



Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING

**PRELIMINARY HYDROLOGY
STUDY**

FOR

**HARLEY KNOX INDUSTRIAL DEVELOPMENT
657 HARLEY KNOX BOULEVARD
PERRIS, CALIFORNIA**

-

PREPARED FOR

**FIRST INDUSTRIAL REALTY TRUST, INC.
898 N. PACIFIC COAST HIGHWAY BLVD., SUITE 175
EL SEGUNDO, CA 90245
PHONE: (310) 414-5400
FAX: (310) 414-5462**

**FEBRUARY 14, 2022
REVISED MAY 20, 2022**

JOB NO. 4066

PREPARED BY

**THIENES ENGINEERING
14349 FIRESTONE BLVD.
LA MIRADA, CALIFORNIA 90638
(714) 521-4811**

PRELIMINARY HYDROLOGY STUDY

FOR

HARLEY KNOX INDUSTRIAL DEVELOPMENT

PREPARED UNDER
THE SUPERVISION OF



REINHARD STENZEL, PE
R.C.E. 56155
EXP. 12/31/22

INTRODUCTION

A: PROJECT LOCATION

The project site is located on the northerly side of Harley Knox Boulevard west of Indian Avenue. Please see next page for vicinity map.

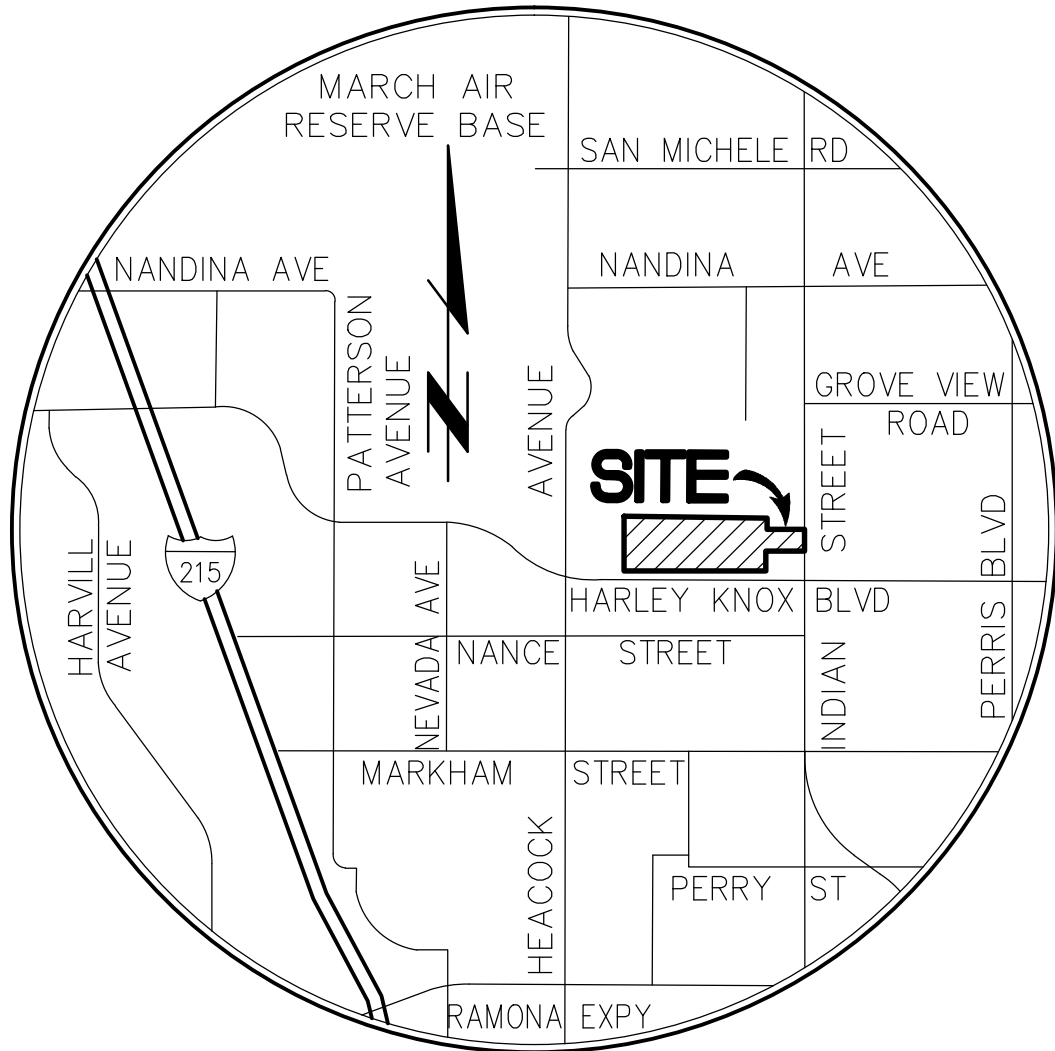
B: STUDY PURPOSE

The purpose of this study is to determine existing and proposed condition 100-year peak flow rates for the project site. Flow ultimately discharge to Perris Valley Storm Channel, Lateral B.

C: PROJECT STAFF:

Thienes Engineering staff involved in this study include:

Reinhard Stenzel
Brian Weil



VICINTY MAP

N.T.S.

DISCUSSION

The project site encompasses approximately 21.58 acres. Proposed improvements include one warehouse type building with approximately 348,000 square feet. There is a truck dock area located on the northerly side of the building with additional trailer parking at the easterly portion of the site. Vehicle parking is located on the southerly portion of the site. There is a bioretention area at the northwest corner of the site and other landscaped areas throughout.

Master Plan Hydrology

From the Master Drainage Plan of the Perris Valley Area (dated June 1991), the site has been tabled to Line “D” which is generally located in Markham Street, and Nance Street. However, Webb and Associates updated the Master Drainage Plan for Line “D” which reduces area to Line D and tables other areas to Lines “E-3” and “E-11”. From this map, the project site has now been tabled northerly to Perris Valley Storm Channel, Lateral “B”.

Riverside County Flood Control and Water Conservation District has acknowledged that the site can drain to this Channel, but flows must be limited to existing conditions (undeveloped).

FEMA Flood Zones

The project site is located within Flood Zone X (unshaded) and Zone D per Map Number 06065C1430H, Effective August 18, 2014. Flood Zone X (unshaded) is described as “areas determined to be outside the 0.2% annual chance floodplain”. Flood Zone D is described as “areas in which flood hazards are undetermined, but possible”. See Appendix “A” for reference FIRM.

Existing Storm Drains

The Perris Valley Storm Channel, Lateral “B” is adjacent to the northerly property line. The channel has a base width of 46’, depth of 9.0’ with 2:1 sideslopes. This is a Riverside County Flood Control and Water Conservation District facility.

There is an existing 18” storm drain in Harley Knox adjacent to the neighboring development to the east. This storm drain conveys runoff easterly in Harley Knox then northerly in Indian Avenue to the Perris Valley Storm Channel. This appears to be a City of Perris storm drain.

See Appendix “A” for reference storm drain plans.

Existing Condition

The site is currently a vacant dirt lot with natural weeds and grasses. The site is relatively flat. The westerly portion of the site (nodes 100-101 and 110-111 on existing condition hydrology map) tends to drain southerly to Harley Knox Boulevard. The respective 100-year peak flow rates to Harley Knox are approximately 10.8 cfs and 8.4 cfs.

The easterly portion of the site (nodes 200-201) tends to drain easterly towards Indian Avenue. The 100-year existing condition peak flow rate at this location is approximately 5.8 cfs

See Appendix “B” for existing condition hydrology calculations and Appendix “D” for hydrology map.

