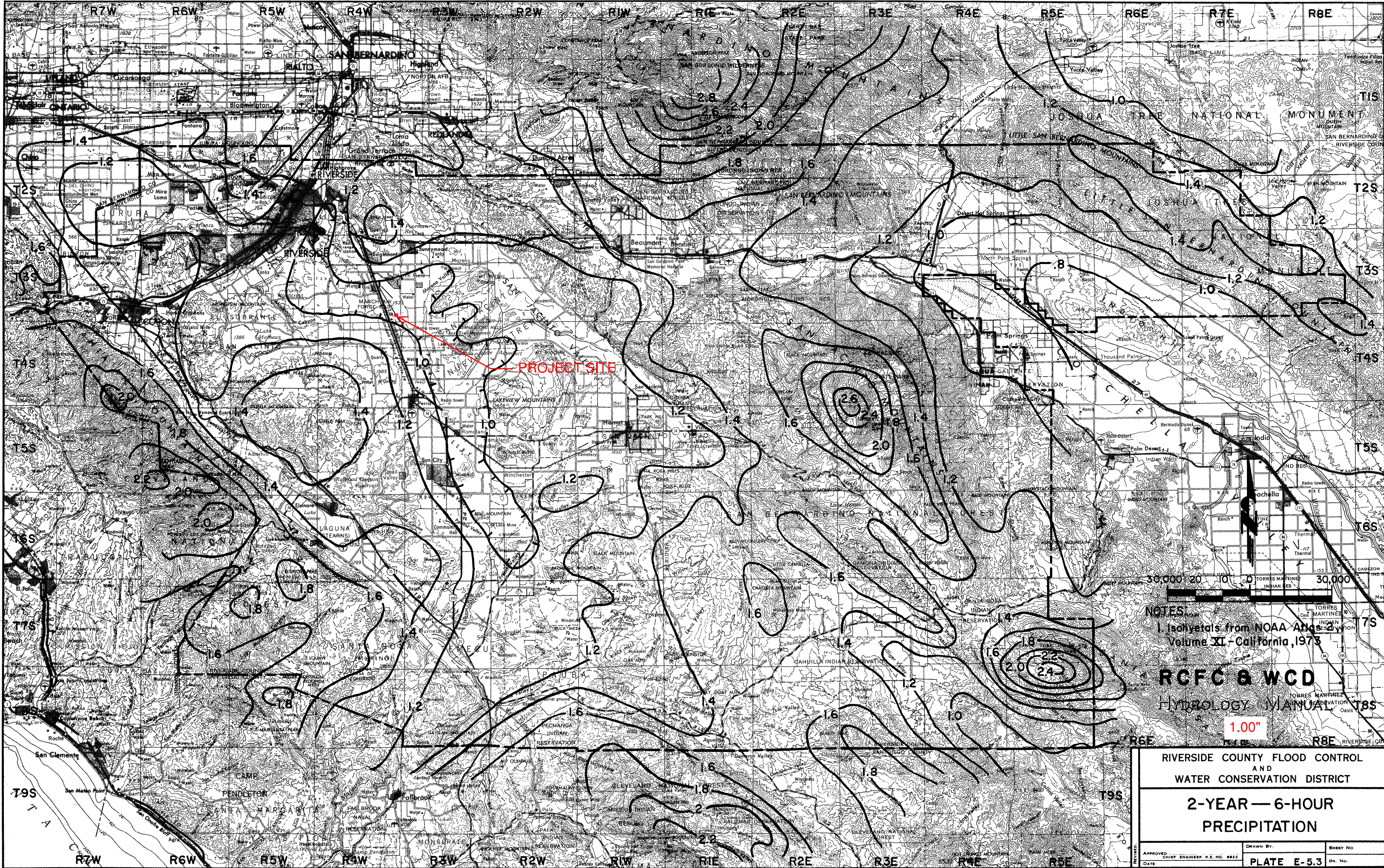
PROJECT SITE

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

RCFC & WCD
 HYDROLOGY MANUAL

0.80"

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT		
2-YEAR — 3-HOUR PRECIPITATION		
APPROVED: _____ CHIEF ENGINEER R.E. NO. 8822	DRAWN BY: <i>R.A.S.</i>	SHEET NO. _____
DATE: _____	PLATE E-5.1	DR. NO. _____



NOTES:
 1. Isohyets from NOAA Atlas 2, Volume XI - California, 1973

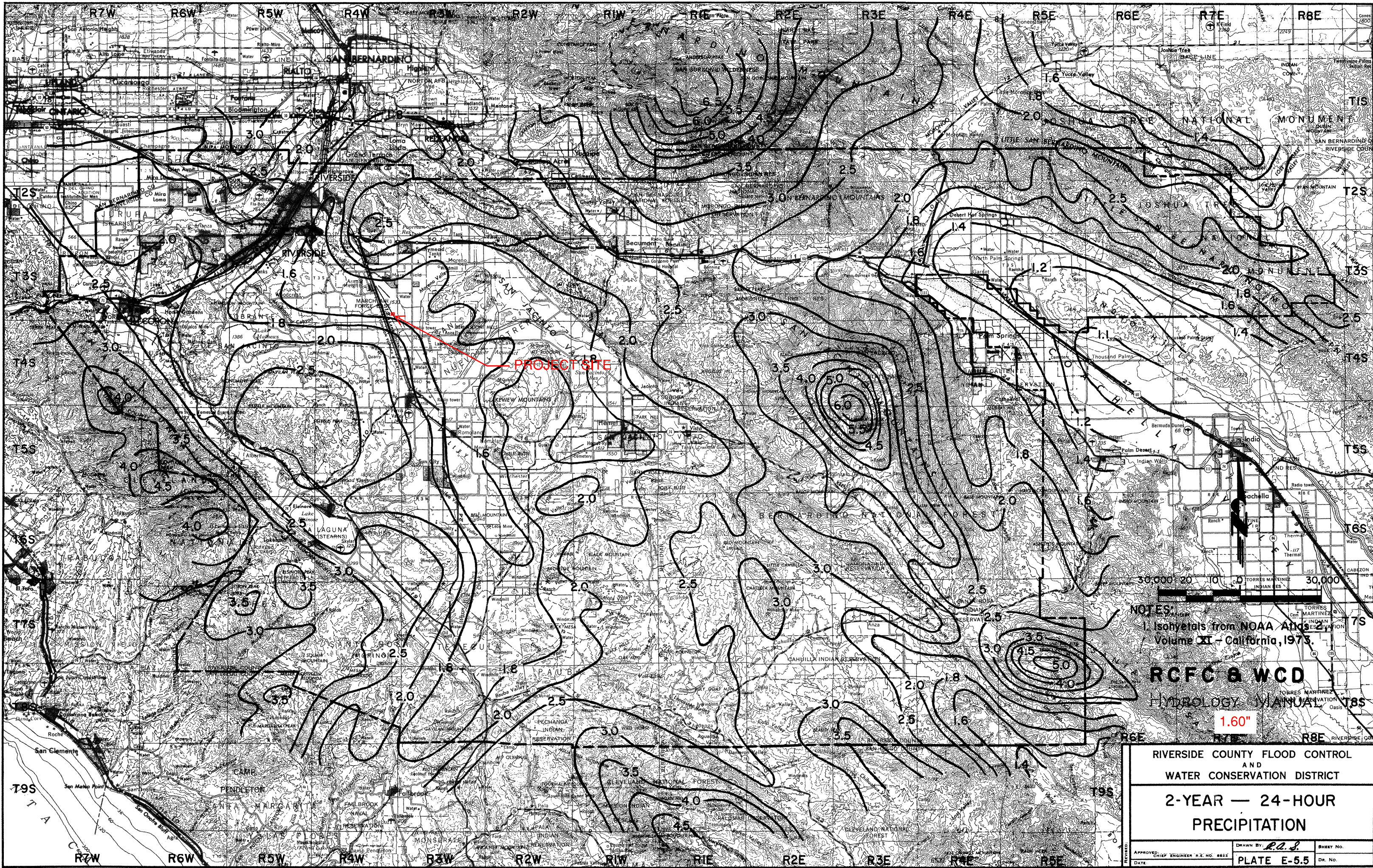
RCFC & WCD
 HYDROLOGY MANUAL

1.00"

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

2-YEAR — 6-HOUR PRECIPITATION

APPROVED: CHIEF ENGINEER R.E. NO. 882	DRAWN BY:	SHEET NO.
DATE:	PLATE E-5.3	DN. NO.

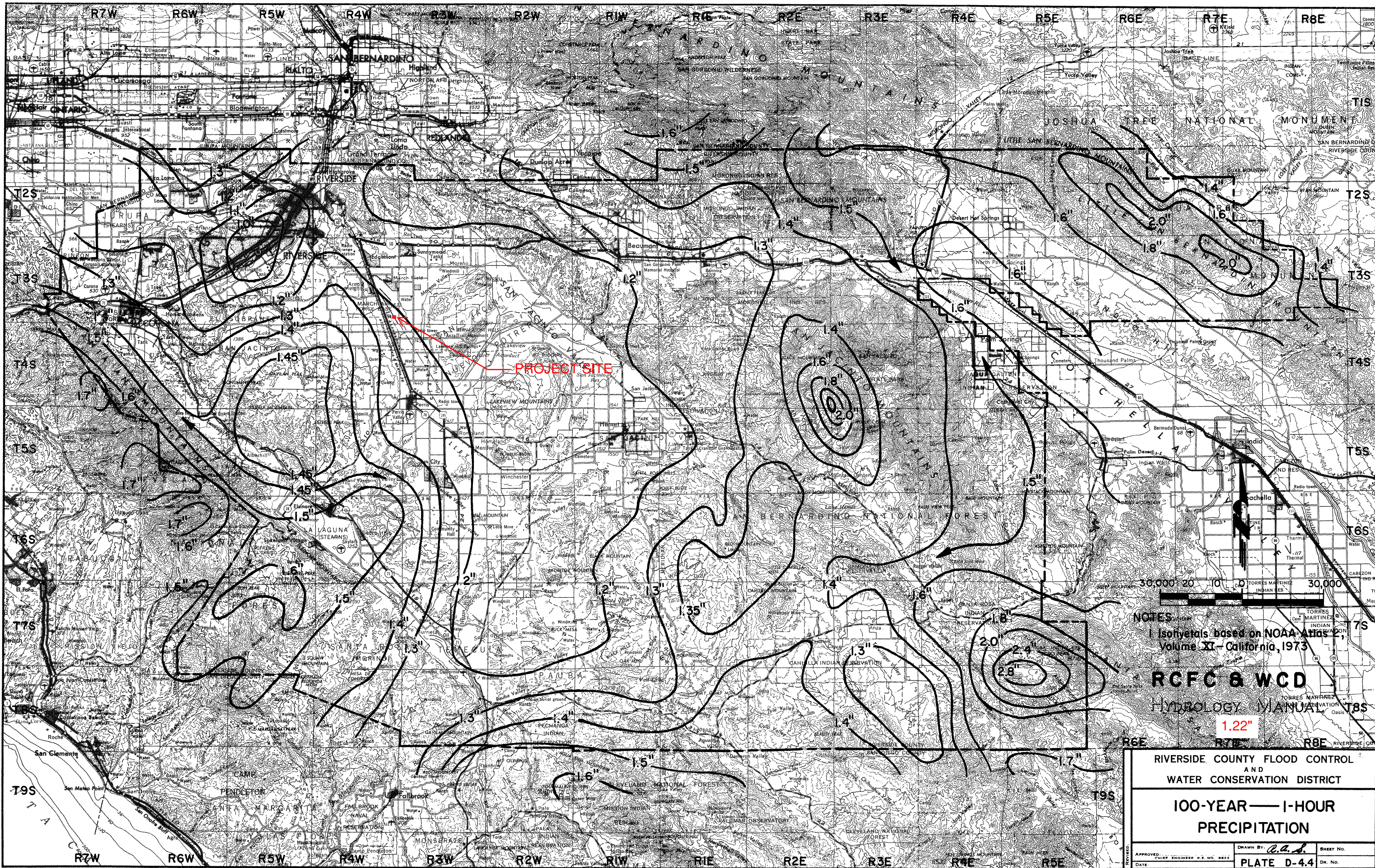


PROJECT SITE

NOTES:
 1. Isohyets from NOAA Atlas 2
 Volume XI - California, 1973.

RCFC & WCD
 HYDROLOGY MANUAL
 1.60"

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT		
2-YEAR — 24-HOUR PRECIPITATION		
APPROVED: <small>CHIEF ENGINEER R.E. NO. 882</small>	DRAWN BY: <i>R.A.S.</i>	SHEET NO.
DATE:	PLATE E-5.5	DR. NO.



NOTES:
 Isohyets based on NOAA Atlas
 Volume XI - California, 1973

RCFC & WCD

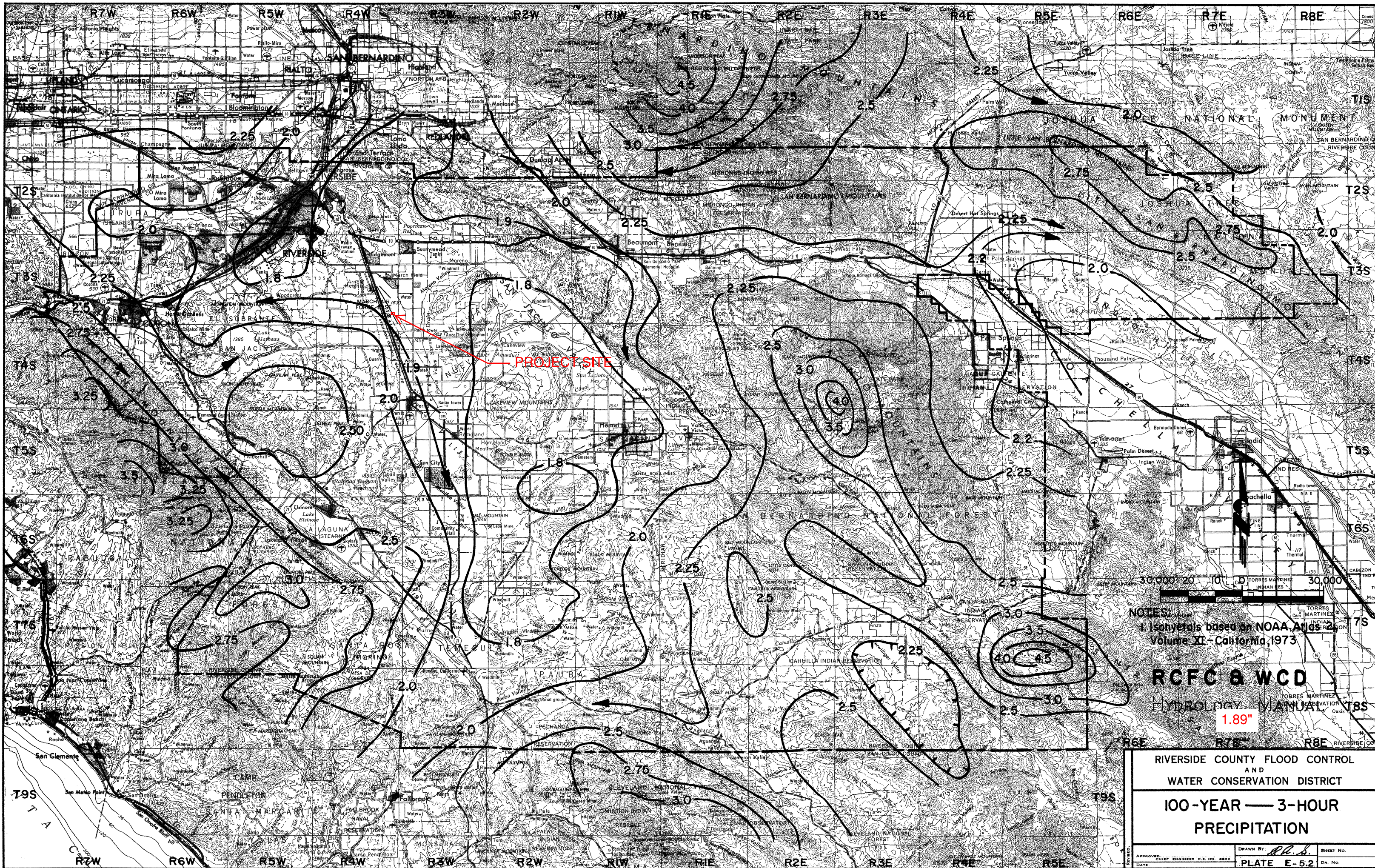
HYDROLOGY MANUAL

1.22"

RIVERSIDE COUNTY FLOOD CONTROL
 AND
 WATER CONSERVATION DISTRICT

**100-YEAR — 1-HOUR
 PRECIPITATION**

APPROVED:	DRAWN BY: <i>C.A.S.</i>	SHEET NO.
DATE:	PLATE D-4.4	Dr. No.