Proposed Condition

Runoff from the westerly parking lot, the northerly truck yard, and the northerly portion of the proposed building (nodes 100-107 on proposed condition hydrology map) drains to catch basins in the parking lot and truck yard. A proposed storm drain conveys runoff easterly.

Runoff from the southerly parking lot and the southerly portion of the building (nodes 200-203) drain to catch basins located in the parking area. A proposed storm drain conveys runoff easterly then to the north and confluences with the previously mentioned storm drain (at node 204). The storm drain continues easterly. The easterly truck parking lot (nodes 205-206) is intercepted in catch basins and conveyed to this storm drain. The onsite storm drain then connects to the Perris Valley Storm Channel.

The proposed condition 100-year peak flow rate is approximately 52.7 cfs undetained.

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

Detention

For final design, Riverside County typically requires detention analysis for the 1-hour, 3-hour, 6-hour and 24-hour duration events for the 2-year, 5-year and 10-year return frequencies. Detention basin and outlet sizing will ensure that none of these storm events has a higher peak discharge in the post-development condition than in the pre-development condition.

Hydrographs for the above events were established for both existing (pre-developed) and proposed (commercial) development conditions. Hydrograph parameters are as follows:

- For the 2-year and 5-year events, the loss rate will be determined using an AMC I condition. For the 10-year event, AMC II was used.

- Undeveloped condition Low Loss=90%
- Basin site Low Loss=10%
- Rainfall values from the Riverside County Hydrology Manual

For preliminary design purposes, sizing may be based on the difference in runoff hydrograph volume between the “developed” condition and the “pre-developed” condition for the 24-hour duration event for the 10-year return frequency.

Hydrographs were established using the area of the project site (site only, no offsite area) for the existing and proposed condition for the 1-hour, 3-hour, 6-hour and 24-hour events for the 10-year storm frequency. The following table summarizes pre- and post-development peak flow rates for the specified events:

Event	Existing Condition	Proposed Condition	Difference
10-Year 1-hour	31.4 cfs	38.3 cfs	+6.9 cfs
10-Year 3-hour	17.0 cfs	22.8 cfs	+5.8 cfs
10-Year 6-hour	13.4 cfs	19.4 cfs	+6.0 cfs
10-Year 24-hour	2.5 cfs	7.2 cfs	+4.7 cfs

The following table summarizes the volumes for the specified storm events:

Event	Existing Condition	Proposed Condition	Difference
10-Year 1-hour	0.88 ac-ft	1.29 ac-ft	+0.41 ac-ft
10-Year 3-hour	0.88 ac-ft	2.04 ac-ft	+1.16 ac-ft
10-Year 6-hour	0.85 ac-ft	2.63 ac-ft	+1.78 ac-ft
10-Year 24-hour	0.60 ac-ft	4.37 ac-ft	+3.77 ac-ft

From the above table, the largest difference in volume is approximately 3.77 acre-feet. This volume has been provided in the truck and trailer yard at a maximum depth of 1.60'. Final design will include basin routing.

See Appendix “C” for proposed and existing condition hydrographs.

Methodology

Hydrology calculations were computed using Riverside County's Rational Method Program (by AES Software). The soil type is “B” per the Riverside County Hydrology Manual (see Appendix "A"). Hydrographs were computed using CivilD Software.