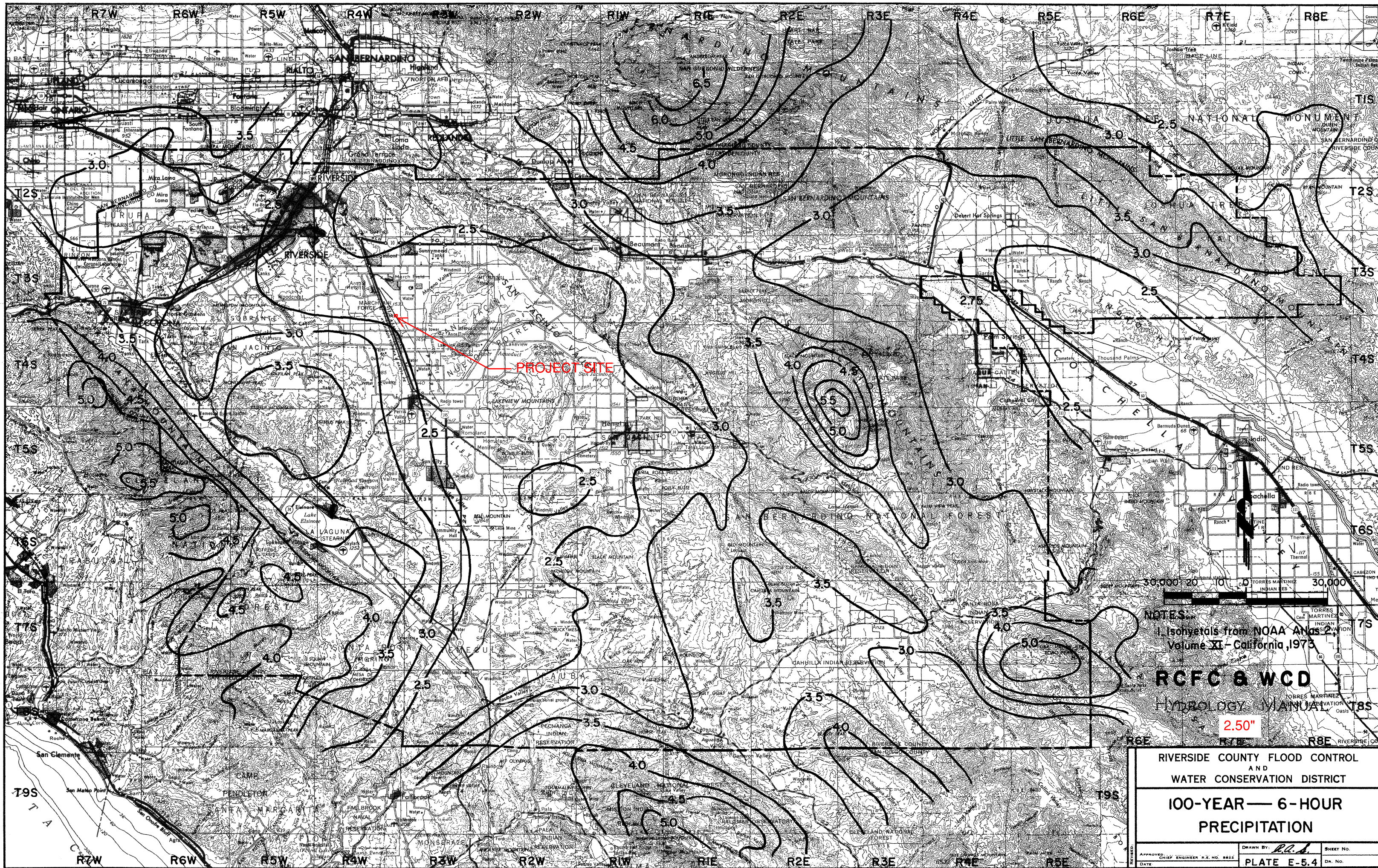


NOTES:
 1. Isohyets based on NOAA Atlas 2
 Volume XI - California, 1973

RCFC & WCD
 HYDROLOGY MANUAL
 1.89"

RIVERSIDE COUNTY FLOOD CONTROL
 AND
 WATER CONSERVATION DISTRICT
**100-YEAR — 3-HOUR
 PRECIPITATION**

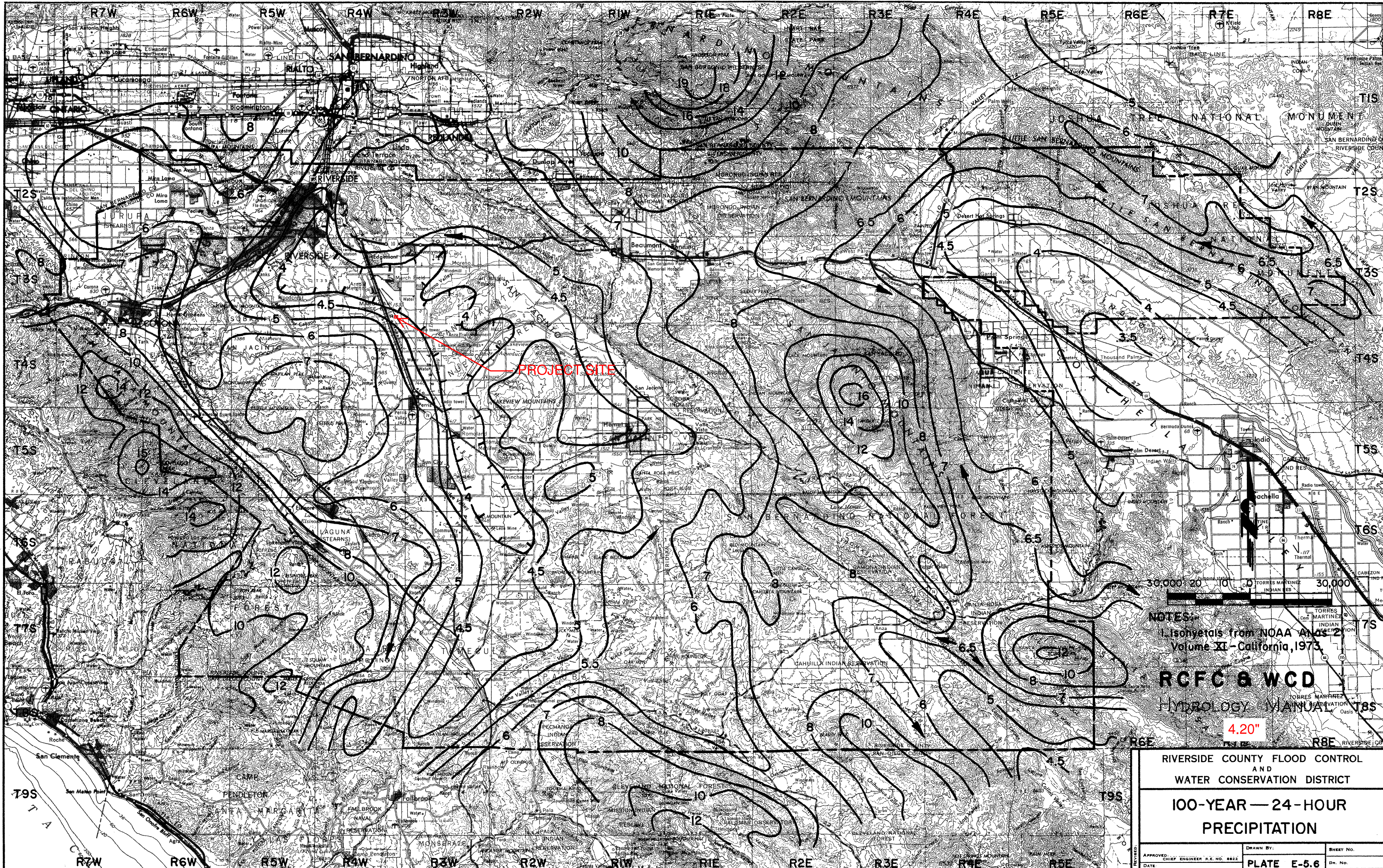
APPROVED: _____
 DATE: _____
 DRAWN BY: *RLB*
 SHEET NO. _____
 PLATE E-5.2
 DR. NO. _____



NOTES:
 Isohyets from NOAA Atlas 2,
 Volume XI - California, 1973

RCFC & WCD
 HYDROLOGY MANUAL
 2.50"

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	
100-YEAR — 6-HOUR PRECIPITATION	
APPROVED: CHIEF ENGINEER P.E. NO. 8822	DRAWN BY: <i>R.A.A.</i>
DATE:	SHEET NO. PLATE E-5.4



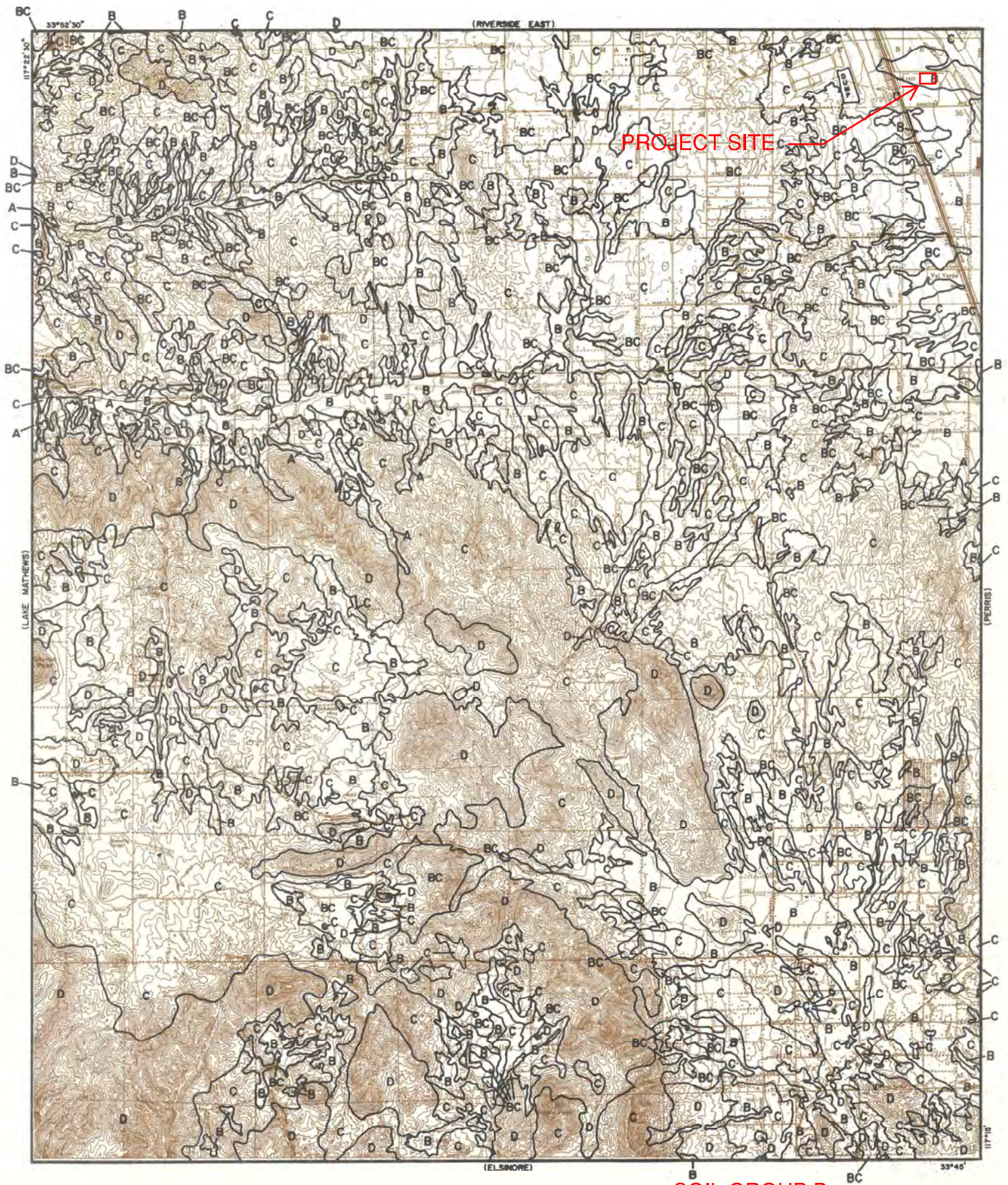
NOTES:
 1. Isohyets from NOAA Atlas 2,
 Volume XI - California, 1973.

RCFC & WCD
 HYDROLOGY MANUAL

4.20"

RIVERSIDE COUNTY FLOOD CONTROL
 AND
 WATER CONSERVATION DISTRICT
**100-YEAR — 24-HOUR
 PRECIPITATION**

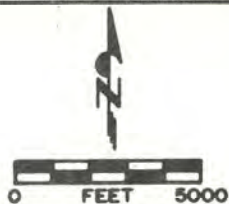
APPROVED: CHIEF ENGINEER R.E. NO. 8822	DRAWN BY:	SHEET NO.
DATE	PLATE E-5.6	DR. NO.



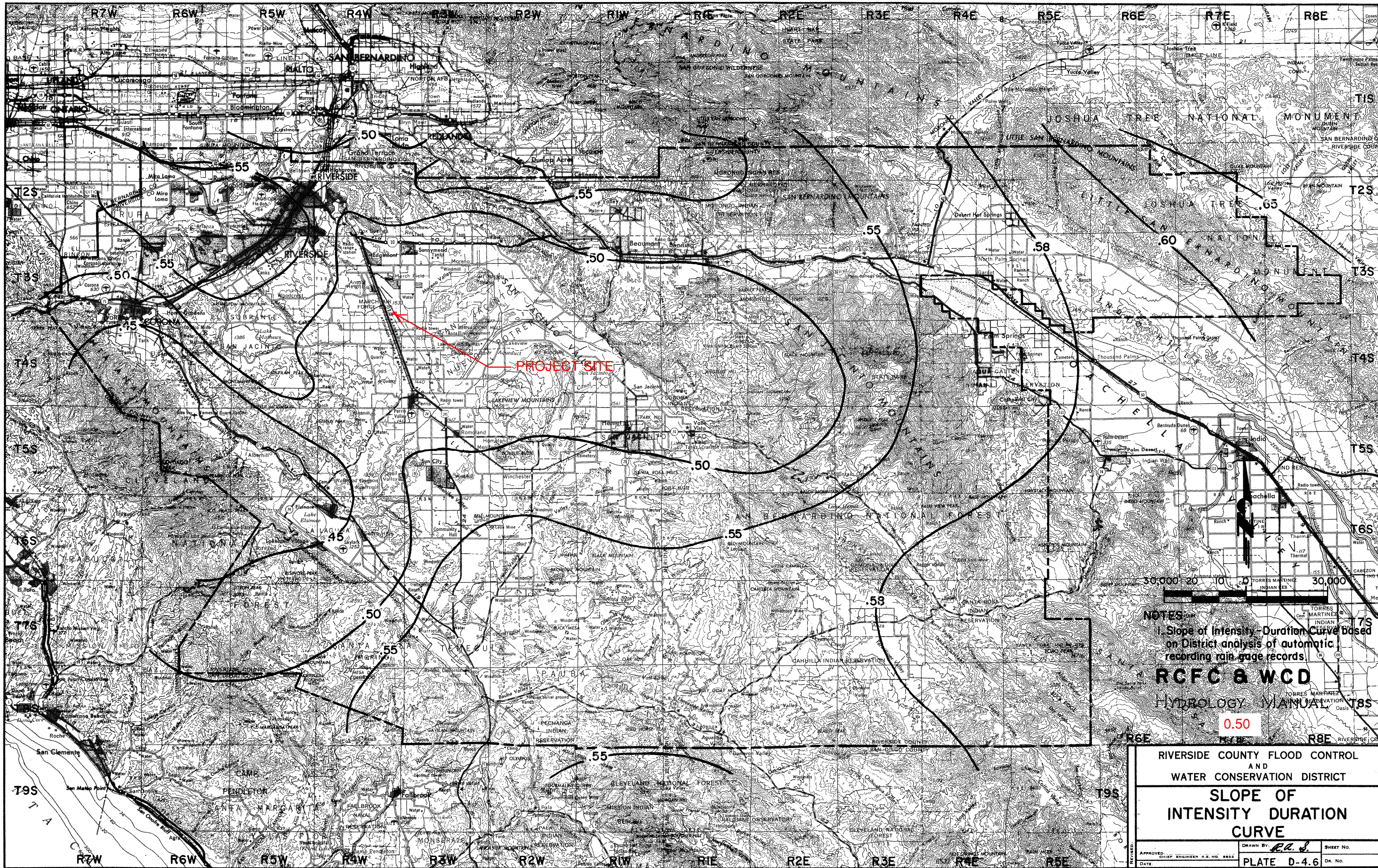
LEGEND

- SOILS GROUP BOUNDARY
- A SOILS GROUP DESIGNATION

RCFC & WCD
HYDROLOGY MANUAL



**HYDROLOGIC SOILS GROUP MAP
FOR
STEELE PEAK**



PROJECT SITE

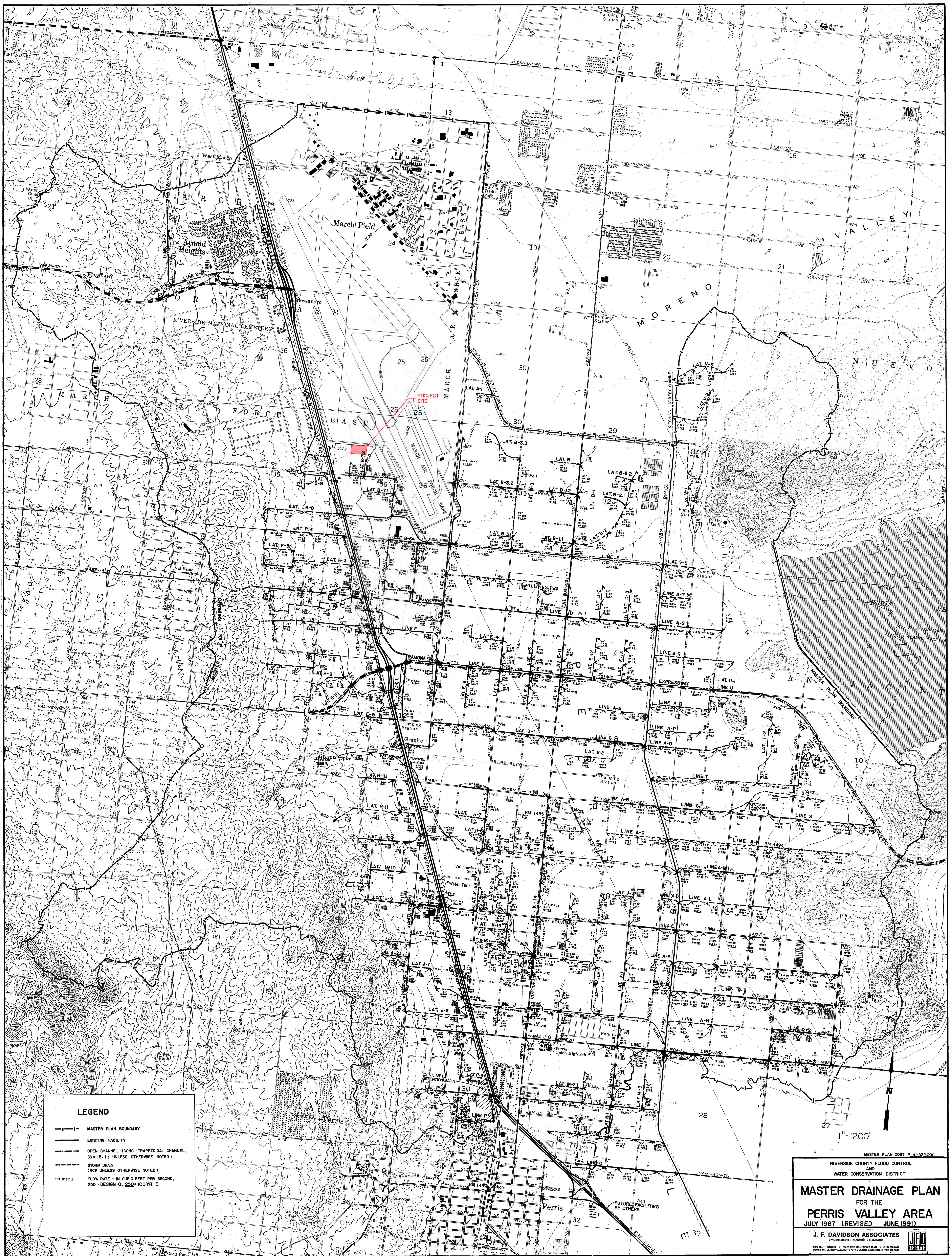
NOTES:
 1. Slope of Intensity-Duration Curve Based on District analysis of automatic recording rain-gage records.

RCFC & WCD
 HYDROLOGY MANUAL

0.50

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT		
SLOPE OF INTENSITY DURATION CURVE		
APPROVED:	DRAWN BY:	SHEET NO.:
DATE:	CHIEF ENGINEER P.E. NO. 8822	PLATE D-4.6
		Dr. No.

PERRIS VALLEY AREA MASTER DRAINAGE PLAN
REFERENCE MATERIAL



LEGEND

- +—+—+— MASTER PLAN BOUNDARY
- EXISTING FACILITY
- OPEN CHANNEL (CONC. TRAPEZOIDAL CHANNEL, SS = 1.5:1, UNLESS OTHERWISE NOTED)
- STORM DRAIN (RCP UNLESS OTHERWISE NOTED)
- 250' x 250' FLOW RATE - IN CUBIC FEET PER SECOND, 250' DESIGN Q, 250' 100 YR. Q

MASTER PLAN COST \$ 1,242,320.00

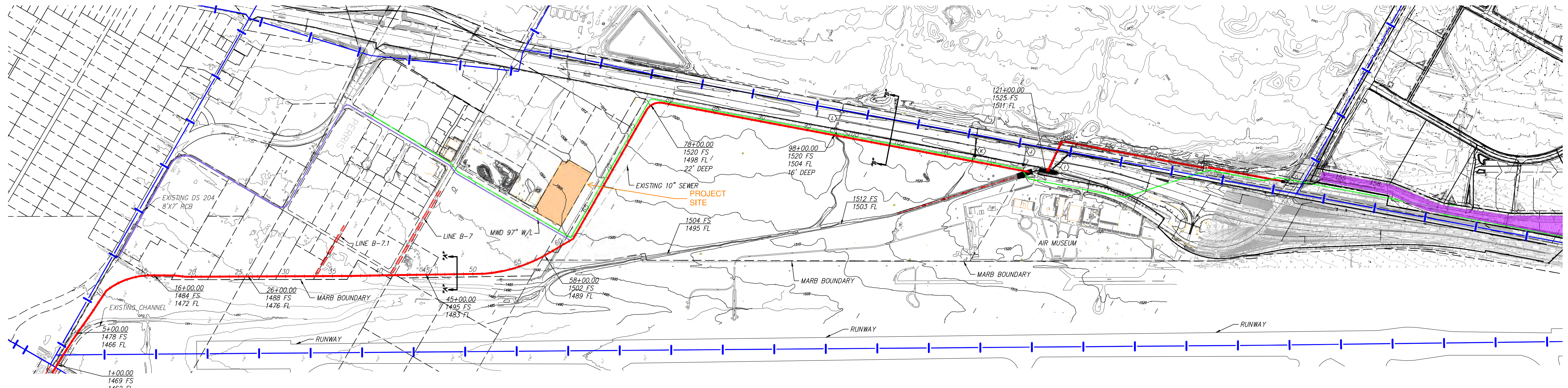
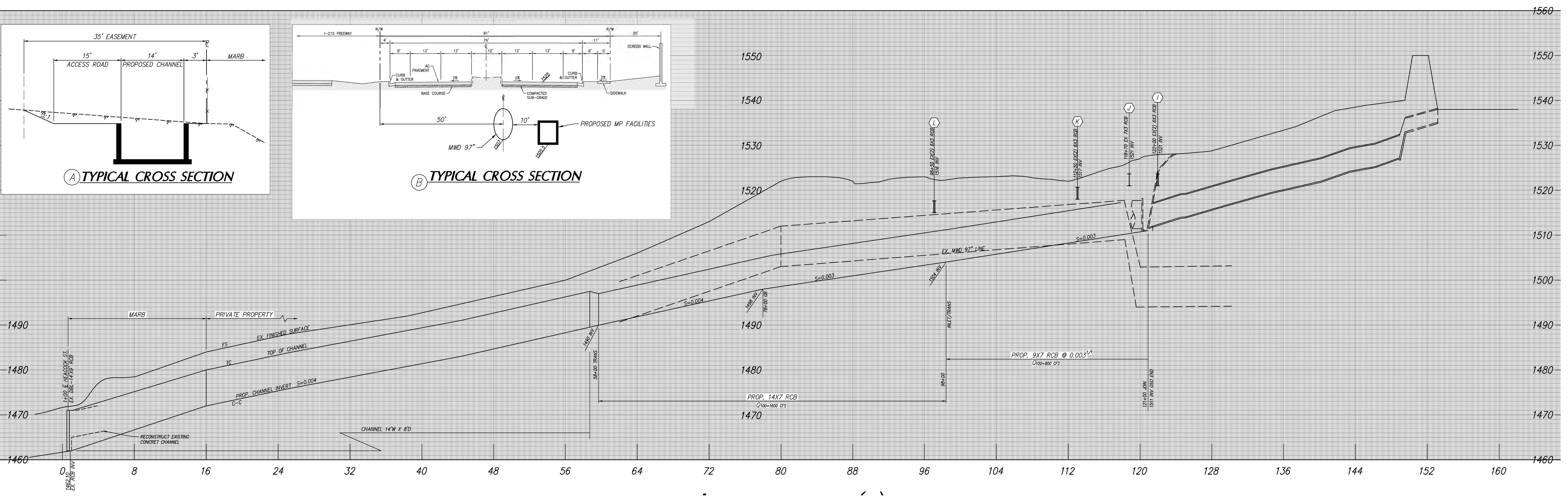
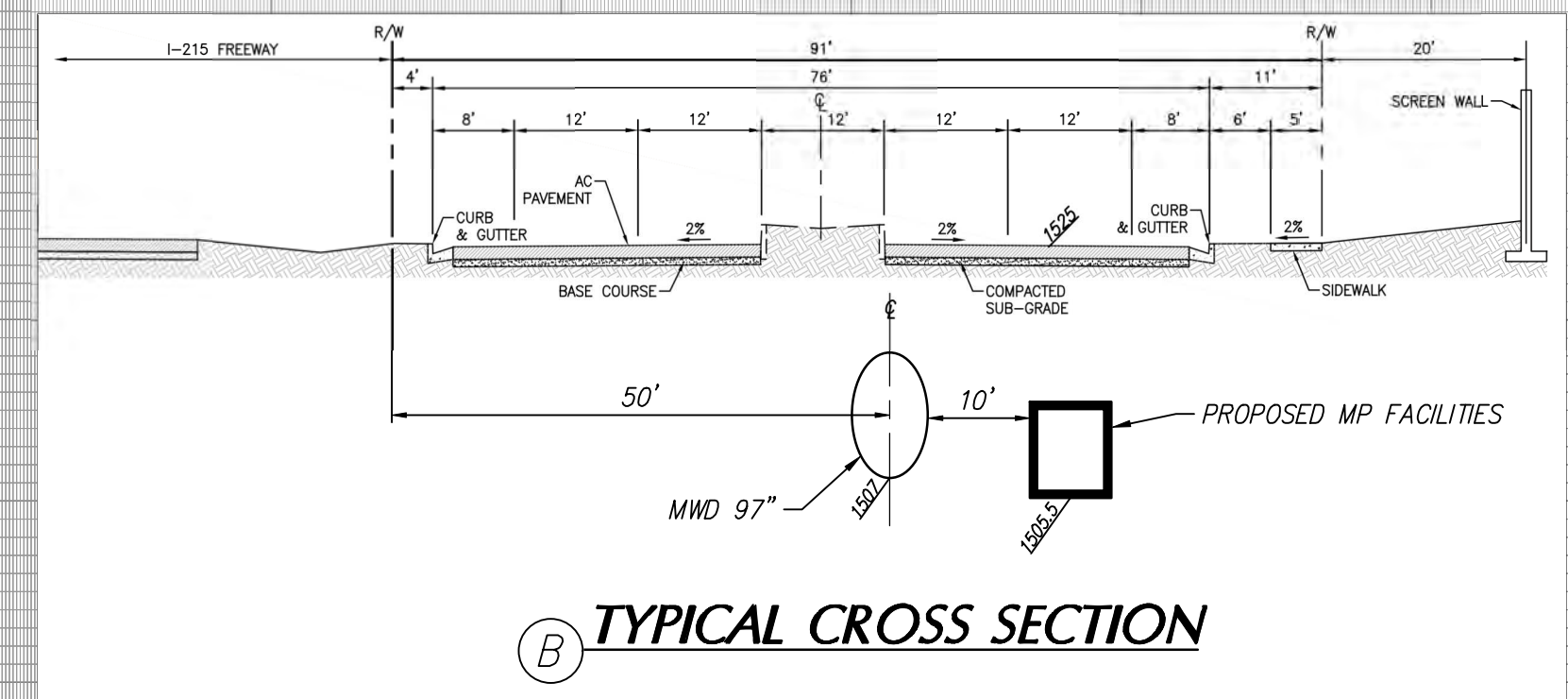
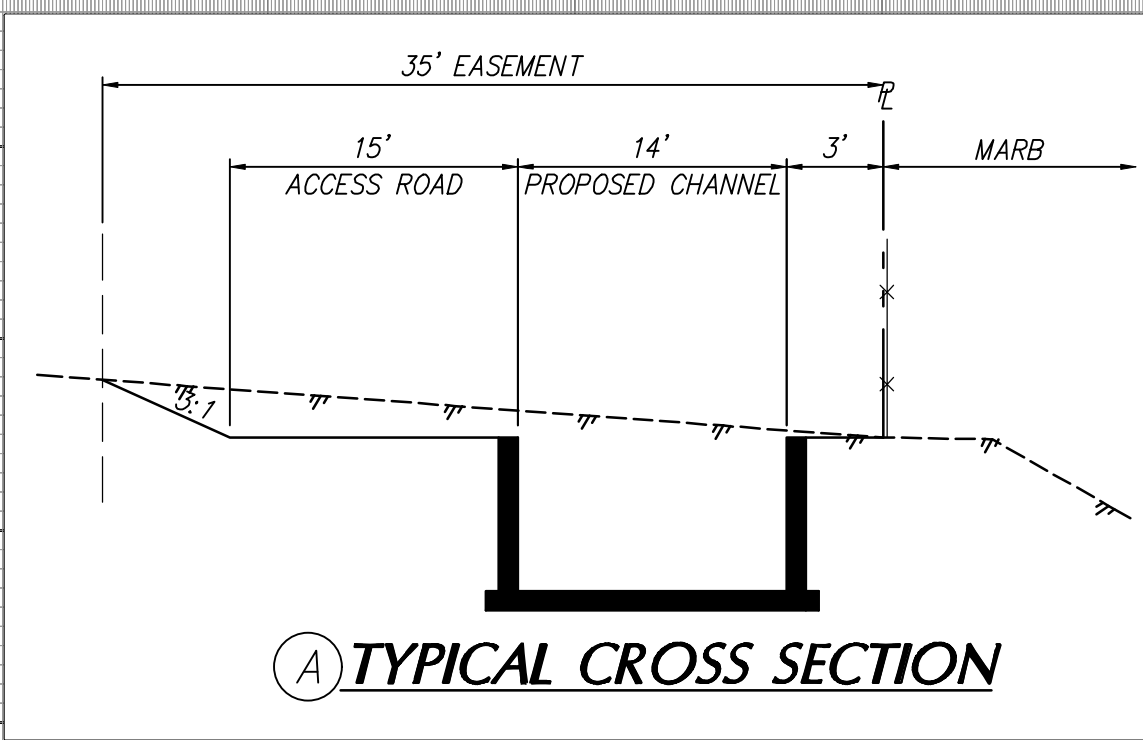
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

MASTER DRAINAGE PLAN
FOR THE
PERRIS VALLEY AREA
JULY 1987 (REVISED JUNE 1991)

J. F. DAVIDSON ASSOCIATES
CIVIL ENGINEERS & PLANNERS - ARCHITECTS

JFD ASSOCIATES

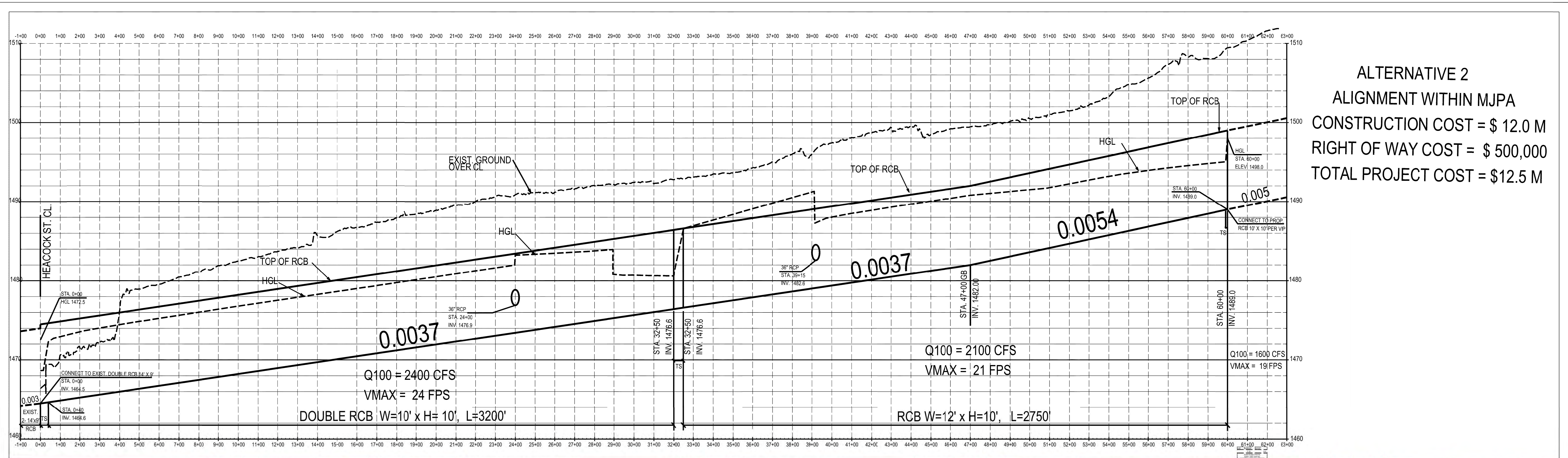
K & A ENGINEERING MASTER PLAN FACILITY EXHIBIT