APPENDIX

DESCRIPTION

A

REFERENCE MATERIALS

B

HYDROLOGY CALCULATIONS
EXISTING CONDITION
PROPOSED CONDITION

C

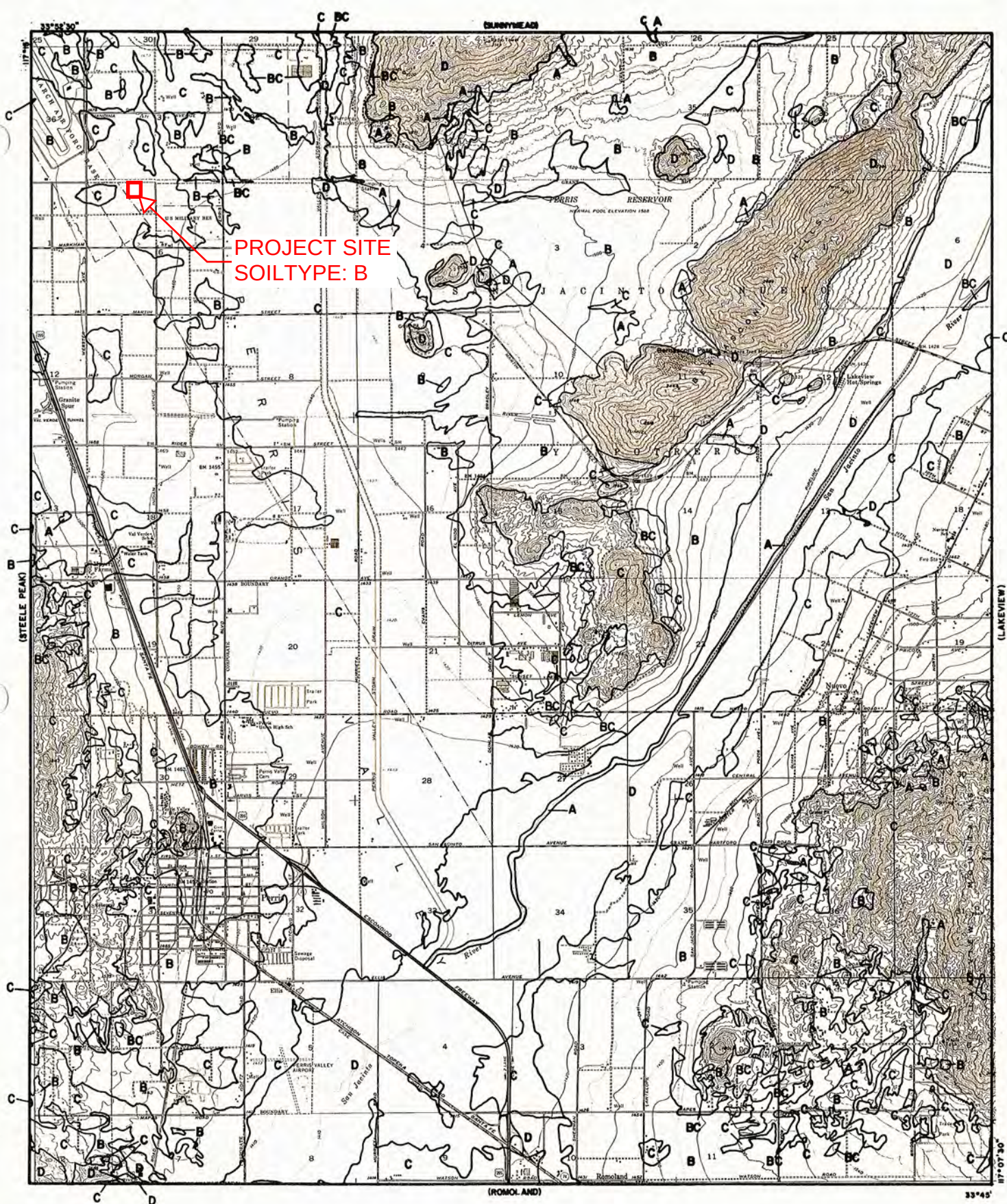
DETENTION ANALYSIS

D

HYDROLOGY MAP

APPENDIX A

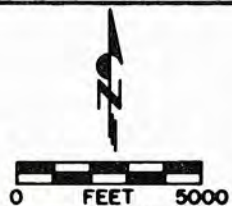
REFERENCE MATERIALS



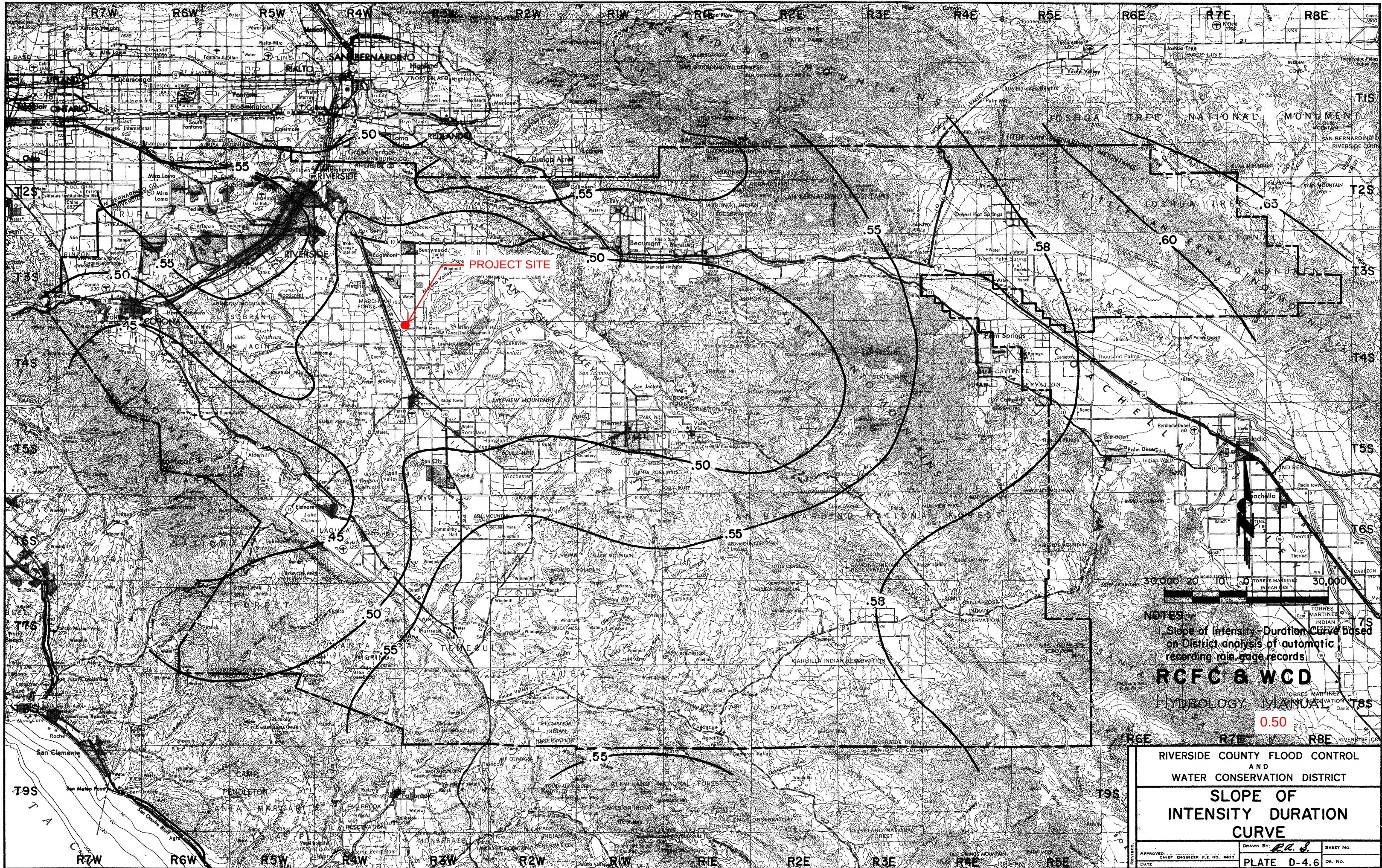
LEGEND

- SOILS GROUP BOUNDARY
- A SOILS GROUP DESIGNATION

RCFC&WCD
HYDROLOGY MANUAL



HYDROLOGIC SOILS GROUP MAP FOR PERRIS



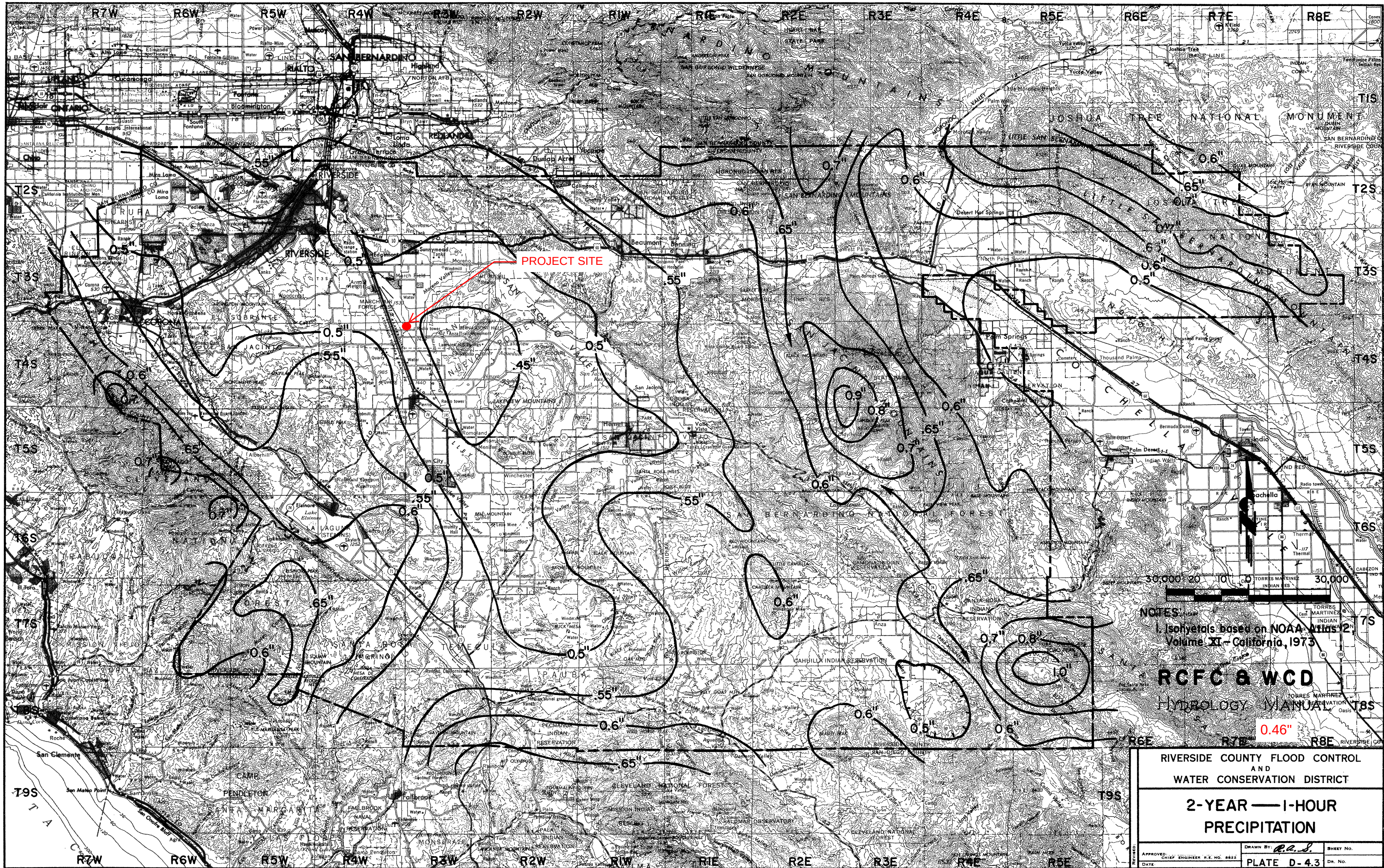
NOTES:
1. Slope of Intensity-Duration Curve based on District analysis of automatic recording rain gage records.