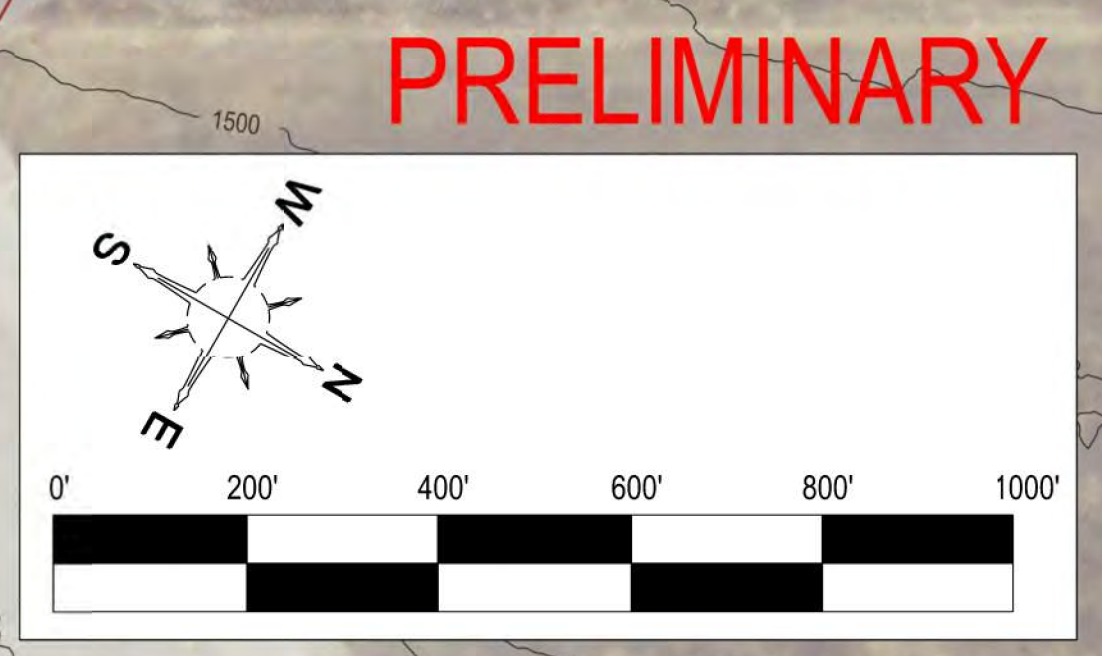
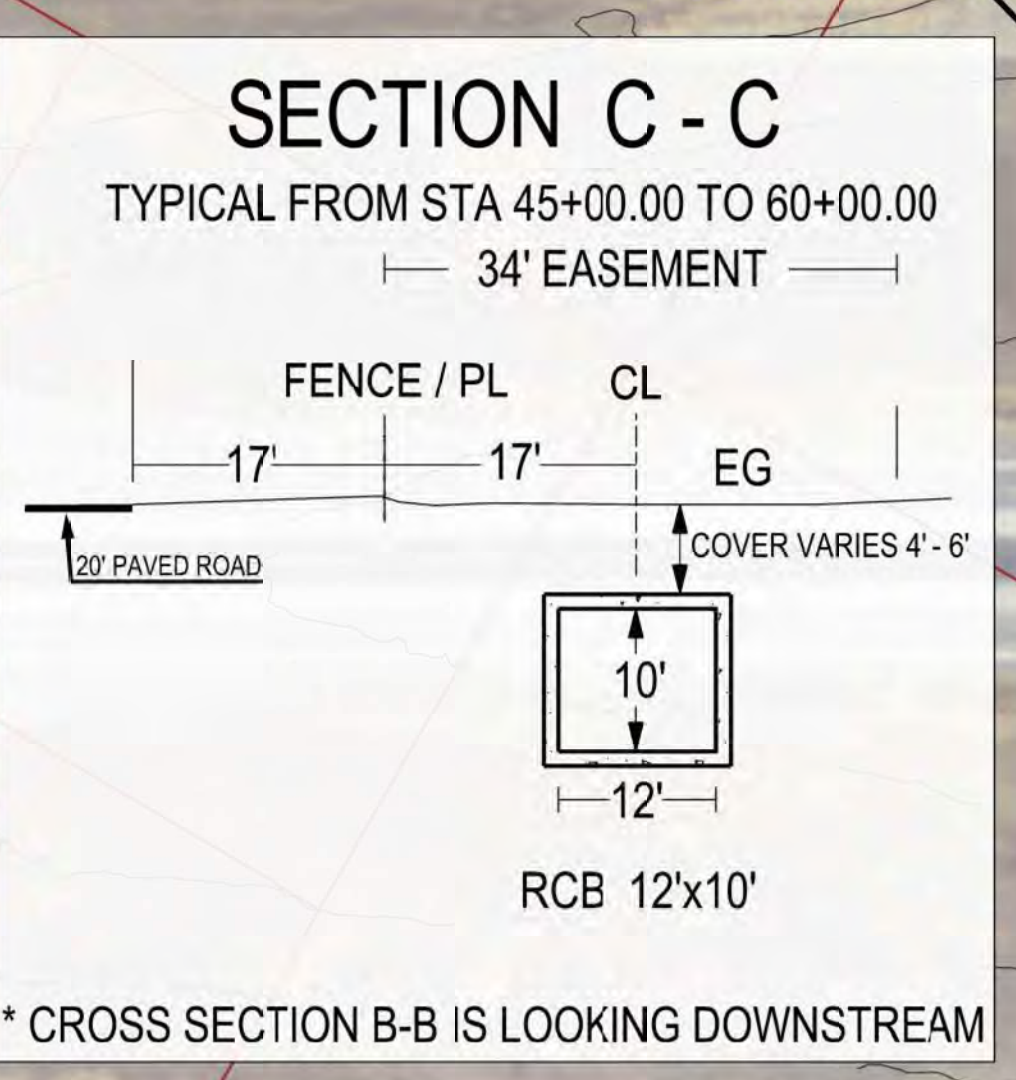
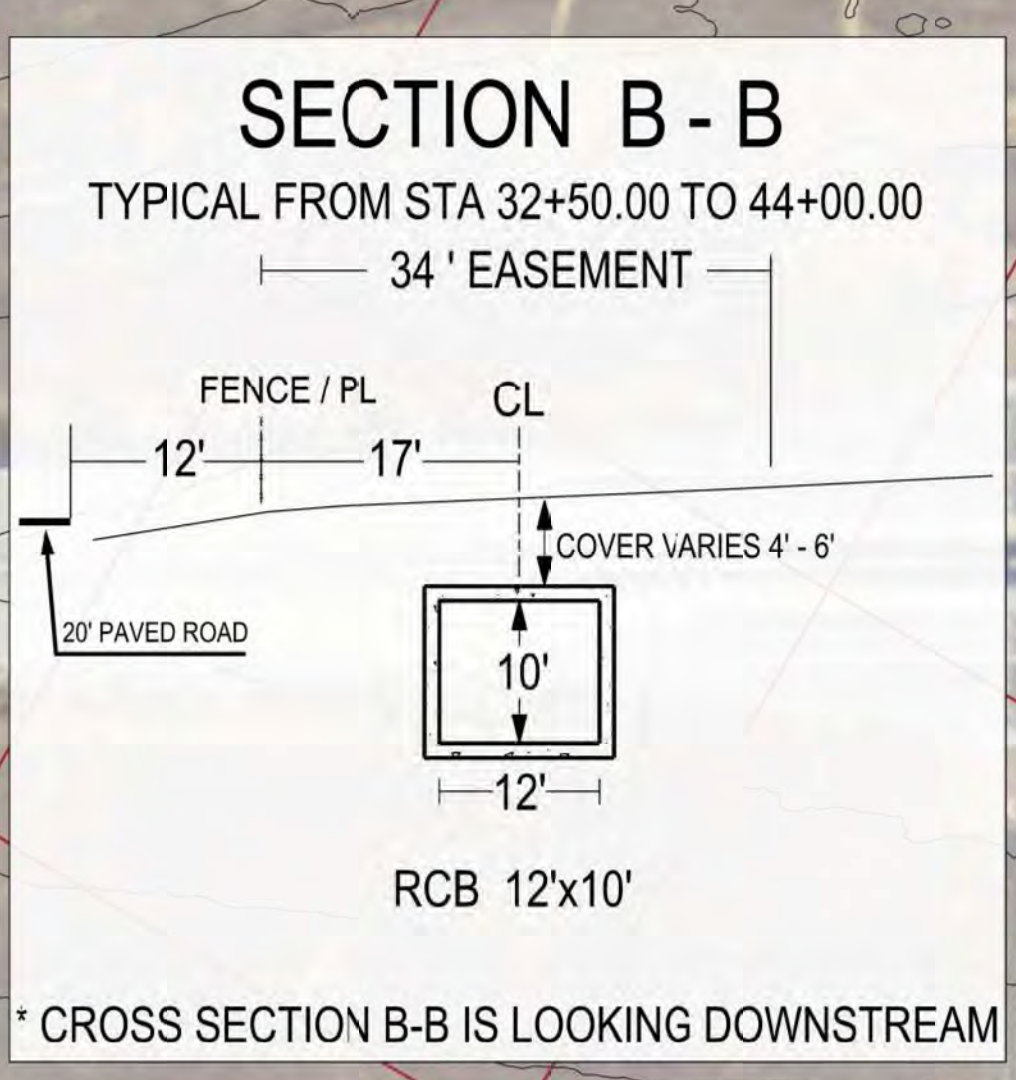
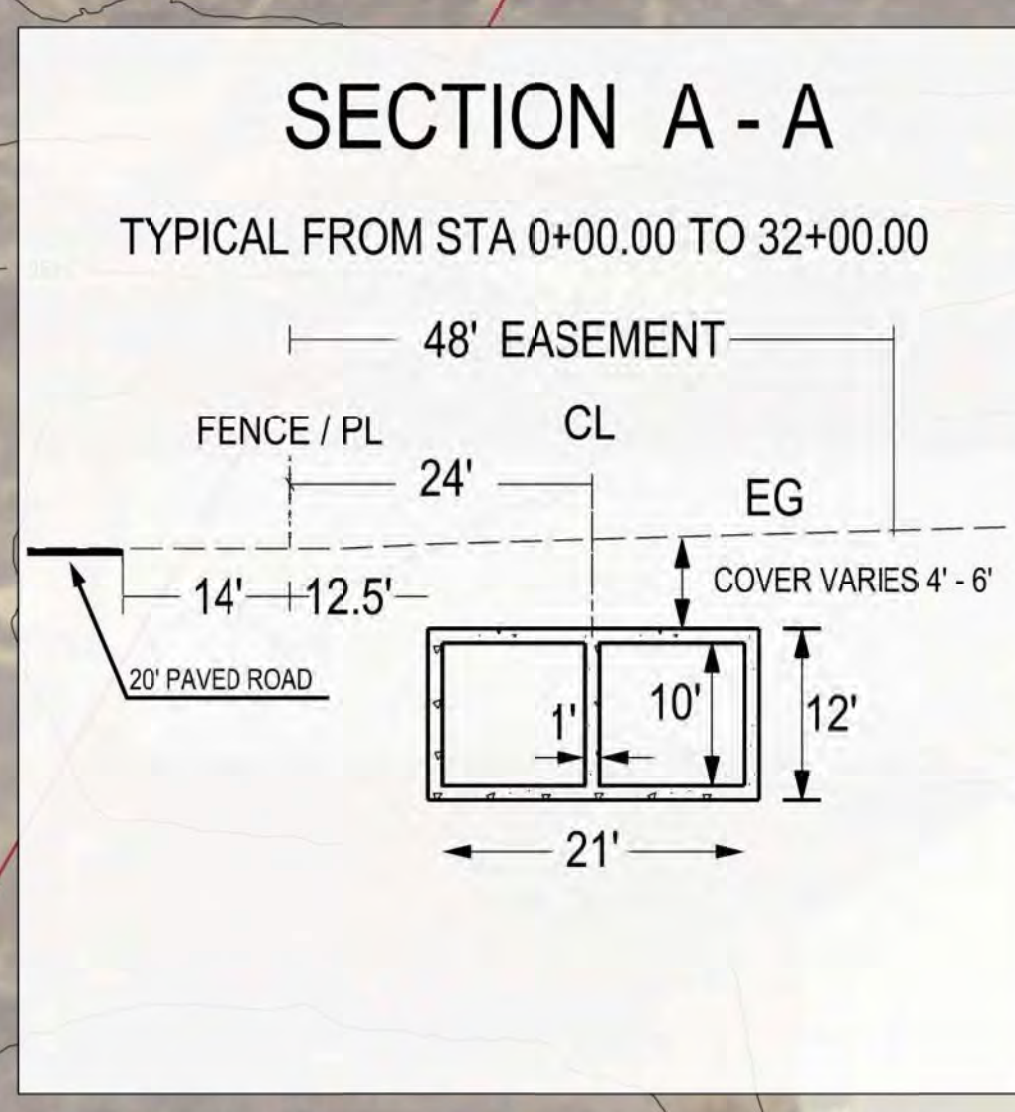
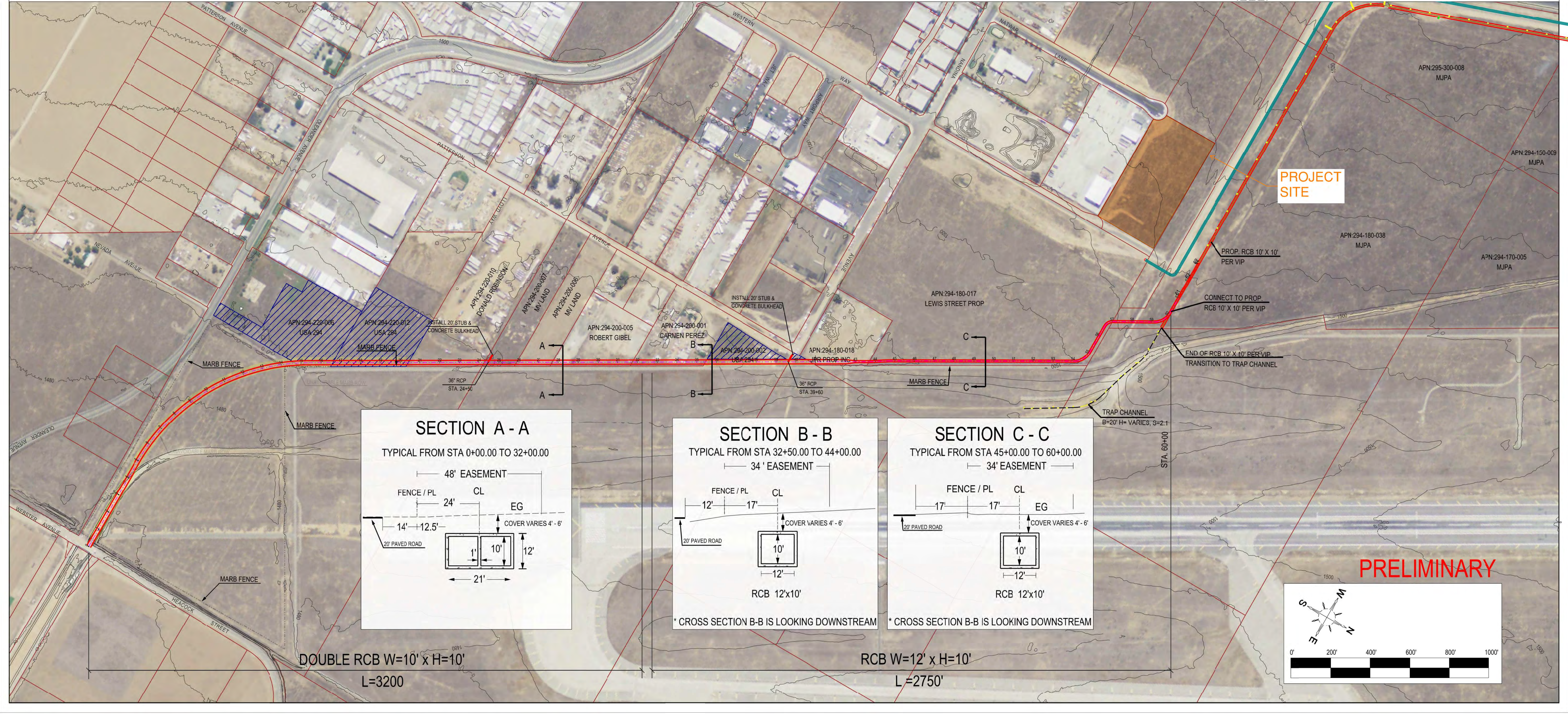
LEGEND:

PROPOSED MP FACILITIES		WATERSHED BOUNDARY	
EXISTING MWD 97" WATER MAIN		SUB AREA BOUNDARY	
SEGMENT		FL	
BASIN 08		PL - MARB	
NODES		- LOTS	
CULVERTS			

ALBERT A. WEBB ASSOCIATES (WEBB) REFERENCE MATERIAL



ALTERNATIVE 2
ALIGNMENT WITHIN MJPA
CONSTRUCTION COST = \$ 12.0 M
RIGHT OF WAY COST = \$ 500,000
TOTAL PROJECT COST = \$12.5 M



RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

GENERAL NOTES:

1. THE CONTRACTOR SHALL CONSTRUCT THE FLOOD CONTROL IMPROVEMENTS SHOWN ON THE DRAWINGS IN CONFORMANCE WITH THE REQUIREMENTS OF THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT'S M.O.U. STANDARD SPECIFICATIONS DATED JUNE 24, 2008, AND RCFC&WCD STANDARD MANUAL. FOR THE LATEST DRAWINGS OF THE STANDARD MANUAL, PLEASE REFER TO THE "PUBLICATIONS AND RECORDS" PAGE FOUND ON THE DISTRICT'S WEBSITE.
2. CONTACT THE ENCROACHMENT PERMIT ENGINEER AT 951.955.1266 IF AN ENCROACHMENT PERMIT IS REQUIRED FROM RIVERSIDE COUNTY FLOOD CONTROL. AFTER THE PERMIT IS ISSUED THE DISTRICT MUST BE NOTIFIED ONE WEEK PRIOR TO CONSTRUCTION.
3. CONTACT CONTRACT ADMINISTRATION AT 951.955.1288 IF CONSTRUCTION INSPECTION WILL BE PERFORMED BY RIVERSIDE COUNTY FLOOD CONTROL. THE DISTRICT MUST BE NOTIFIED TWENTY DAYS (20) PRIOR TO CONSTRUCTION.
4. ALL STATIONING REFERS TO CENTERLINE OF CONSTRUCTION UNLESS OTHERWISE NOTED.
5. STATIONING FOR LATERALS AND CONNECTOR PIPE REFER TO THE CENTERLINE INTERSECTION STATIONS.
6. FORTY-EIGHT HOURS BEFORE EXCAVATION, CALL UNDERGROUND SERVICE ALERT 1.800.422.4133
7. ALL ELEVATIONS SHOWN ARE IN FEET AND DECIMALS THEREOF BASED ON THE VERTICAL DATUM IS DERIVED FROM THE NATIONAL GEODETIC VERTICAL DATUM (NGVD 29).
8. ALL COORDINATES ARE SHOWN IN FEET AND DECIMALS THEREOF BASED ON THE NORTH AMERICAN DATUM (NAD 83), CALIFORNIA COORDINATE SYSTEM (CCS), ZONE 6 AND EPOCH 2011.00.
9. ALL CROSS SECTIONS ARE TAKEN LOOKING DOWNSTREAM.
10. ELEVATIONS OF UTILITIES ARE APPROXIMATE UNLESS OTHERWISE NOTED.
11. UNLESS OTHERWISE SPECIFIED, MINIMUM STREET RECONSTRUCTION SHALL BE 4" TYPE "B" HOT MIX ASPHALT OVER 6" CLASS 2 AGGREGATE BASE OR AS SPECIFIED BY THE ENGINEER.
12. OPENINGS RESULTING FROM THE CUTTING OR PARTIAL REMOVAL OF EXISTING CULVERTS, PIPES OR SIMILAR STRUCTURES TO BE ABANDONED SHALL BE SEALED WITH 6" OF CLASS "B" CONCRETE.
13. PIPE CONNECTED TO THE MAINLINE PIPE SHALL CONFORM TO JUNCTION STRUCTURE NO.4 (JS229) UNLESS OTHERWISE NOTED.
14. PIPE BEDDING SHALL CONFORM TO RCFC&WCD STD. DWG. NO. M815 EXCEPT FOR COVER <2 FEET. FOR COVER <2 FEET, CONCRETE SLURRY (2000 PSI-2 SACK) SHALL BE USED. THE ENTIRE TRENCH SHALL BE SLURRY EXTENDING 4 INCHES MINIMUM AND 12 INCHES MAXIMUM ABOVE THE TOP OF THE PIPE.
15. BH-1 INDICATES SOIL BORING LOCATIONS BASED ON THE SOILS REPORT DATED DECEMBER 12, 2015 BY SOUTHERN CALIFORNIA GEOTECHNICAL. LOCATIONS SHOWN ARE APPROXIMATE.
16. "V" IS THE DEPTH OF CATCH BASINS MEASURED FROM THE TOP OF CURB TO INVERT OF CONNECTOR PIPE.
17. CATCH BASINS SHALL BE LOCATED SO THAT LOCAL DEPRESSIONS SHALL BEGIN AT EXISTING CURB RETURN JOINT, UNLESS OTHERWISE SPECIFIED.
18. ALL CURBS, GUTTERS, SIDEWALKS, DRIVEWAYS AND OTHER EXISTING IMPROVEMENTS TO BE RECONSTRUCTED IN KIND AND AT THE SAME ELEVATION AND LOCATION AS THE EXISTING IMPROVEMENTS UNLESS OTHERWISE NOTED.
19. STANDARD DRAWINGS CALLED FOR ON THE PLAN AND PROFILE SHALL CONFORM TO DISTRICT STANDARD DRAWINGS UNLESS NOTED OTHERWISE.
20. THE CONTRACTOR IS REQUIRED TO CALL ALL UTILITY AGENCIES REGARDING TEMPORARY SHORING AND SUPPORT REQUIREMENTS FOR THE VARIOUS UTILITY LINES SHOWN ON THESE PLANS.
21. DURING ROUGH GRADING OPERATIONS AND PRIOR TO CONSTRUCTION OF PERMANENT DRAINAGE STRUCTURES, TEMPORARY DRAINAGE CONTROL SHOULD BE PROVIDED TO PREVENT PONDING WATER AND DAMAGE TO ADJACENT PROPERTIES.
22. APPROVAL OF THESE PLANS BY THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT DOES NOT RELIEVE THE DEVELOPER'S ENGINEER OF RESPONSIBILITY FOR THE ENGINEERING DESIGN. IF FIELD CHANGES ARE REQUIRED, IT WILL BE THE RESPONSIBILITY OF THE DESIGN ENGINEER TO MAKE THE NECESSARY CORRECTIONS.
23. THE CONTRACTOR OR DEVELOPER SHALL SECURE ALL REQUIRED ENCROACHMENT AND OR STATE AND FEDERAL REGULATORY PERMITS PRIOR TO THE COMMENCEMENT OF ANY WORK.

24. THE CONCRETE COATING ON THE INSIDE OF ALL REINFORCED CONCRETE PIPES MUST BE INCREASED TO PROVIDE A MINIMUM OF 1-1/2 INCHES OVER THE REINFORCING AND INCREASED TO A MINIMUM OF 3-1/2 INCHES OVER REINFORCING OF BOX CULVERT, WHEN DESIGN VELOCITIES EXCEED 20 FEET PER SECOND. THE CONCRETE DESIGN STRENGTH IN THESE REACHES SHALL BE F'C=5,000 PSI FOR VELOCITIES EXCEEDING 20 FEET PER SECOND AND F'C=6,000 PSI FOR VELOCITIES EXCEEDING 30 FEET PER SECOND.
25. CONSTRUCTION JOINTS FOR CALTRANS STANDARD REINFORCED CONCRETE BOX SHALL BE PLACED ACCORDING TO RCFC&WCD STANDARD DRAWING NO. BOX 401.

BENCHMARK

THE BENCHMARK FOR THIS PROJECT IS BASED ON THE NATIONAL GEODETIC SURVEY (NGS) VERTICAL CONTROL NETWORK. BENCHMARK NUMBER PID DX2725 DESIGNATION Z1143, ELEVATION 1532.70' (NAVD29). DESCRIBED AS FOLLOWS, "MORENO VALLEY, NEAR THE INTERSECTION OF INTERSTATE 215 AND VAN BUREN BLVD. PROCEED WEST ALONG VAN BUREN BLVD TO AVE A, (WEST FRONTAGE RD) THEN 0.1 MILE (0.16 KM) SOUTH ALONG DIRT PATROL ON THE EAST SIDE OF ATSF RAILROAD TRACKS. FOUND A USCGS 3-1/4 INCH BRASS DISK STAMPED Z 1143 1961 SET FLUSH ON TOP OF A CONCRETE MONUMENT (ROUND), 15 FEET (4.6 M) SOUTHEAST OF MILEPOST 11, 183 FEET (55.8 M) SOUTHEAST OF A SWITCH STAND, 25 FEET (7.6 M) EAST OF TRACKS, 5.4 FEET (1.6 M) WEST OF 215 FWY RIGHT OF WAY FENCE AND 5 INCHES ABOVE GROUND."

GRID COORDINATE VALUES (EPOCH 2011.00 U.S. FEET)

EWPP	N 2347786.8482	E 6175507.1253
PPBF	N 2248987.1186	E 6278618.5712

BASIS OF BEARINGS

THE BASIS OF BEARINGS FOR THIS SURVEY IS THE CALIFORNIA COORDINATE SYSTEM, ZONE 6, NAD 83 (EPOCH 2011.00) AS DETERMINED LOCALLY BY A LINE BETWEEN CONTINUOUS GLOBAL POSITIONING STATIONS (CGPS) AND/OR CONTINUOUS OPERATING REFERENCE STATIONS (CORS) EWPP AND PPBF BEING S46°13'24.03"E AS DERIVED FROM GEODETIC VALUES PUBLISHED BY THE CALIFORNIA SPATIAL REFERENCE CENTER (CSRC) AND/OR NATIONAL GEODETIC SURVEY (NGS), RESPECTIVELY. ALL DISTANCES ARE U.S. FEET (GRID). GROUND DISTANCES CAN BE OBTAINED BY DIVIDING THE GRID DISTANCES BY A COMBINATION FACTOR OF 0.99993097.

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

JS 226 JUNCTION STRUCTURE NO.1
JS 230 JUNCTION STRUCTURE NO.5

MH 253 MANHOLE NO.3
MH 255 MANHOLE FRAME & COVER NON-ROCKING
MH 257 MANHOLE SHAFT FOR CAST PIPE
MH 259 STANDARD DROP STEP
MH 260 24" MANHOLE FRAME AND COVER

TS 301 TRANSITION STRUCTURE NO. 2

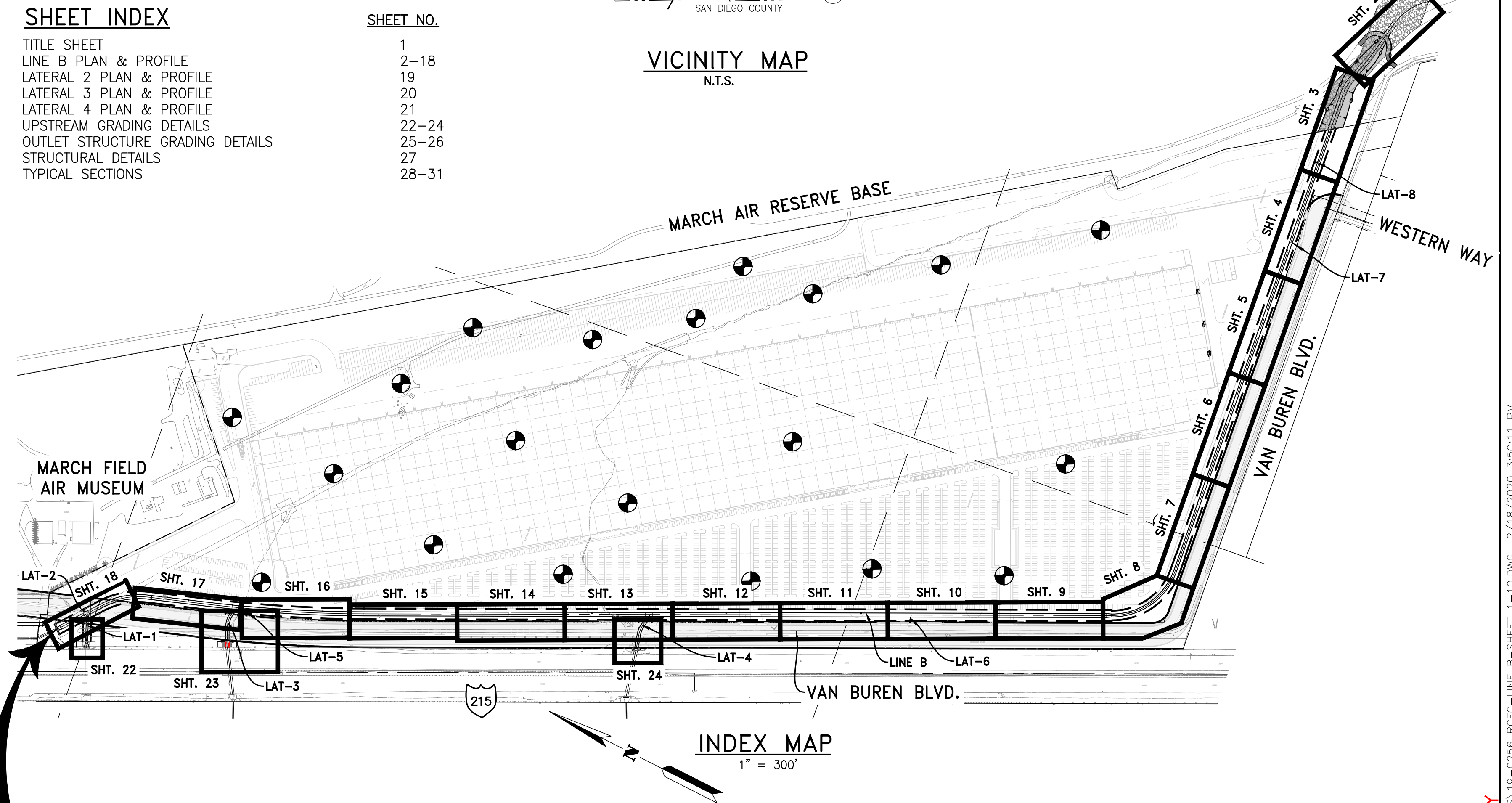
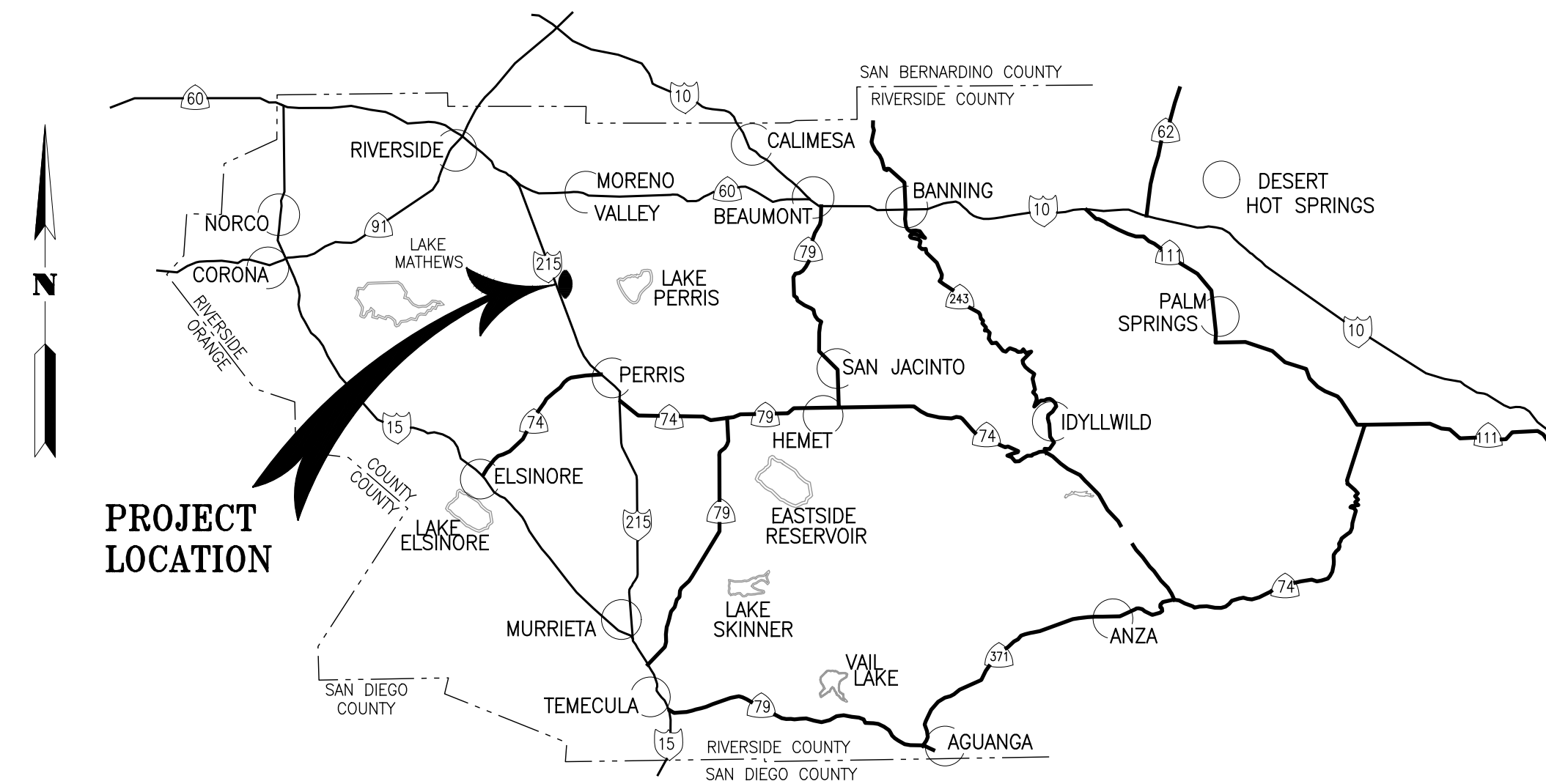
M 814 ABBREVIATIONS AND SYMBOLS
M 816 CONCRETE BULKHEAD

SPPWC STANDARD DRAWINGS

STD 225-2 BLANKET PROTECTION FOR PIPES
STD 380-4 CONCRETE COLLAR FOR RCP
STD 390-0 PRECAST RCB

CALTRANS STANDARD

D80 CAST-IN-PLACE RCB
A85 CHAIN LINK FENCE
D89 PIPE CULVERT HEADWALLS STRAIGHT & "L"



END PROJECT

BEGIN PROJECT

APPROVAL OF MARB APPROVAL OF OUTLET STRUCTURE DOUGLAS WATERS, P.E. - DEPUTY BASE ENGINEER 452ND MSG/CIVIL ENGINEERS		MJPA MJPA PUBLIC WORKS ENGINEER	
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT RECOMMENDED FOR APPROVAL BY:		APPROVED BY:	
DESIGN ENGINEER:		CHIEF ENGINEER:	
DATE:		DATE:	
PROJECT NO. XX	DRAWING NO. XX	PERRIS VALLEY MDP LINE B TITLE SHEET	
SHEET NO. 1 OF 31			

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

ENGINEER, RCE C67239
DATE:

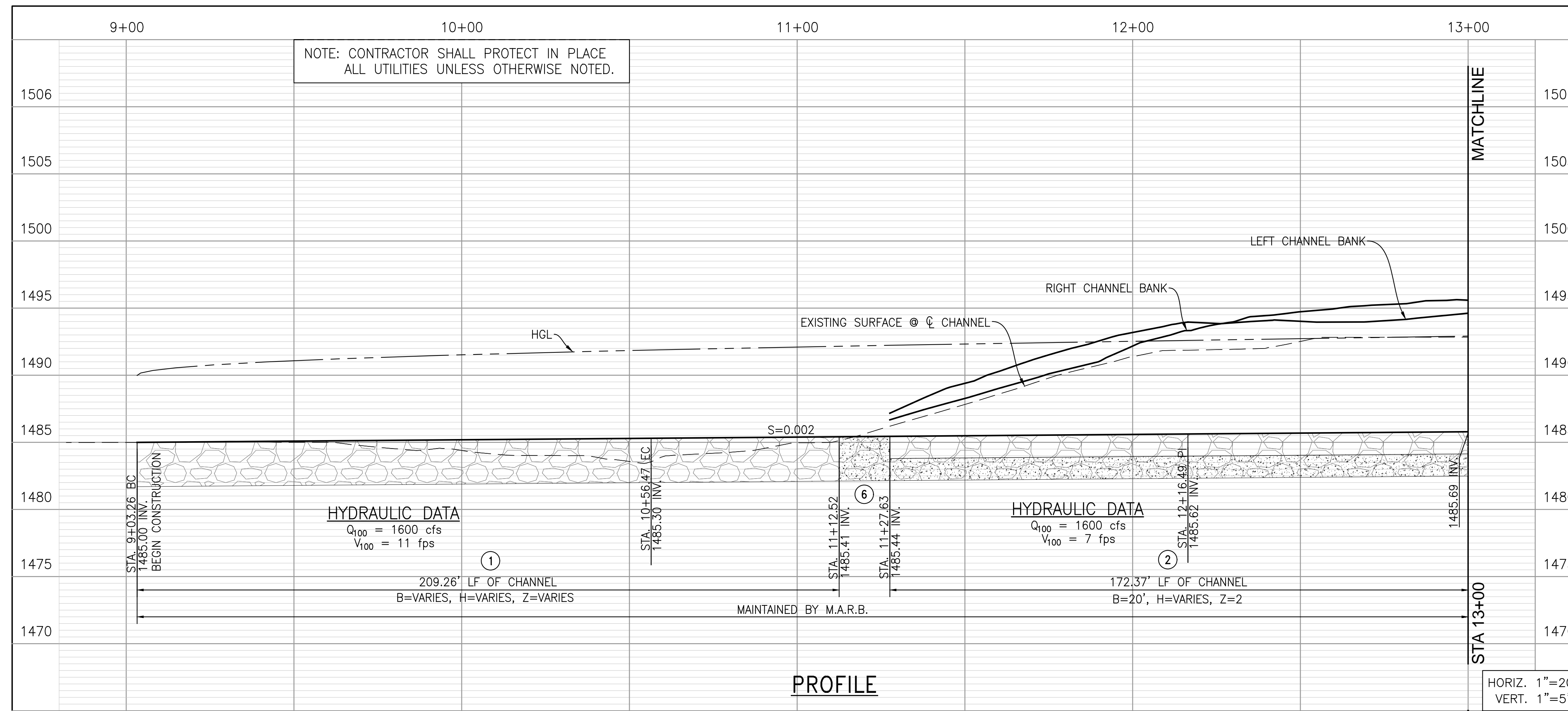
DESIGNED BY: JCC
DRAWN BY: MJS
CONSTR. SET: 2/18/20
CHECKED BY: RFS

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

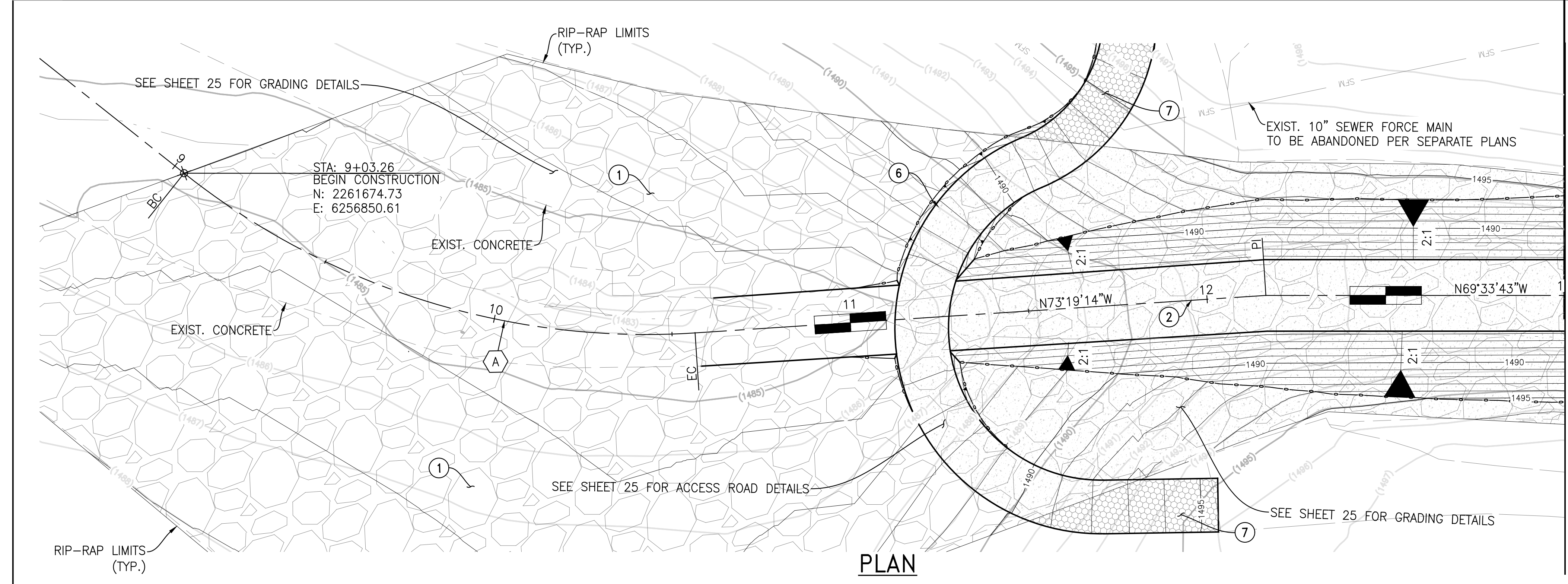
PERMANENT BENCH MARK
NO. PID DX275
SEE SHEET 1 FOR DESCRIPTION
ELEV. = 1532.7 (NGVD29)
NAVD88 = NGVD29 + 2.46'