RCFC & WCD

HYDROLOGY MANUAL

0.50

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT		
SLOPE OF INTENSITY DURATION CURVE		
APPROVED: CHIEF ENGINEER R.E. NO. 8822	DRAWN BY: <i>R.E. J.</i>	SHEET NO.
DATE	PLATE D-4.6	DR. NO.

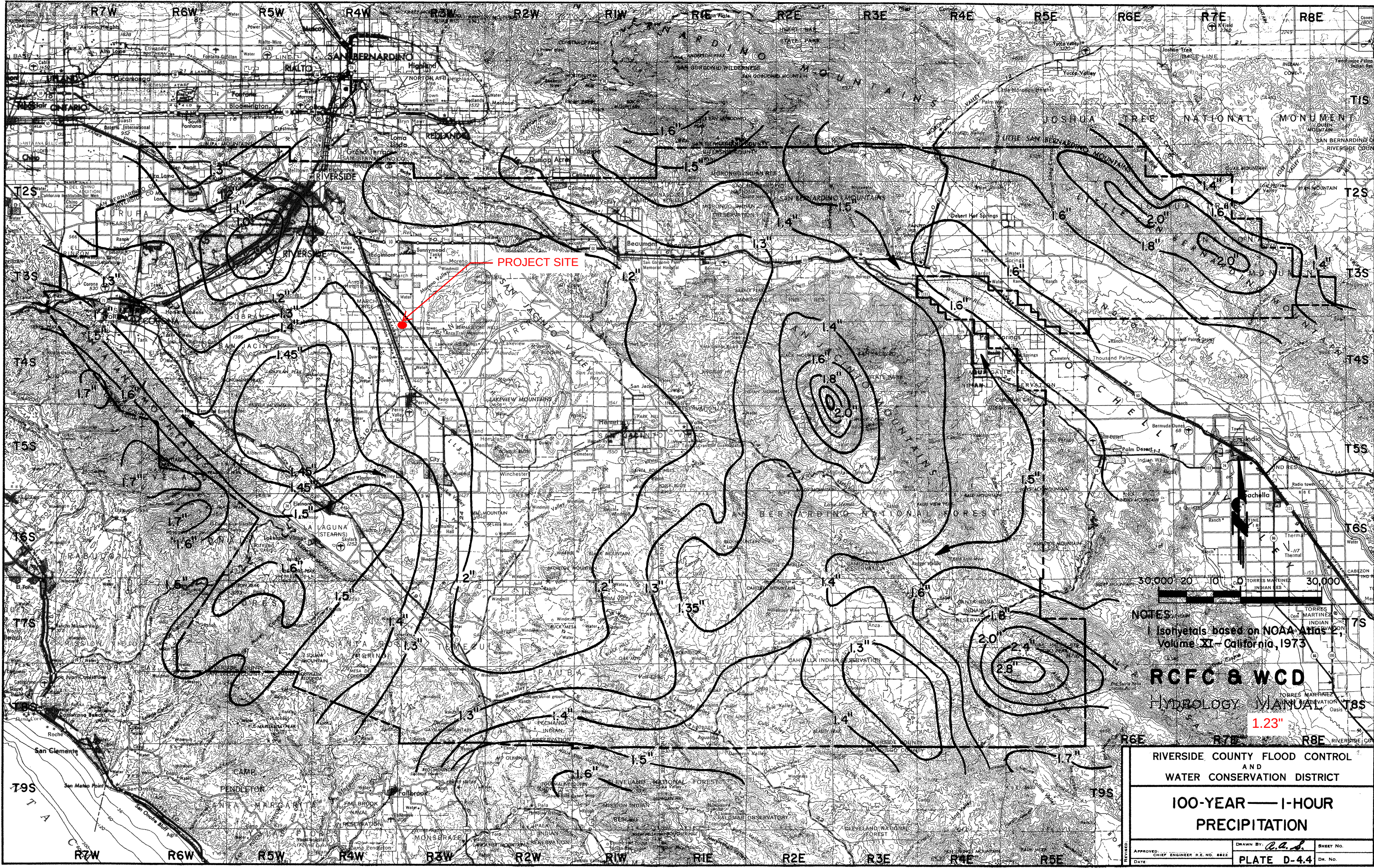


NOTES:
Isohyets based on NOAA Atlas 2,
Volume XI - California, 1973

RCFC & WCD
HYDROLOGY MANUAL

**RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT**
**2-YEAR — 1-HOUR
PRECIPITATION**

APPROVED: CHIEF ENGINEER R.E. NO. 882	DRAWN BY: <i>P.L.S.</i>	SHEET NO.
DATE:	PLATE D-4.3	DR. NO.



30,000 20 10 0 10 20 30,000
INCHES

NOTES:
1. Isohyets based on NOAA Atlas 14, Volume XI - California, 1973.

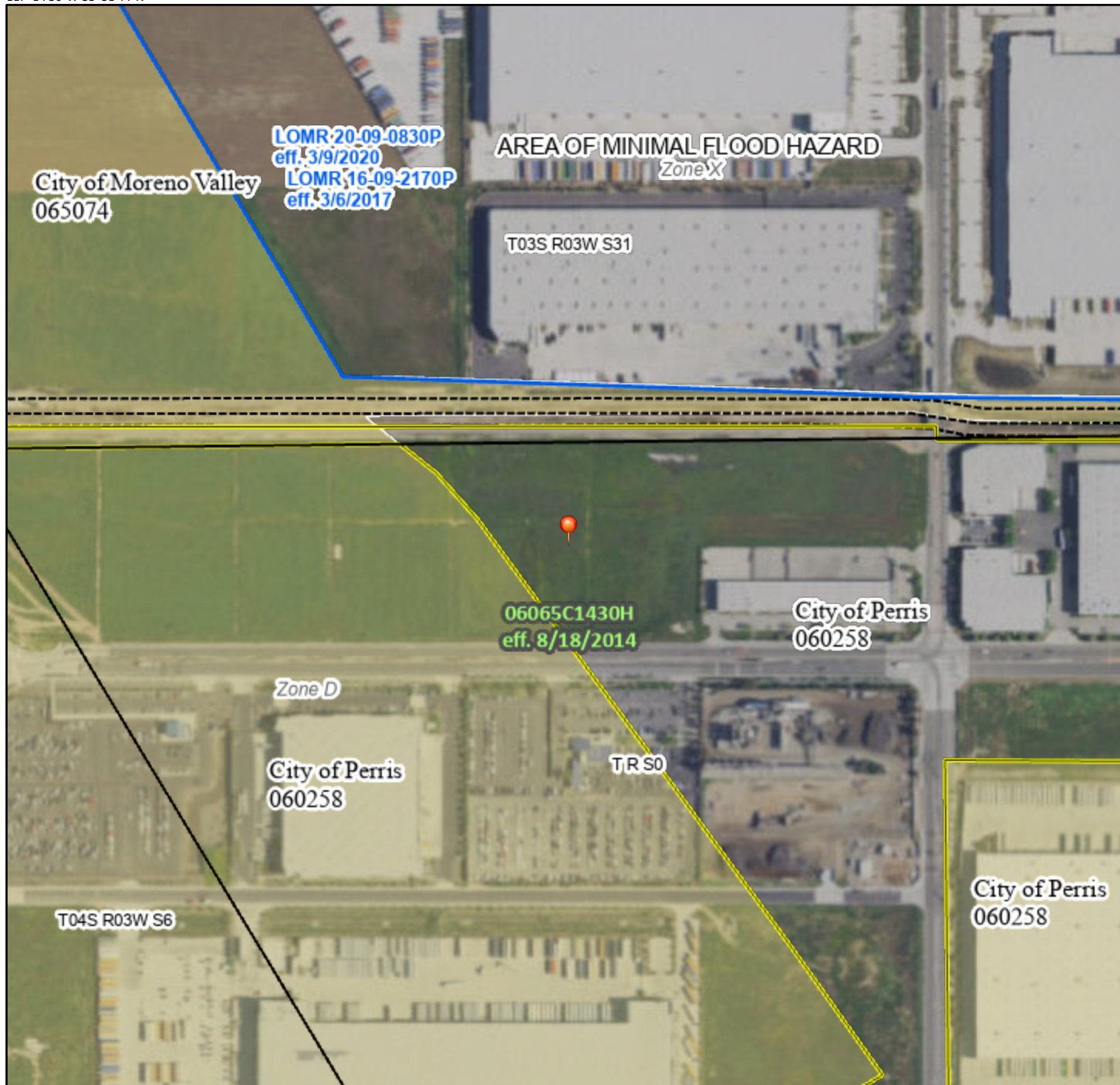
RCFC & WCD
HYDROLOGY MANUAL
1.23"