REF.	DESCRIPTION	APPR.	DATE

FOR REVIEW ONLY
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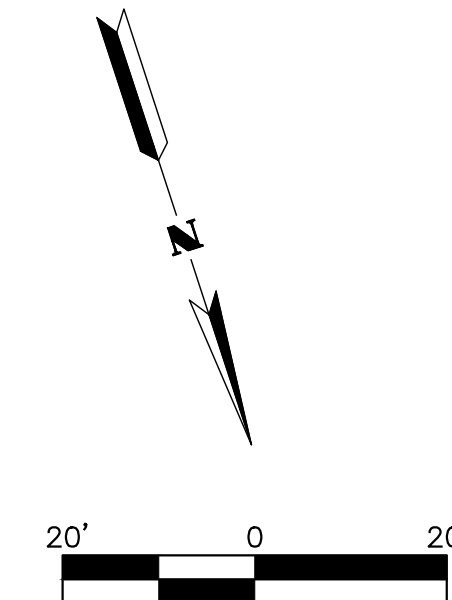
NOTE: SEE TYPICAL SECTION ON SHEET 28



NOTES:

- ① INSTALL 1/4 TON LOOSE RIP RAP, T=3.3' LIMITS PER PLAN
- ② INSTALL 1/4 TON HALF DEPTH GROUDED RIP RAP, T=3.3' LIMITS PER PLAN
- ⑥ CONSTRUCT 15' WIDE 1/4 TON FULL DEPTH GROUDED RIP RAP MAINTENANCE ROAD, T=3.3' GROUT FLUSH WITH TOP OF RIP RAP TO PROVIDE A DRIVABLE SURFACE. BROOM FINISH PERPENDICULAR TO DRIVING DIRECTION. SEE DETAIL ON SHEET 24
- ⑦ CONSTRUCT 3" THICK CLASS II BASE ACCESS ROAD

CURVE DATA	
R	207.91'
Δ	42°13'16"
L	153.21'
T	80.27'
BC	STA. 9+03.26
EC	STA. 10+56.47
P	NORTHING 2261743.471
	EASTING 6256809.156



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 FAX (951) 788-1256

ENGINEER, RCE C67239

DESIGNED BY: JCC
 DRAWN BY: MJS
 CONSTR. SET: 2/18/20
 CHECKED BY: RSF
 PB NUMBER:

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1-800-422-4133
 for the location of buried utility lines.
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 TWO WORKING DAYS BEFORE YOU DIG

PERMANENT BENCH MARK
 NO. PID DX275
 SEE SHEET 1 FOR DESCRIPTION
 ELEV. = 1532.7 (NGVD29)
 NAVD88 = NGVD29 + 2.46'

REF.	DESCRIPTION	APPR.	DATE

REVISIONS

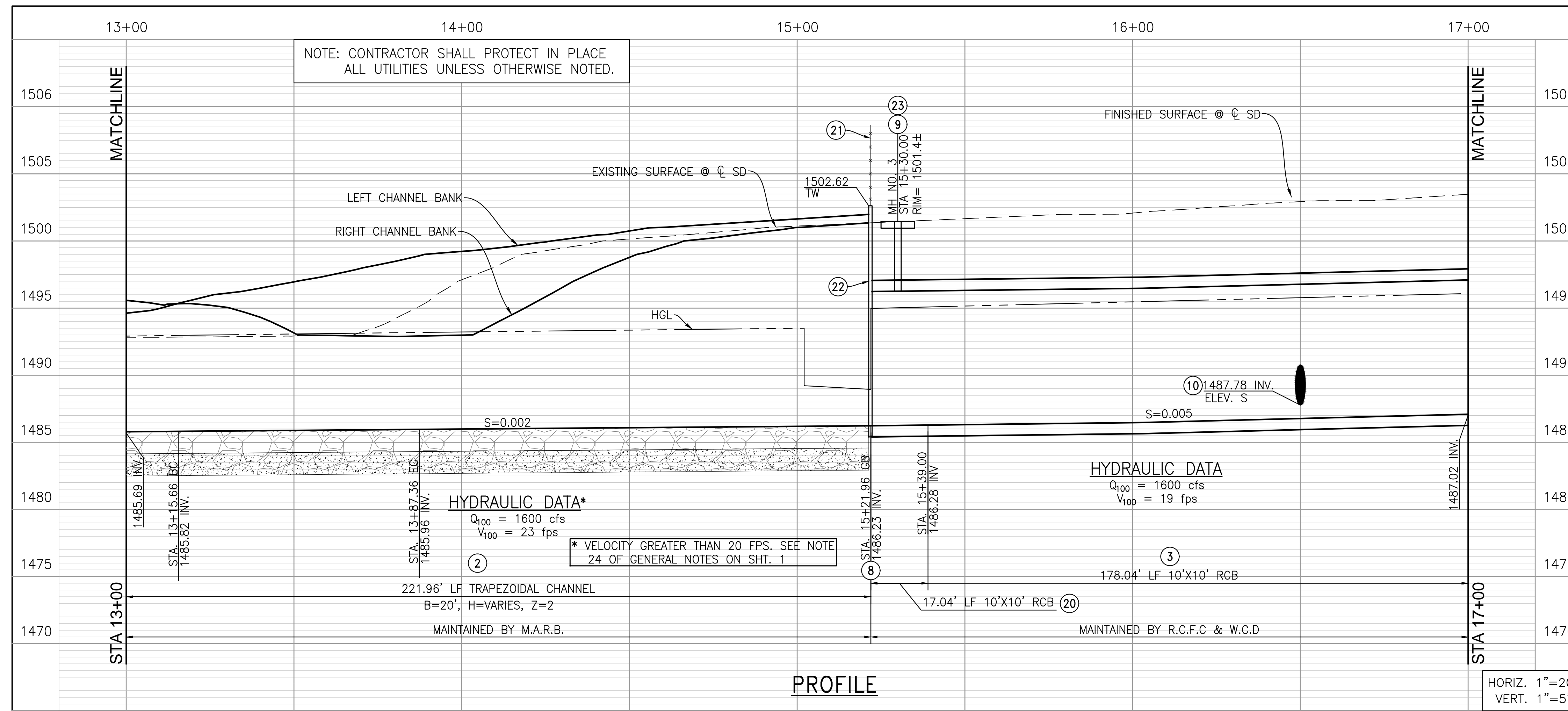
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

RECOMMENDED FOR APPROVAL BY: _____ DATE: _____

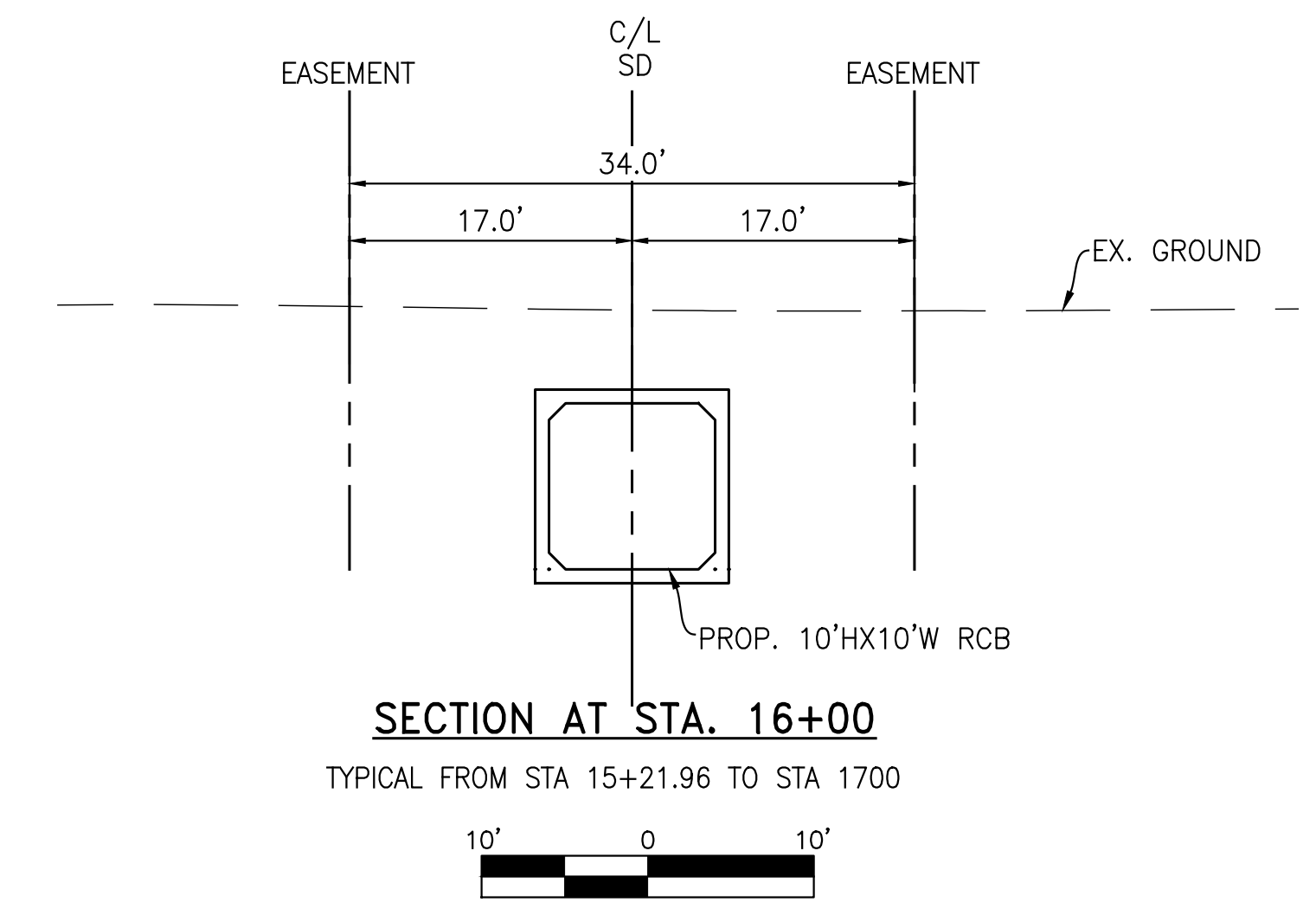
APPROVED BY: _____ DATE: _____

PERRIS VALLEY MDP
 LINE B
 PLAN & PROFILE
 STA. 9+03.26 TO STA. 13+00

PROJECT NO. XX
 DRAWING NO. XX
 SHEET NO. 2 OF 31



STA. 14+50 NOTE: SEE TYPICAL SECTION ON SHEET 28
TYPICAL FROM 13+00 TO STA 15+21.96

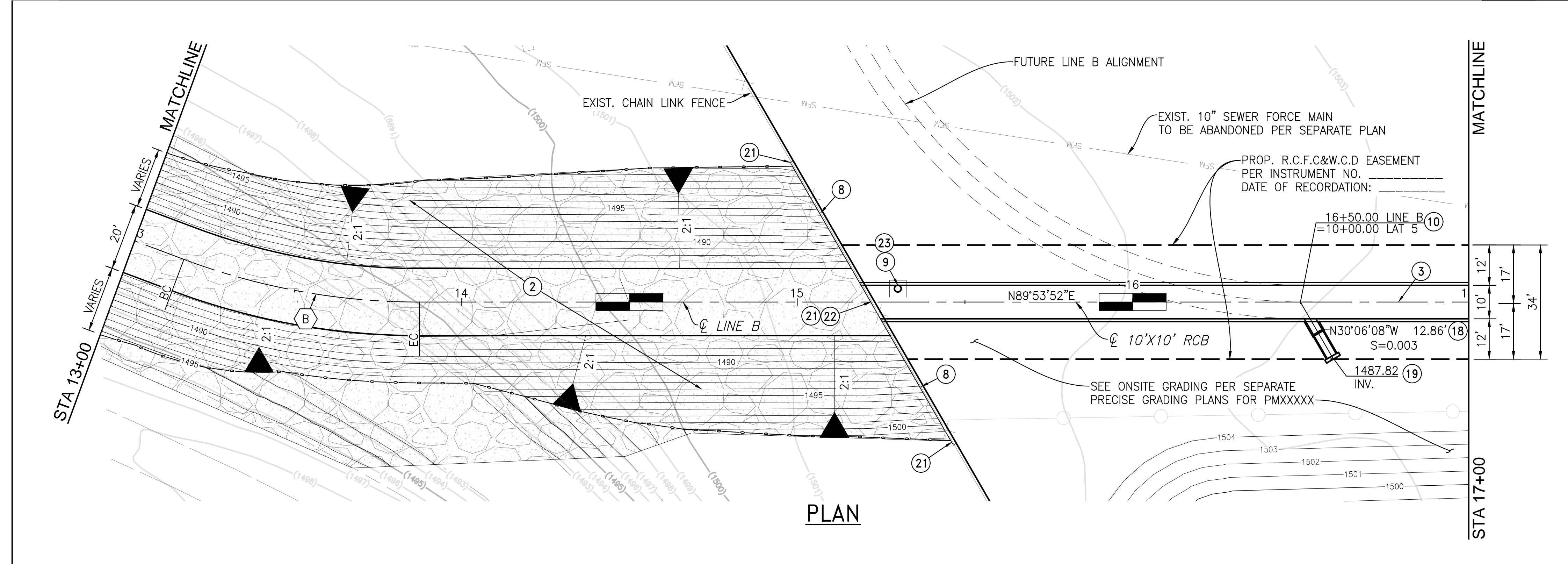


SECTION AT STA. 16+00

TYPICAL FROM STA 15+21.96 TO STA 1700

MANHOLE / JUNCTION STRUCTURE DATA					
LATERAL	CL STATION	WALL STATION	STRUCTURE	A	C
LAT. 5	16+50	10+05.80	JS NO. 1	60'	10.8'

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



NOTES:

- ② INSTALL 1/4 TON HALF DEPTH GROUTED RIP RAP, T=3.3' LIMITS PER PLAN
- ③ INSTALL 10' H X 10' W PRECAST RCB PER STRUCTURAL DETAILS ON SHEET 26
- ⑧ CONSTRUCT HEADWALL PER CALTRANS STD. PLANS NO. D89 & MODIFIED PER SHEET XX
- ⑨ CONSTRUCT MANHOLE NO. 3 PER RCFC&WCD STD. DWG. NO. MH252
- ⑩ CONSTRUCT JUNCTION STRUCTURE NO. 1 PER RCFC&WCD STD. DWG. NO. JS 226
- ⑬ CONSTRUCT 24" DIA. RCP, CLASS IV
- ⑰ CONSTRUCT CONCRETE BULKHEAD PER RCFC&WCD STD. DWG. NO. M816
- ⑳ CONSTRUCT 10' H X 10' W CAST-IN-PLACE RCB PER CALTRANS STD. PLAN D-80
- ㉑ REMOVE EXISTING FENCE & REPLACE WITH 6' HIGH (MATCH EXISTING) AIRFORCE SECURITY FENCE WITH SINGLE 45 DEGREE BARBED WIRE ARM (BARBS TOWARD THE CHANNEL) PER UFC 4-022-03 SECURITY FENCE & GATE SPECIFICATIONS & DWG. NO. UFC-702
- ㉒ CONSTRUCT PARAPET PER DETAIL ON SHEET 26
- ㉓ INSTALL 5' X 5' X 0.5' THICK CONCRETE PAD REINFORCED WITH NO. 4 BARS AT 18" EACH WAY.

CURVE DATA		(B)
R	200.00'	
Δ	20°32'25"	
L	71.70'	
T	36.24'	
BC	STA. 13+15.66	
EC	STA. 13+87.36	
PI	NORTHING 2261859.723	
	EASTING 6256452.091	

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

ENGINEER, RCE C67239 DATE:

DESIGNED BY: JCC
DRAWN BY: MJS
CONSTR. SET: 2/18/20
CHECKED BY: RSF
PB NUMBER:

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PERMANENT BENCH MARK
NO. PID DX275
SEE SHEET 1 FOR DESCRIPTION
ELEV. = 1532.7 (NGVD29)
NAVD88 = NGVD29 + 2.46'

REF.	DESCRIPTION	APPR.	DATE

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

PERRIS VALLEY MDP
LINE B
PLAN & PROFILE
STA. 13+00 TO STA. 17+00

PROJECT NO. XX
DRAWING NO. XX
SHEET NO. 3 OF 31

H:\2019\19-0256\DRAWINGS\PLAN SHEETS\19-0256 RCFC-LINE B-SHEET 1-10.DWG 2/18/2020 3:50:11 PM

THIENES ENGINEERING, INC. PUBLIC STORM DRAIN PLAN

MARCH AIR
RESERVE BASE



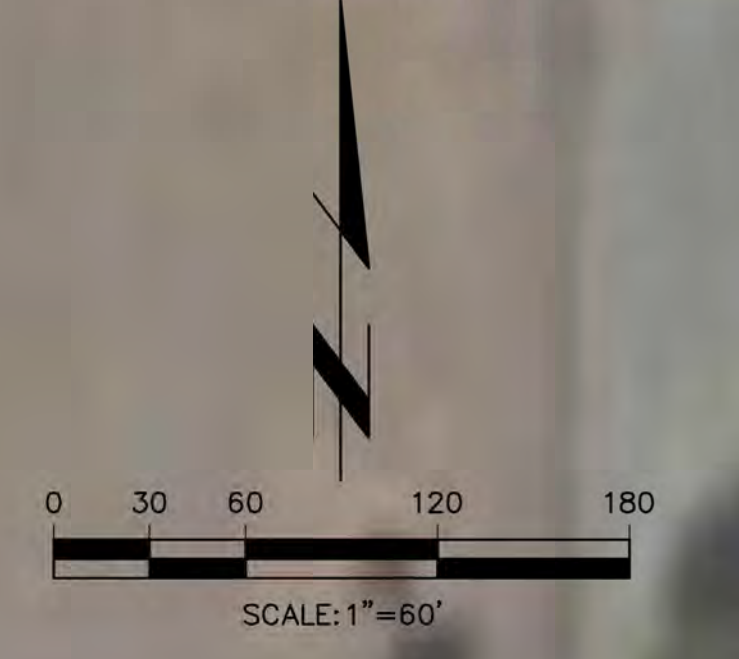
BUILDING 1
419,034 SF

PHASE ONE
INTERIM DETENTION BASIN

NATWAR LANE

WESTERN WAY

NANDINA DRIVE



PREPARED FOR:
FIRST INDUSTRIAL REALTY TRUST, INC.
888 N. PACIFIC COAST HIGHWAY STE. 175
EL SEGUNDO, CA 90245
PHONE: (310) 321-3813
EMAIL: MPO@FIRSTINDUSTRIAL.COM

TEI Thienes Engineering, Inc.
CIVIL ENGINEERING - LAND SURVEYING
4444 FINESTONE AVENUE SUITE 200
TOLAND, CALIFORNIA 90260
PHONE: (310) 742-1111 FAX: (310) 742-1113

Designed by	_____	Approved by	_____
Date	_____	Date	_____
Checked by	_____	Public Works Director	R.C.E. XXXXX
Date	_____		
Designed by	_____		
Date	_____		
Checked by	_____		
Date	_____		

Sheet **1** of **2** Sheets

CITY OF PERRIS
PUBLIC WORKS DEPARTMENT

PUBLIC STORM DRAIN PLAN

FREWAY 215 AND NATWAR LANE

NATWAR LANE

3788 / 1 OF 2 SHEET

APPENDIX B

HYDROLOGY CALCULATIONS

EXISTING CONDITION

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 1435

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* FIRST MARCH BUILDING 2 *
* EXISTING CONDITION 100-YEAR *
* NODES 200-201 *