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT		
100-YEAR — 1-HOUR PRECIPITATION		
APPROVED: DATE	CHIEF ENGINEER R.E. NO. 8822	DRAWN BY: <i>C.A.S.</i> SHEET NO. PLATE D-4.4 DR. NO.

National Flood Hazard Layer FIRMette



117°14'36"W 33°51'44"N



0 250 500 1,000 1,500 2,000 Feet 1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
		Area with Flood Risk due to Levee Zone D
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard Zone X
		Effective LOMRs
GENERAL STRUCTURES		Area of Undetermined Flood Hazard Zone D
		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance Water Surface Elevation
		17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
MAP PANELS		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
		Digital Data Available
		No Digital Data Available
		Unmapped

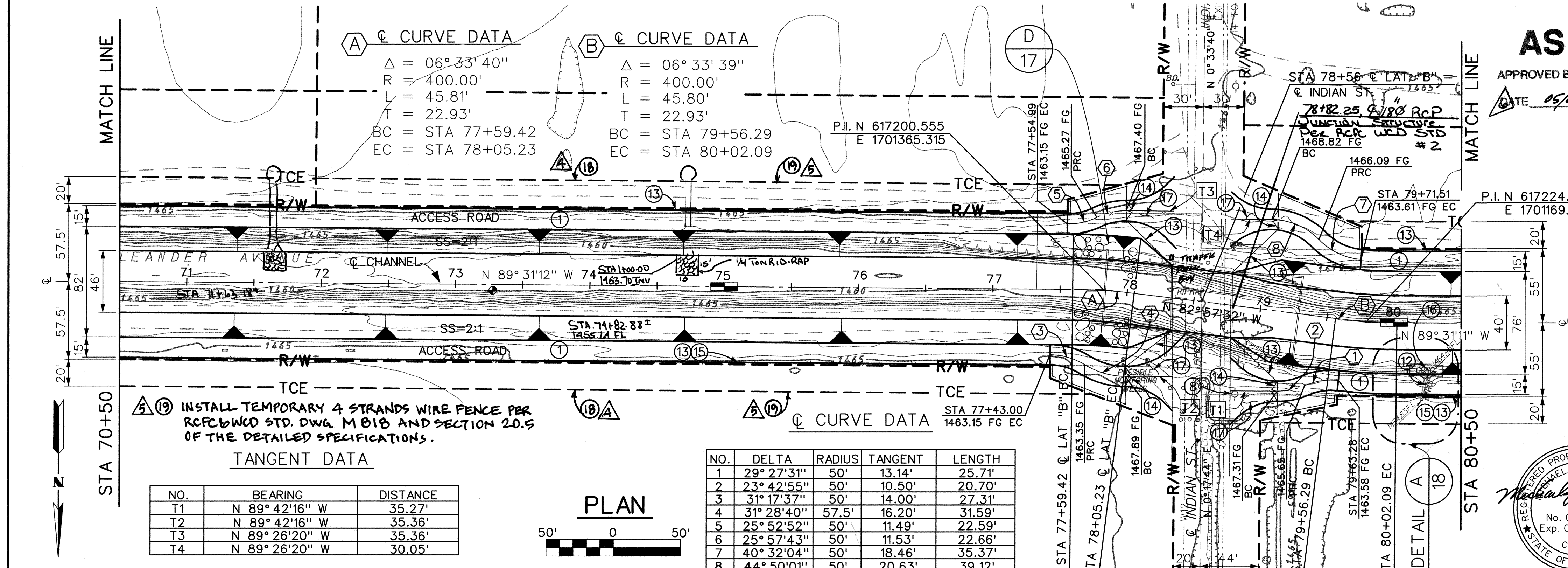
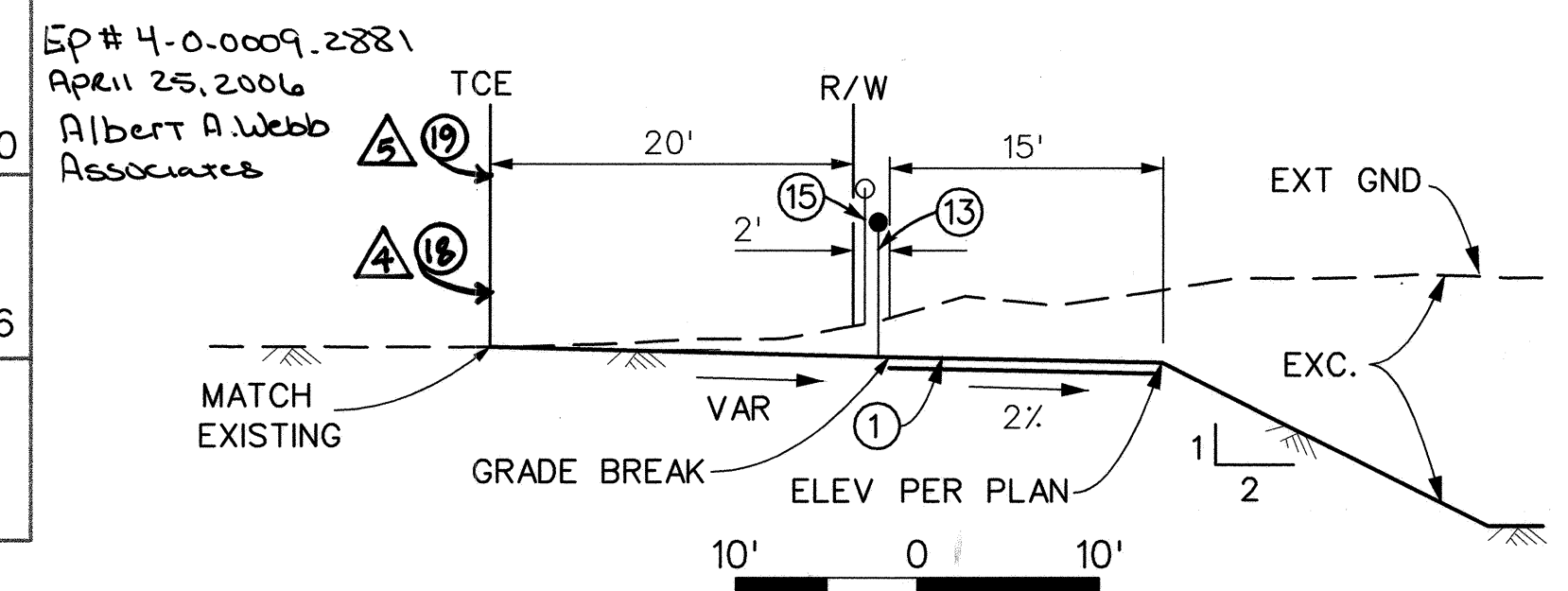
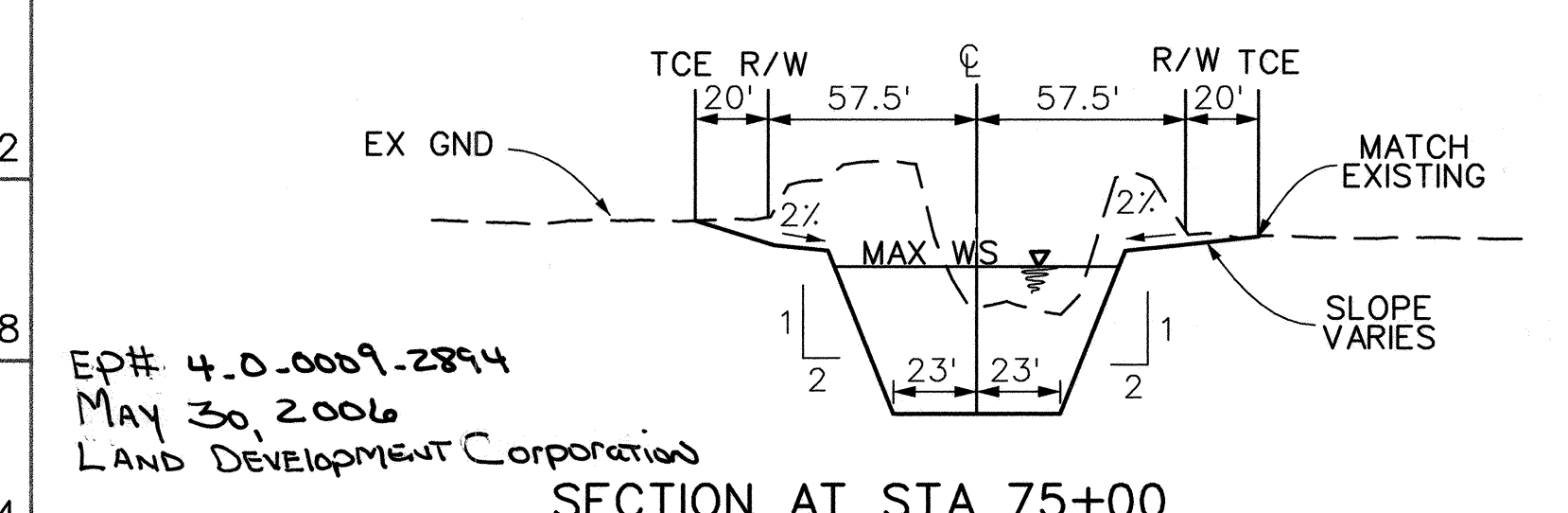
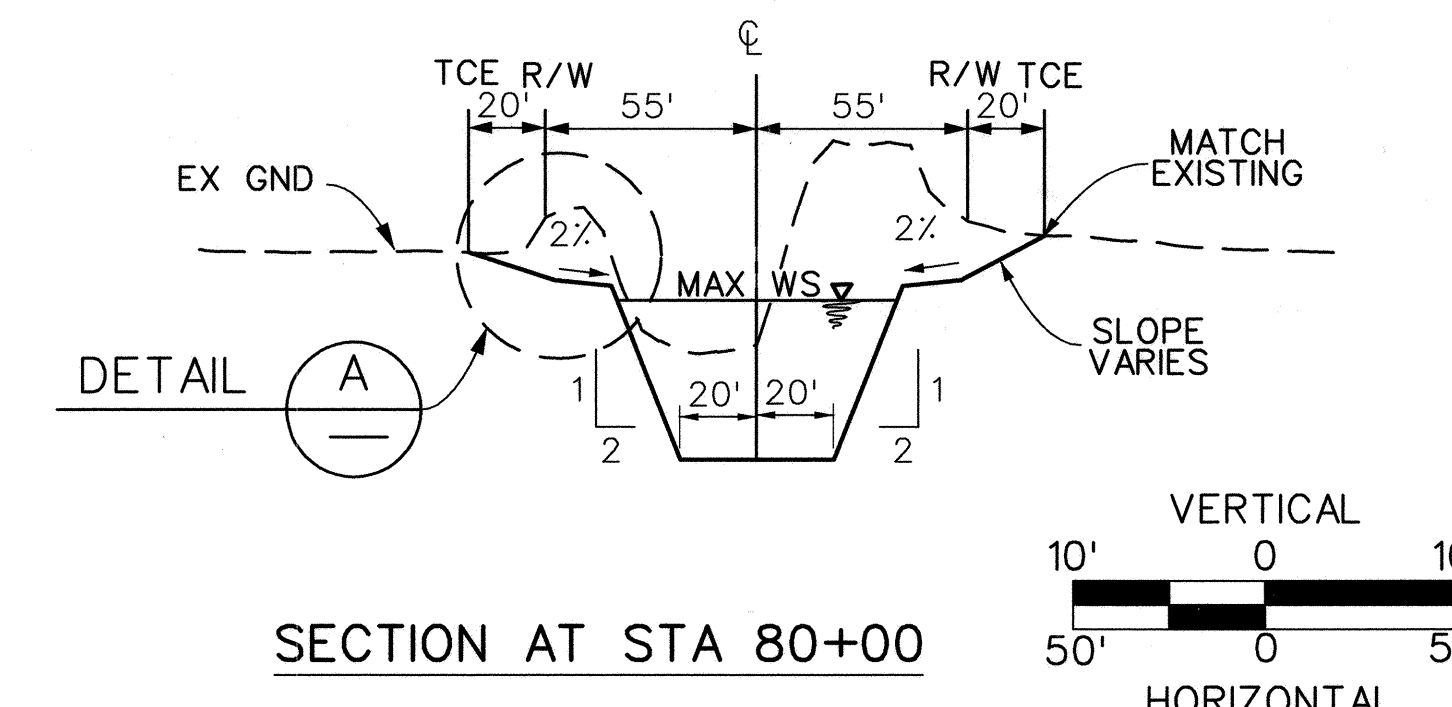
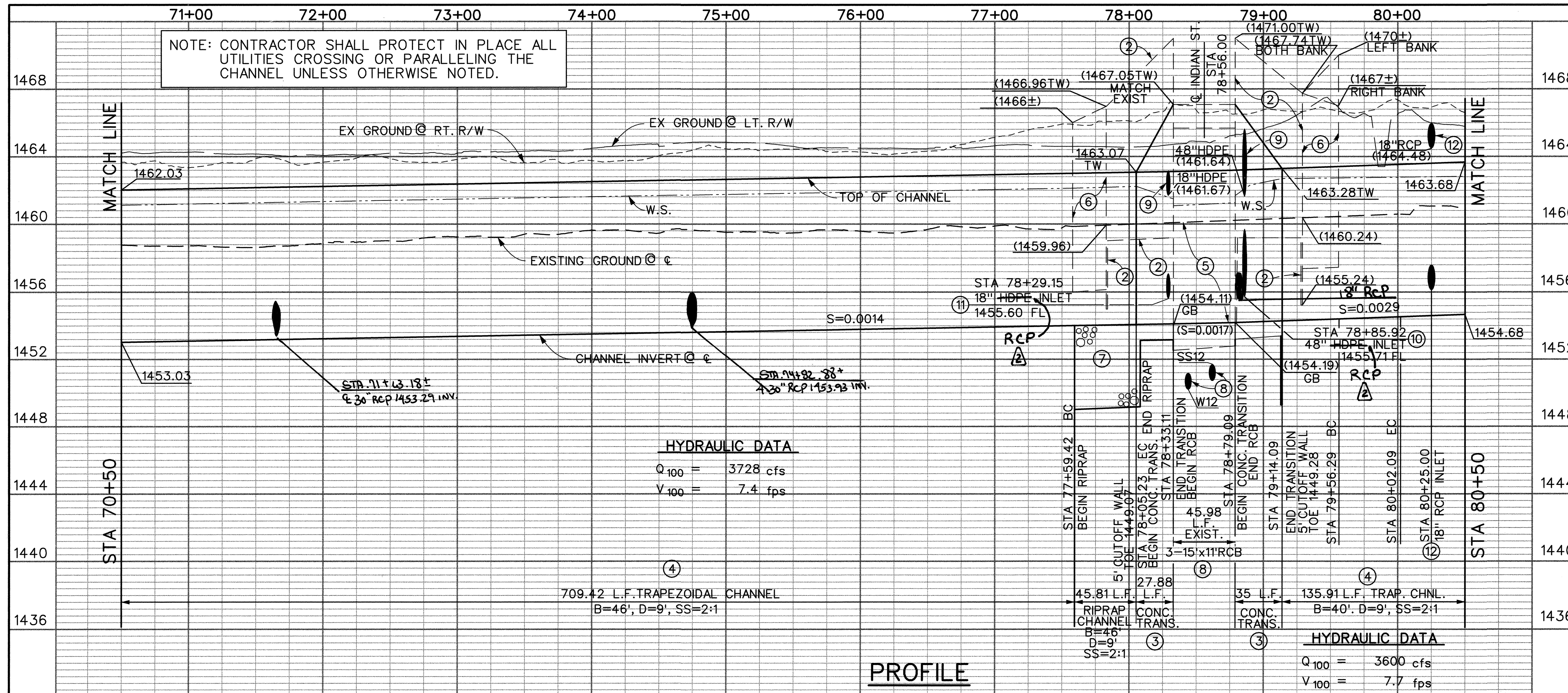