FILE NAME: W:\3933\E200.DAT
TIME/DATE OF STUDY: 16:26 03/02/2021

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 = 0.95
2-YEAR, 1-HOUR PRECIPITATION(INCH) = 0.470
100-YEAR, 1-HOUR PRECIPITATION(INCH) = 1.220
COMPUTED RAINFALL INTENSITY DATA:
STORM EVENT = 100.00 1-HOUR INTENSITY(INCH/HOUR) = 1.220
SLOPE OF INTENSITY DURATION CURVE = 0.5000
RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
NOTE: CONSIDER ALL CONFLUENCE STREAM COMBINATIONS
FOR ALL 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 30.0 20.0 0.018/0.018/0.020 0.67 2.00 0.0313 0.167 0.0150

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 200.00 TO NODE 201.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=====

ASSUMED INITIAL SUBAREA UNIFORM
DEVELOPMENT IS: UNDEVELOPED WITH POOR COVER
TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
INITIAL SUBAREA FLOW-LENGTH(FEET) = 791.74
UPSTREAM ELEVATION(FEET) = 1510.42
DOWNSTREAM ELEVATION(FEET) = 1501.89
ELEVATION DIFFERENCE(FEET) = 8.53
TC = 0.533*[(791.74**3)/(8.53)]**.2 = 19.027
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.166
UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .6066
SOIL CLASSIFICATION IS "B"
SUBAREA RUNOFF(CFS) = 8.41
TOTAL AREA(ACRES) = 6.40 TOTAL RUNOFF(CFS) = 8.41

=====

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 6.4 TC(MIN.) = 19.03
PEAK FLOW RATE(CFS) = 8.41

=====

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 1435

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* FIRST MARCH BUILDING 2 *
* EXISTING CONDITION 100-YEAR *
* NODES 210-211 *

FILE NAME: W:\3933\E210.DAT
TIME/DATE OF STUDY: 08:49 03/03/2021

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 = 0.95
2-YEAR, 1-HOUR PRECIPITATION(INCH) = 0.470
100-YEAR, 1-HOUR PRECIPITATION(INCH) = 1.220
COMPUTED RAINFALL INTENSITY DATA:
STORM EVENT = 100.00 1-HOUR INTENSITY(INCH/HOUR) = 1.220
SLOPE OF INTENSITY DURATION CURVE = 0.5000
RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
NOTE: CONSIDER ALL CONFLUENCE STREAM COMBINATIONS
FOR ALL DOWNSTREAM ANALYSES

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0313 0.167	0.0150

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 210.00 TO NODE 211.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
=====

ASSUMED INITIAL SUBAREA UNIFORM
DEVELOPMENT IS: UNDEVELOPED WITH FAIR COVER
TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
INITIAL SUBAREA FLOW-LENGTH(FEET) = 1026.40
UPSTREAM ELEVATION(FEET) = 1520.99
DOWNSTREAM ELEVATION(FEET) = 1508.27
ELEVATION DIFFERENCE(FEET) = 12.72
TC = 0.709*[(1026.40**3)/(12.72)]**.2 = 27.339
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 1.807
UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .5697
SOIL CLASSIFICATION IS "B"
SUBAREA RUNOFF(CFS) = 9.32
TOTAL AREA(ACRES) = 9.05 TOTAL RUNOFF(CFS) = 9.32

=====

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 9.1 TC(MIN.) = 27.34
PEAK FLOW RATE(CFS) = 9.32

=====

END OF RATIONAL METHOD ANALYSIS

▲

PROPOSED CONDITION


```

-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
=====
      ASSUMED INITIAL SUBAREA UNIFORM
      DEVELOPMENT IS COMMERCIAL
      TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
      INITIAL SUBAREA FLOW-LENGTH(FEET) = 255.58
      UPSTREAM ELEVATION(FEET) = 1509.93
      DOWNSTREAM ELEVATION(FEET) = 1501.21
      ELEVATION DIFFERENCE(FEET) = 8.72
      TC = 0.303*[( 255.58**3)/( 8.72)]**.2 = 5.470
      100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.041
      COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8815
      SOIL CLASSIFICATION IS "B"
      SUBAREA RUNOFF(CFS) = 8.90
      TOTAL AREA(ACRES) = 2.50 TOTAL RUNOFF(CFS) = 8.90

*****
FLOW PROCESS FROM NODE 111.00 TO NODE 112.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1498.21 DOWNSTREAM(FEET) = 1498.12
FLOW LENGTH(FEET) = 36.92 MANNING'S N = 0.012
DEPTH OF FLOW IN 24.0 INCH PIPE IS 15.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.12
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 8.90
PIPE TRAVEL TIME(MIN.) = 0.15 Tc(MIN.) = 5.62
LONGEST FLOWPATH FROM NODE 110.00 TO NODE 112.00 = 292.50 FEET.

*****
FLOW PROCESS FROM NODE 112.00 TO NODE 112.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 5.62
RAINFALL INTENSITY(INCH/HR) = 3.99
TOTAL STREAM AREA(ACRES) = 2.50
PEAK FLOW RATE(CFS) AT CONFLUENCE = 8.90

** CONFLUENCE DATA **
STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 2.01 8.74 3.197 0.60
2 8.90 5.62 3.987 2.50

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

** PEAK FLOW RATE TABLE **
STREAM RUNOFF Tc INTENSITY
NUMBER (CFS) (MIN.) (INCH/HOUR)
1 10.20 5.62 3.987
2 9.15 8.74 3.197

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 10.20 Tc(MIN.) = 5.62
TOTAL AREA(ACRES) = 3.1
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 112.00 = 773.29 FEET.

*****
FLOW PROCESS FROM NODE 112.00 TO NODE 122.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1498.11 DOWNSTREAM(FEET) = 1497.83
FLOW LENGTH(FEET) = 113.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 24.0 INCH PIPE IS 17.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.25
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 10.20
PIPE TRAVEL TIME(MIN.) = 0.44 Tc(MIN.) = 6.06
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 122.00 = 886.29 FEET.

*****
FLOW PROCESS FROM NODE 122.00 TO NODE 122.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 6.06
RAINFALL INTENSITY(INCH/HR) = 3.84
TOTAL STREAM AREA(ACRES) = 3.10
PEAK FLOW RATE(CFS) AT CONFLUENCE = 10.20

*****
FLOW PROCESS FROM NODE 120.00 TO NODE 121.00 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) = 299.78
 UPSTREAM ELEVATION(FEET) = 1505.02
 DOWNSTREAM ELEVATION(FEET) = 1501.21
 ELEVATION DIFFERENCE(FEET) = 3.81
 $TC = 0.303 * [(299.78^{**3}) / (3.81)]^{**2} = 7.104$
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.546
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8795
 SOIL CLASSIFICATION IS "B"
 SUBAREA RUNOFF(CFS) = 7.02
 TOTAL AREA(ACRES) = 2.25 TOTAL RUNOFF(CFS) = 7.02

 FLOW PROCESS FROM NODE 121.00 TO NODE 122.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 =====
 ELEVATION DATA: UPSTREAM(FEET) = 1498.21 DOWNSTREAM(FEET) = 1497.85
 FLOW LENGTH(FEET) = 36.92 MANNING'S N = 0.012
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.58
 ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 7.02
 PIPE TRAVEL TIME(MIN.) = 0.09 Tc(MIN.) = 7.20
 LONGEST FLOWPATH FROM NODE 120.00 TO NODE 122.00 = 336.70 FEET.

 FLOW PROCESS FROM NODE 122.00 TO NODE 122.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
 =====
 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 7.20
 RAINFALL INTENSITY(INCH/HR) = 3.52
 TOTAL STREAM AREA(ACRES) = 2.25
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 7.02

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	10.20	6.06	3.838	3.10
1	9.15	9.19	3.117	3.10
2	7.02	7.20	3.523	2.25

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	16.11	6.06	3.838
2	16.38	7.20	3.523
3	15.36	9.19	3.117

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 16.38 Tc(MIN.) = 7.20
 TOTAL AREA(ACRES) = 5.3
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 122.00 = 886.29 FEET.

 FLOW PROCESS FROM NODE 122.00 TO NODE 132.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 =====
 ELEVATION DATA: UPSTREAM(FEET) = 1497.82 DOWNSTREAM(FEET) = 1496.88
 FLOW LENGTH(FEET) = 378.01 MANNING'S N = 0.012
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 19.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.84
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 16.38
 PIPE TRAVEL TIME(MIN.) = 1.30 Tc(MIN.) = 8.50
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 132.00 = 1264.30 FEET.

 FLOW PROCESS FROM NODE 132.00 TO NODE 132.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 =====
 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 8.50
 RAINFALL INTENSITY(INCH/HR) = 3.24
 TOTAL STREAM AREA(ACRES) = 5.35
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 16.38

 FLOW PROCESS FROM NODE 130.00 TO NODE 131.00 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) = 172.64
 UPSTREAM ELEVATION(FEET) = 1505.74
 DOWNSTREAM ELEVATION(FEET) = 1503.64
 ELEVATION DIFFERENCE(FEET) = 2.10

TC = 0.303*[(172.64**3)/(2.10)]**.2 = 5.747
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.942
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8811
 SOIL CLASSIFICATION IS "B"
 SUBAREA RUNOFF(CFS) = 1.39
 TOTAL AREA(ACRES) = 0.40 TOTAL RUNOFF(CFS) = 1.39

 FLOW PROCESS FROM NODE 131.00 TO NODE 132.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 =====
 ELEVATION DATA: UPSTREAM(FEET) = 1500.31 DOWNSTREAM(FEET) = 1497.54
 FLOW LENGTH(FEET) = 16.37 MANNING'S N = 0.012
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
 DEPTH OF FLOW IN 12.0 INCH PIPE IS 2.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 12.22
 ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 1.39
 PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 5.77
 LONGEST FLOWPATH FROM NODE 130.00 TO NODE 132.00 = 189.01 FEET.

 FLOW PROCESS FROM NODE 132.00 TO NODE 132.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
 =====
 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 5.77
 RAINFALL INTENSITY(INCH/HR) = 3.93
 TOTAL STREAM AREA(ACRES) = 0.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.39

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	16.11	7.41	3.471	5.35
1	16.38	8.50	3.241	5.35
1	15.36	10.54	2.911	5.35
2	1.39	5.77	3.934	0.40

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	13.93	5.77	3.934
2	17.33	7.41	3.471
3	17.52	8.50	3.241
4	16.39	10.54	2.911

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 17.52 Tc(MIN.) = 8.50
 TOTAL AREA(ACRES) = 5.8
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 132.00 = 1264.30 FEET.

 FLOW PROCESS FROM NODE 132.00 TO NODE 172.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 =====
 ELEVATION DATA: UPSTREAM(FEET) = 1496.87 DOWNSTREAM(FEET) = 1496.59
 FLOW LENGTH(FEET) = 110.73 MANNING'S N = 0.012
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 4.93
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 17.52
 PIPE TRAVEL TIME(MIN.) = 0.37 Tc(MIN.) = 8.87
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE 172.00 = 1375.03 FEET.

 FLOW PROCESS FROM NODE 172.00 TO NODE 172.00 IS CODE = 10

>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
 =====

 FLOW PROCESS FROM NODE 140.00 TO NODE 141.00 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) = 84.50
 UPSTREAM ELEVATION(FEET) = 1505.46
 DOWNSTREAM ELEVATION(FEET) = 1504.33
 ELEVATION DIFFERENCE(FEET) = 1.13
 TC = 0.303*[(84.50**3)/(1.13)]**.2 = 4.237
 COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.226
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8821
 SOIL CLASSIFICATION IS "B"
 SUBAREA RUNOFF(CFS) = 0.37
 TOTAL AREA(ACRES) = 0.10 TOTAL RUNOFF(CFS) = 0.37

```

*****
FLOW PROCESS FROM NODE 141.00 TO NODE 151.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1502.00 DOWNSTREAM(FEET) = 1501.51
FLOW LENGTH(FEET) = 114.83 MANNING'S N = 0.012
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
DEPTH OF FLOW IN 12.0 INCH PIPE IS 3.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 2.25
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.37
PIPE TRAVEL TIME(MIN.) = 0.85 Tc(MIN.) = 5.85
LONGEST FLOWPATH FROM NODE 140.00 TO NODE 151.00 = 199.33 FEET.
*****
FLOW PROCESS FROM NODE 151.00 TO NODE 151.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 5.85
RAINFALL INTENSITY(INCH/HR) = 3.91
TOTAL STREAM AREA(ACRES) = 0.10
PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.37
*****
FLOW PROCESS FROM NODE 150.00 TO NODE 151.00 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) = 84.50
UPSTREAM ELEVATION(FEET) = 1505.46
DOWNSTREAM ELEVATION(FEET) = 1504.33
ELEVATION DIFFERENCE(FEET) = 1.13
TC = 0.303*[( 84.50**3)/( 1.13)]**.2 = 4.237
COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.226
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8821
SOIL CLASSIFICATION IS "B"
SUBAREA RUNOFF(CFS) = 0.37
TOTAL AREA(ACRES) = 0.10 TOTAL RUNOFF(CFS) = 0.37
*****
FLOW PROCESS FROM NODE 151.00 TO NODE 151.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 5.00
RAINFALL INTENSITY(INCH/HR) = 4.23
TOTAL STREAM AREA(ACRES) = 0.10
PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.37

** CONFLUENCE DATA **
STREAM RUNOFF Tc INTENSITY AREA
NUMBER (CFS) (MIN.) (INCH/HOUR) (ACRE)
1 0.37 5.85 3.907 0.10
2 0.37 5.00 4.226 0.10

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

** PEAK FLOW RATE TABLE **
STREAM RUNOFF Tc INTENSITY
NUMBER (CFS) (MIN.) (INCH/HOUR)
1 0.69 5.00 4.226
2 0.72 5.85 3.907