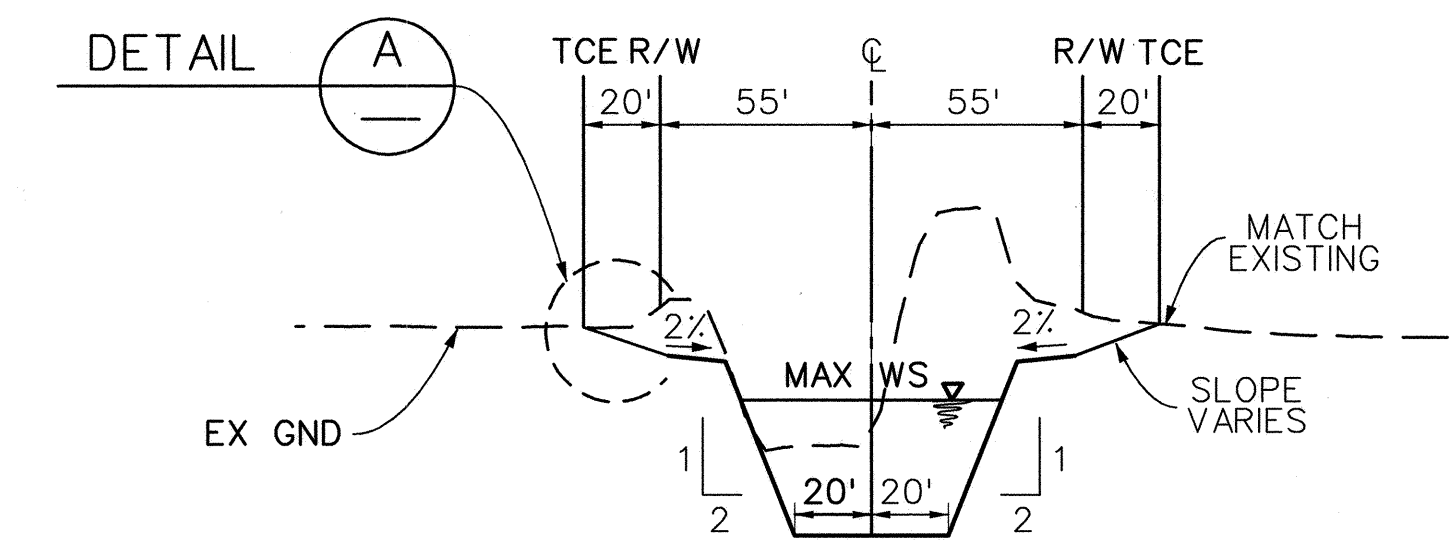
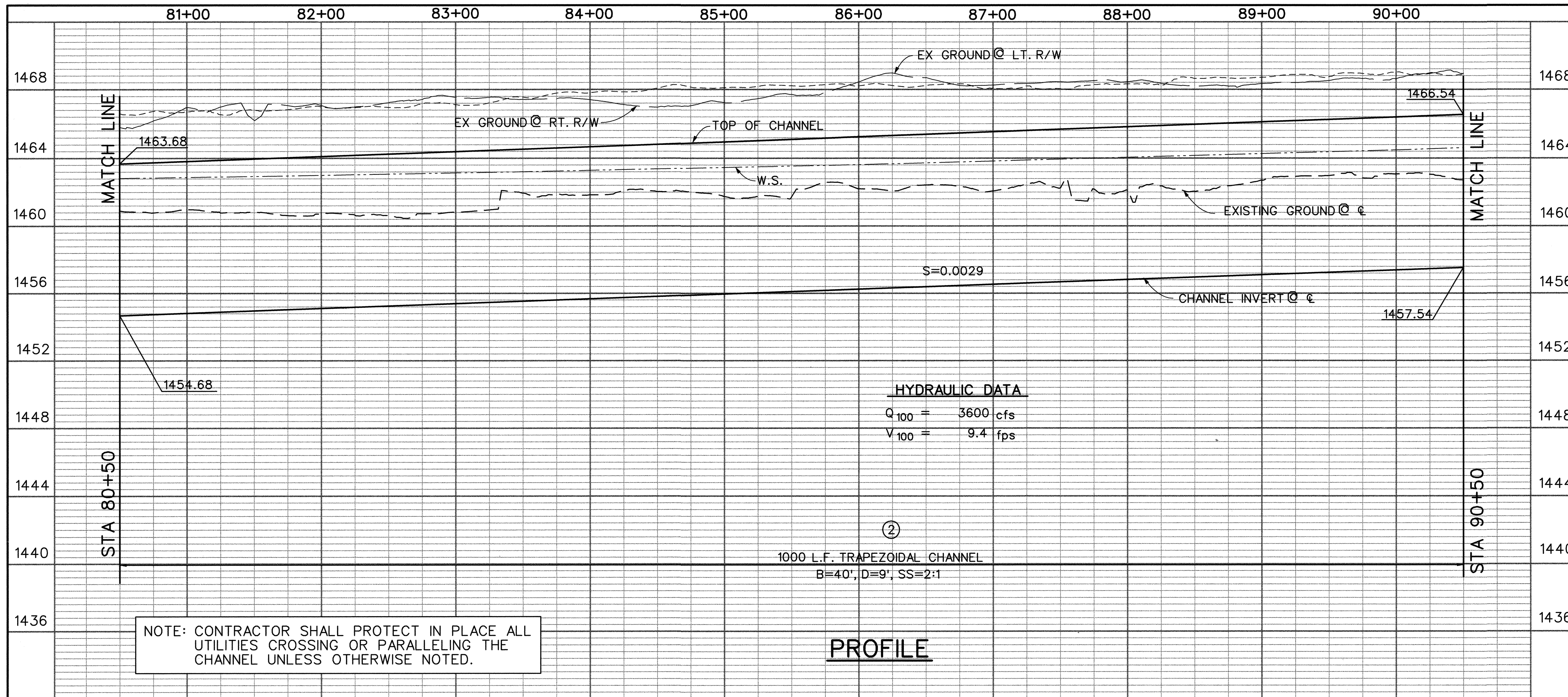
The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