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 0.72 Tc(MIN.) = 5.85
TOTAL AREA(ACRES) = 0.2
LONGEST FLOWPATH FROM NODE 140.00 TO NODE 151.00 = 199.33 FEET.
*****
FLOW PROCESS FROM NODE 151.00 TO NODE 161.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1501.50 DOWNSTREAM(FEET) = 1501.00
FLOW LENGTH(FEET) = 114.83 MANNING'S N = 0.012
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
DEPTH OF FLOW IN 12.0 INCH PIPE IS 4.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 2.73
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 0.72
PIPE TRAVEL TIME(MIN.) = 0.70 Tc(MIN.) = 6.55
LONGEST FLOWPATH FROM NODE 140.00 TO NODE 161.00 = 314.16 FEET.
*****
FLOW PROCESS FROM NODE 161.00 TO NODE 161.00 IS CODE = 1

```

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 6.55
RAINFALL INTENSITY(INCH/HR) = 3.69
TOTAL STREAM AREA(ACRES) = 0.20
PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.72

FLOW PROCESS FROM NODE 160.00 TO NODE 161.00 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) = 84.32
UPSTREAM ELEVATION(FEET) = 1505.46
DOWNSTREAM ELEVATION(FEET) = 1504.32
ELEVATION DIFFERENCE(FEET) = 1.14
TC = 0.303*[(84.32**3)/(1.14)]**.2 = 4.224
COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.226
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8821
SOIL CLASSIFICATION IS "B"
SUBAREA RUNOFF(CFS) = 0.37
TOTAL AREA(ACRES) = 0.10 TOTAL RUNOFF(CFS) = 0.37

FLOW PROCESS FROM NODE 161.00 TO NODE 161.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 5.00
RAINFALL INTENSITY(INCH/HR) = 4.23
TOTAL STREAM AREA(ACRES) = 0.10
PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.37

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	0.69	5.71	3.955	0.20
1	0.72	6.55	3.692	0.20
2	0.37	5.00	4.226	0.10

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	0.98	5.00	4.226
2	1.04	5.71	3.955
3	1.04	6.55	3.692

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 1.04 Tc(MIN.) = 6.55
TOTAL AREA(ACRES) = 0.3
LONGEST FLOWPATH FROM NODE 140.00 TO NODE 161.00 = 314.16 FEET.

FLOW PROCESS FROM NODE 161.00 TO NODE 171.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====

ELEVATION DATA: UPSTREAM(FEET) = 1500.98 DOWNSTREAM(FEET) = 1500.51
FLOW LENGTH(FEET) = 114.83 MANNING'S N = 0.012
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
DEPTH OF FLOW IN 12.0 INCH PIPE IS 5.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 2.96
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.04
PIPE TRAVEL TIME(MIN.) = 0.65 Tc(MIN.) = 7.20
LONGEST FLOWPATH FROM NODE 140.00 TO NODE 171.00 = 428.99 FEET.

FLOW PROCESS FROM NODE 171.00 TO NODE 171.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 7.20
RAINFALL INTENSITY(INCH/HR) = 3.52
TOTAL STREAM AREA(ACRES) = 0.30
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.04

FLOW PROCESS FROM NODE 170.00 TO NODE 171.00 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) = 84.50
 UPSTREAM ELEVATION(FEET) = 1505.46
 DOWNSTREAM ELEVATION(FEET) = 1504.33
 ELEVATION DIFFERENCE(FEET) = 1.13
 TC = 0.303*[(84.50**3)/(1.13)]**.2 = 4.237
 COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.226
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8821
 SOIL CLASSIFICATION IS "B"
 SUBAREA RUNOFF(CFS) = 0.37
 TOTAL AREA(ACRES) = 0.10 TOTAL RUNOFF(CFS) = 0.37

 FLOW PROCESS FROM NODE 171.00 TO NODE 171.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 5.00
 RAINFALL INTENSITY(INCH/HR) = 4.23
 TOTAL STREAM AREA(ACRES) = 0.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.37

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	0.98	5.66	3.972	0.30
1	1.04	6.36	3.748	0.30
1	1.04	7.20	3.522	0.30
2	0.37	5.00	4.226	0.10

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	1.24	5.00	4.226
2	1.33	5.66	3.972
3	1.37	6.36	3.748
4	1.35	7.20	3.522

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 1.37 Tc(MIN.) = 6.36
 TOTAL AREA(ACRES) = 0.4
 LONGEST FLOWPATH FROM NODE 140.00 TO NODE 171.00 = 428.99 FEET.

 FLOW PROCESS FROM NODE 171.00 TO NODE 172.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1500.50 DOWNSTREAM(FEET) = 1496.68
 FLOW LENGTH(FEET) = 88.01 MANNING'S N = 0.012
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
 DEPTH OF FLOW IN 12.0 INCH PIPE IS 3.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.48
 ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 1.37
 PIPE TRAVEL TIME(MIN.) = 0.20 Tc(MIN.) = 6.56
 LONGEST FLOWPATH FROM NODE 140.00 TO NODE 172.00 = 517.00 FEET.

 FLOW PROCESS FROM NODE 172.00 TO NODE 172.00 IS CODE = 11

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

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	1.24	5.20	4.143	0.40
2	1.33	5.86	3.905	0.40
3	1.37	6.56	3.691	0.40
4	1.35	7.40	3.475	0.40

LONGEST FLOWPATH FROM NODE 140.00 TO NODE 172.00 = 517.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	13.93	6.17	3.805	5.75
2	17.33	7.79	3.387	5.75
3	17.52	8.87	3.172	5.75
4	16.39	10.93	2.858	5.75

LONGEST FLOWPATH FROM NODE 100.00 TO NODE 172.00 = 1375.03 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	12.99	5.20	4.143
2	14.56	5.86	3.905
3	15.22	6.17	3.805
4	15.97	6.56	3.691
5	17.82	7.40	3.475
6	18.65	7.79	3.387
7	18.76	8.87	3.172

8 17.50 10.93 2.858

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 18.76 Tc(MIN.) = 8.87
TOTAL AREA(ACRES) = 6.2

FLOW PROCESS FROM NODE 172.00 TO NODE 172.00 IS CODE = 12

>>>>CLEAR MEMORY BANK # 1 <<<<<
=====

FLOW PROCESS FROM NODE 172.00 TO NODE 173.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====

ELEVATION DATA: UPSTREAM(FEET) = 1496.58 DOWNSTREAM(FEET) = 1496.55
FLOW LENGTH(FEET) = 12.35 MANNING'S N = 0.012
DEPTH OF FLOW IN 30.0 INCH PIPE IS 21.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.90
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 18.76
PIPE TRAVEL TIME(MIN.) = 0.04 Tc(MIN.) = 8.92
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 173.00 = 1387.38 FEET.
=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 6.2 TC(MIN.) = 8.92
PEAK FLOW RATE(CFS) = 18.76

*** PEAK FLOW RATE TABLE ***

	Q(CFS)	Tc(MIN.)
1	12.99	5.25
2	14.56	5.90
3	15.22	6.21
4	15.97	6.60
5	17.82	7.44
6	18.65	7.83
7	18.76	8.92
8	17.50	10.98

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 1435

Analysis prepared by:

***** DESCRIPTION OF STUDY *****
* FIRST MARCH BUILDING 2 *
* PROPOSED CONDITION 100-YEAR *
* NODES 180-181 *

FILE NAME: W:\3933\P180.DAT
TIME/DATE OF STUDY: 15:38 03/02/2021

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 = 0.95
2-YEAR, 1-HOUR PRECIPITATION(INCH) = 0.470
100-YEAR, 1-HOUR PRECIPITATION(INCH) = 1.220
COMPUTED RAINFALL INTENSITY DATA:
STORM EVENT = 100.00 1-HOUR INTENSITY(INCH/HOUR) = 1.220
SLOPE OF INTENSITY DURATION CURVE = 0.5000
RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
NOTE: CONSIDER ALL CONFLUENCE STREAM COMBINATIONS
FOR ALL DOWNSTREAM ANALYSES

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0313 0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

- Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
 - (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 180.00 TO NODE 181.00 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) = 34.31
UPSTREAM ELEVATION(FEET) = 1503.92
DOWNSTREAM ELEVATION(FEET) = 1503.54
ELEVATION DIFFERENCE(FEET) = 0.38
TC = 0.303*[(34.31**3)/(0.38)]**.2 = 3.068
COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.226
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8821
SOIL CLASSIFICATION IS "B"
SUBAREA RUNOFF(CFS) = 0.93
TOTAL AREA(ACRES) = 0.25 TOTAL RUNOFF(CFS) = 0.93

=====

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 0.2 TC(MIN.) = 5.00
PEAK FLOW RATE(CFS) = 0.93

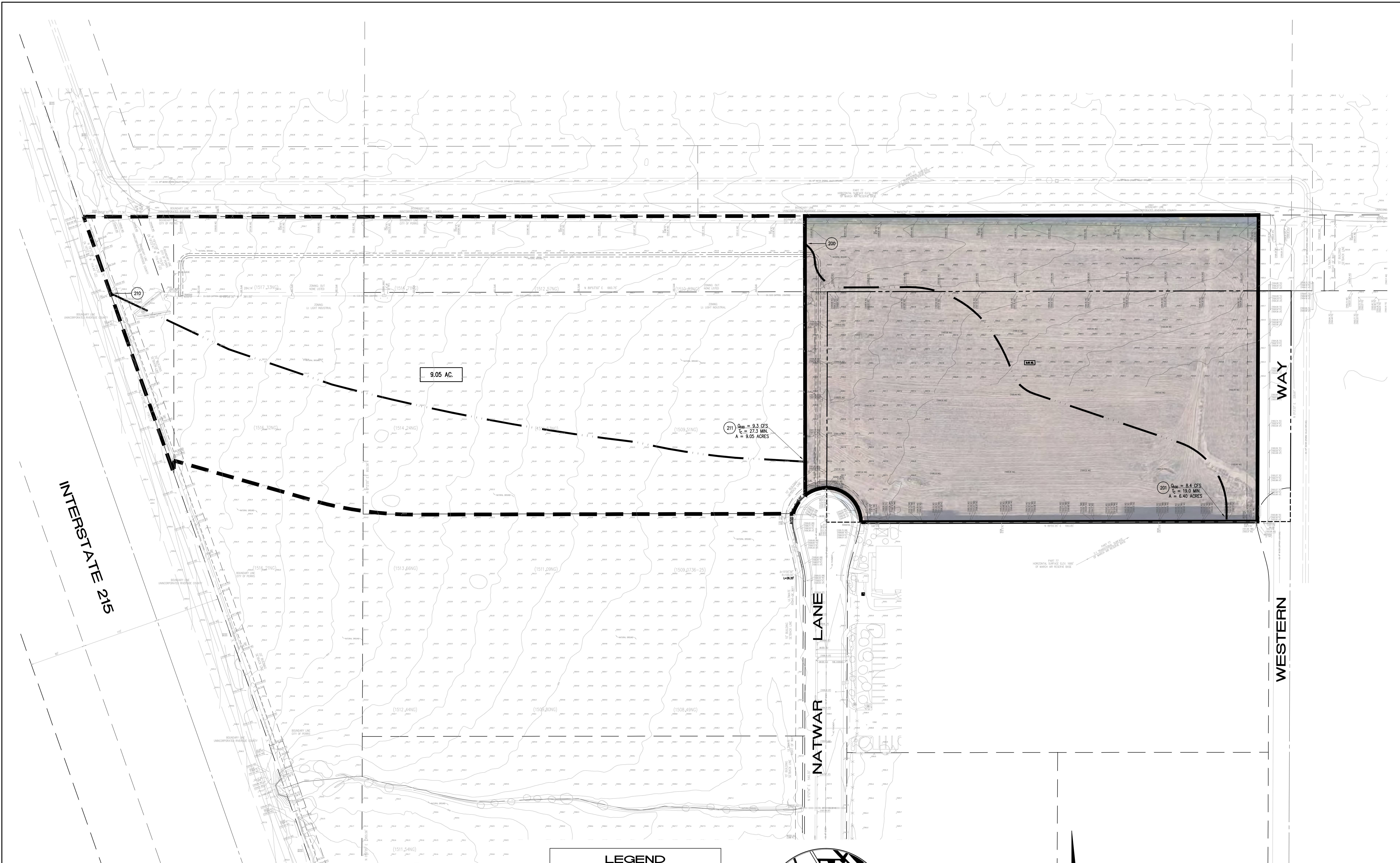
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END OF RATIONAL METHOD ANALYSIS

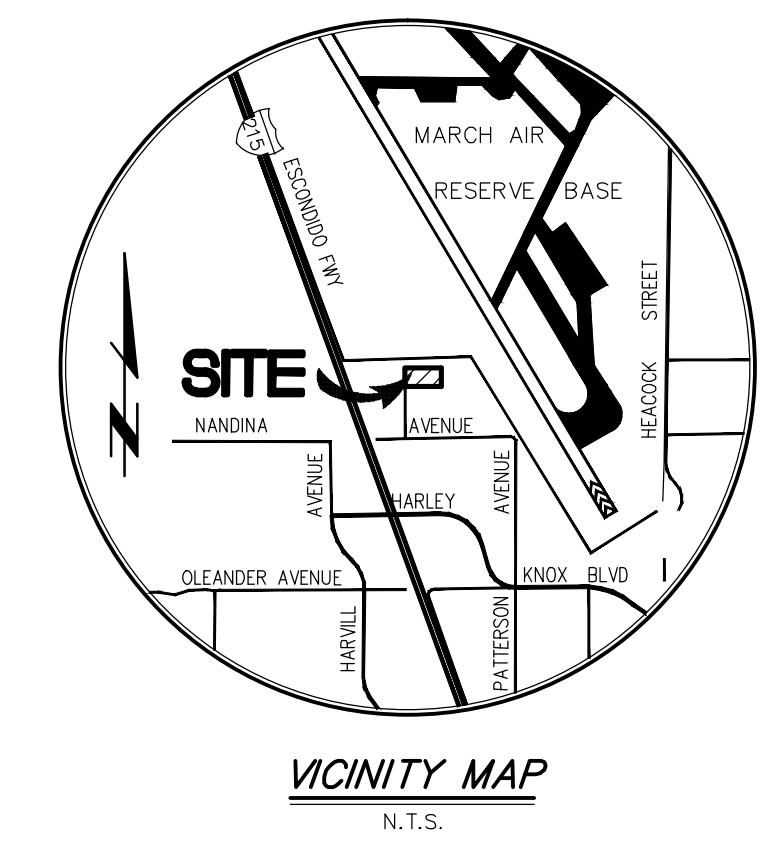
▲

APPENDIX C

HYDROLOGY MAPS



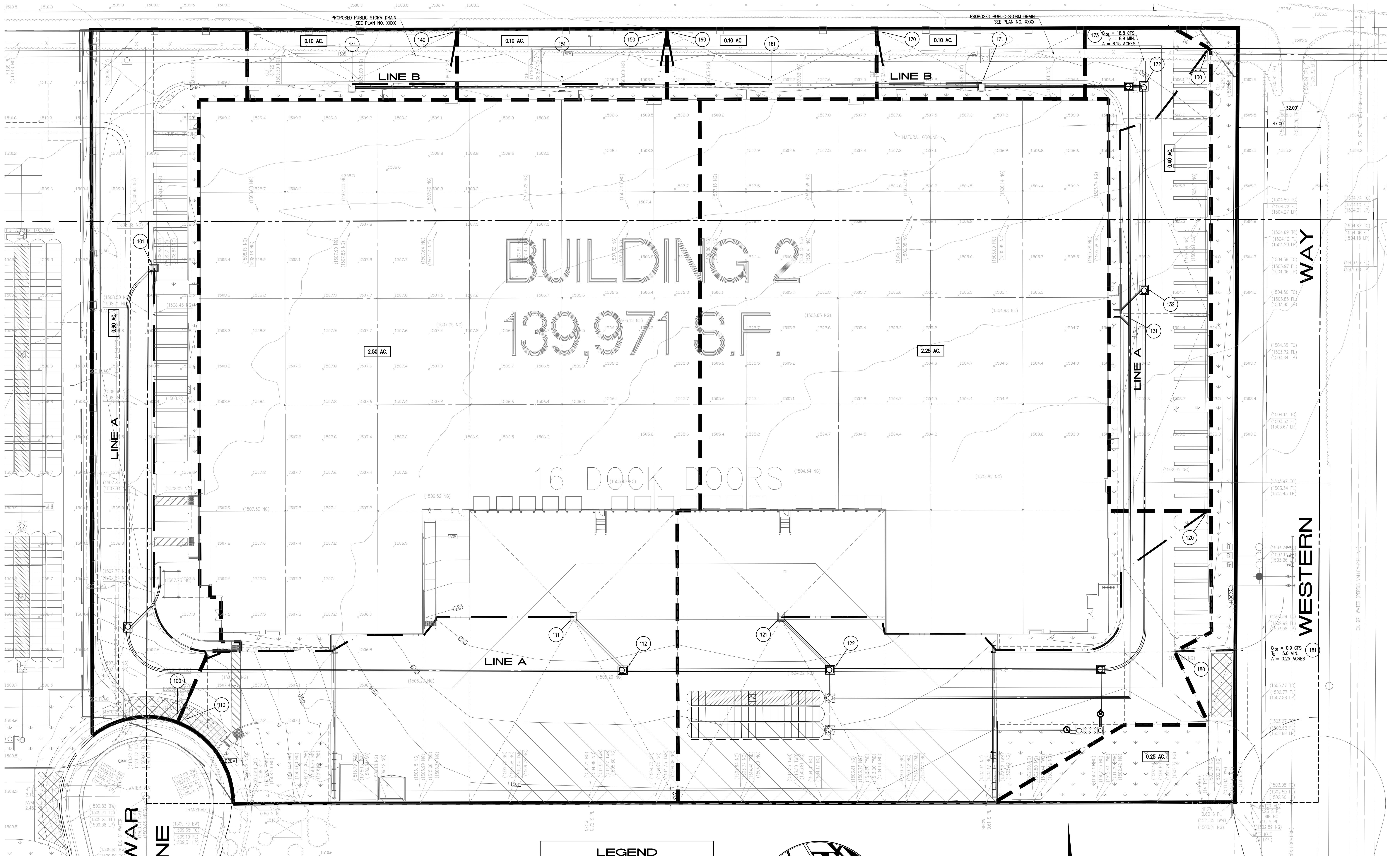
LEGEND	
	PROJECT BOUNDARY
	SUBAREA BOUNDARY
	FLOW PATH
	SUBAREA AREA
	NODE NUMBER
T_c	TIME OF CONCENTRATION
Q_{100}	DISCHARGE (CUBIC FEET PER SECOND) NUMBER DESIGNATE YEAR OF FREQUENCY



PREPARED FOR:
FIRST INDUSTRY REALTY TRUST, INC.
 898 N. PACIFIC COAST HIGHWAY STE. 175
 EL SEGUNDO, CA 90245
 PHONE: (310) 321-3813
 EMAIL: MPIC@FIRSTINDUSTRIAL.COM



CITY OF PERRIS PUBLIC WORKS DEPARTMENT	
EXISTING CONDITION HYDROLOGY MAP FIRST MARCH NATWAR LANE	
Designed by _____ Date _____	Approved by _____ Date _____
Checked by _____ Date _____	Public Works Director _____ R.C.E. XXXXX
Designed by _____ Date _____	
Checked by _____ Date _____	
Sheet 1 of 1 Sheets	



BUILDING 2
139,971 S.F.

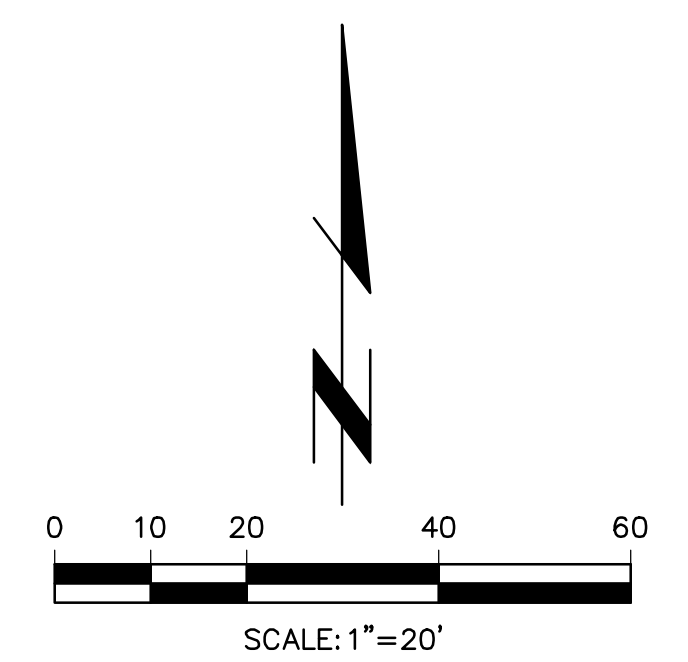
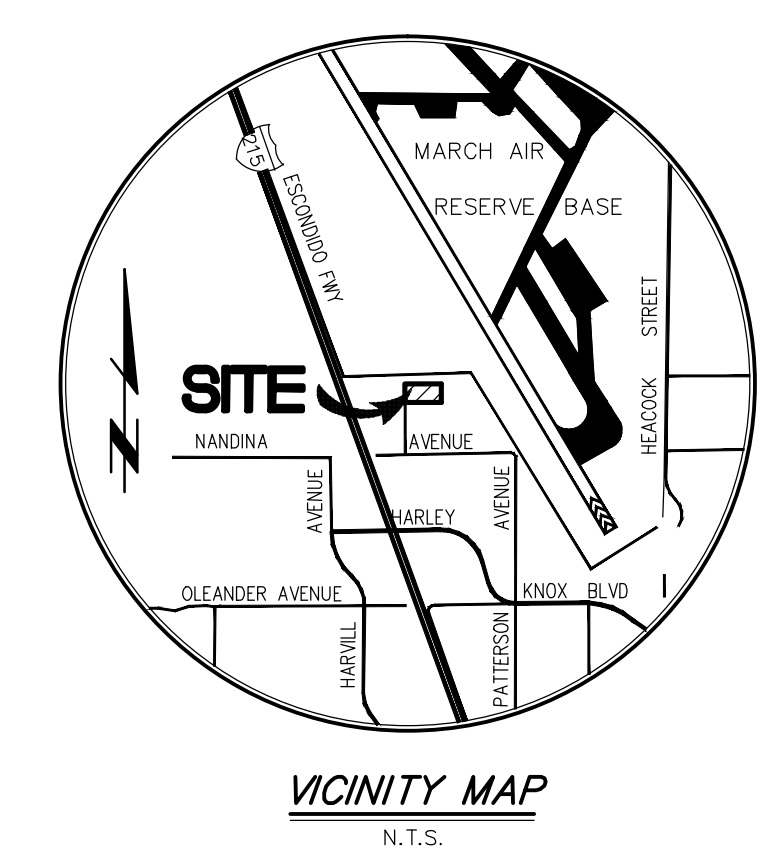
16 DOCK DOORS

NATWAR LANE

WAY

WESTERN

LEGEND	
	PROJECT BOUNDARY
	SUBAREA BOUNDARY
	FLOW PATH
	SUBAREA AREA
	NODE NUMBER
T_c	TIME OF CONCENTRATION
Q_{100}	DISCHARGE (CUBIC FEET PER SECOND) NUMBER DESIGNATE YEAR OF FREQUENCY



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Tai Thienes Engineering, Inc.
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 14144 FIRESTONE BOULEVARD
 LA BURE, CALIFORNIA 90639
 PH: (714) 521-4811 FAX: (714) 521-4753

CITY OF PERRIS PUBLIC WORKS DEPARTMENT	
PROPOSED CONDITION HYDROLOGY MAP FIRST MARCH NATWAR LANE	
Designed by _____	Approved by _____ Date _____
Checked by _____	Public Works Director _____ R.C.E. XXXXX
Designed by _____	
Date _____	
Checked by _____	
Date _____	
Sheet 1 of 1 Sheets	