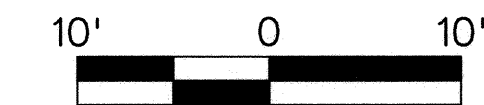
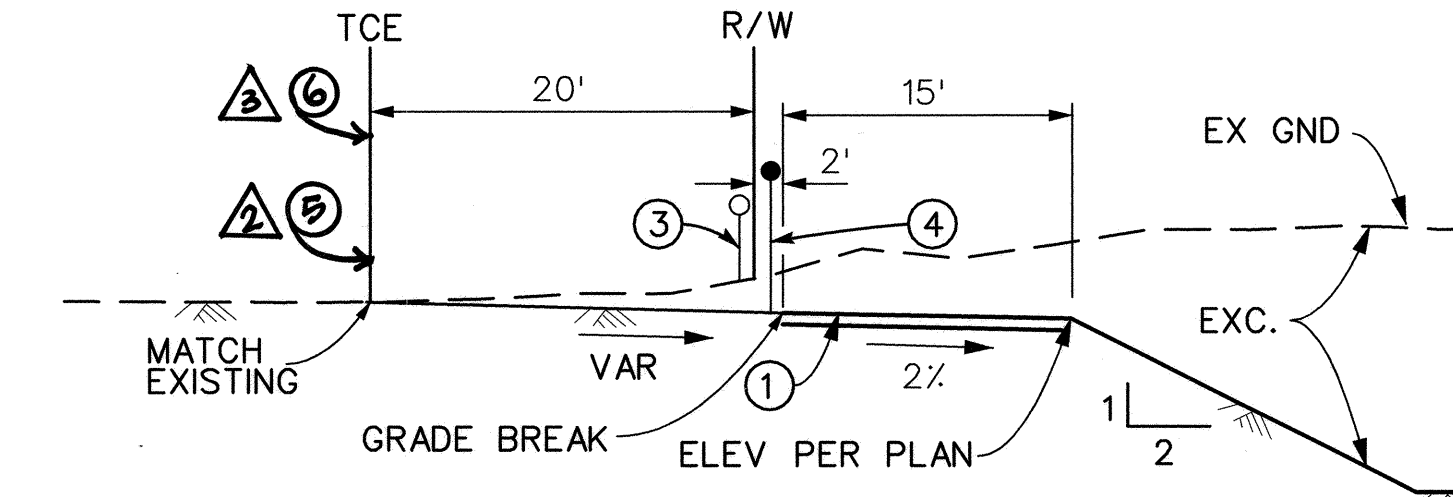
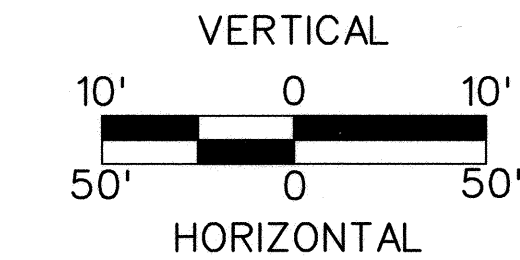
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **12/15/2021 at 2:48 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.





SECTION AT STA 89+00



ACCESS ROAD DET. A

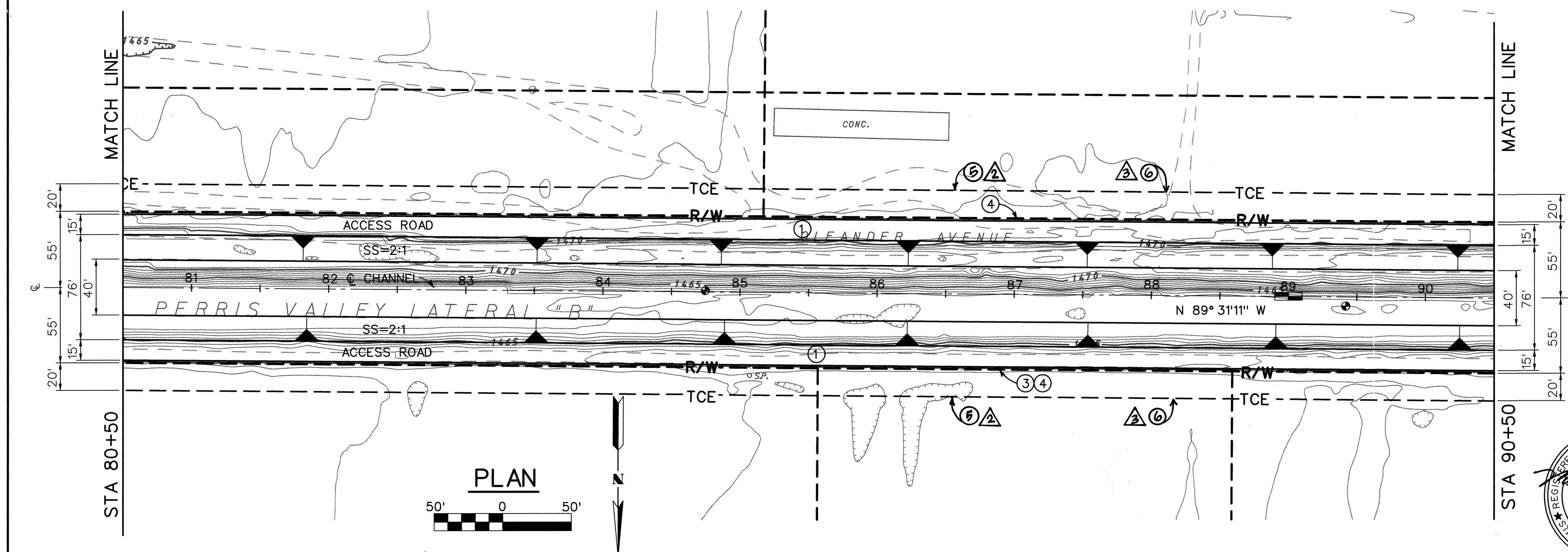
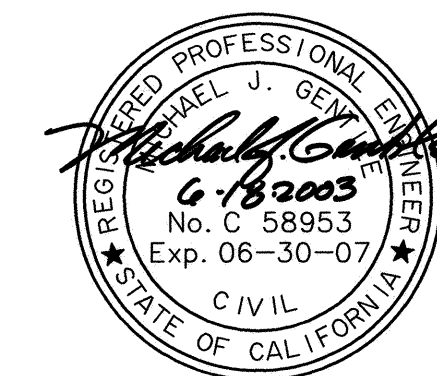
AS BUILT

APPROVED BY: *[Signature]*

DATE: 05/05/06

NOTES

- CONSTRUCT 15' WIDE ACCESS ROAD PER DETAIL "A" HEREON. PLACE 3" CRUSHED SLAG AGGREGATE OR APPROVED EQUIVALENT
- CONSTRUCT TRAPEZOIDAL CHANNEL PER TYPICAL SECTION SHOWN HEREON
- REMOVE AND DISPOSE EXISTING FENCE
- CONSTRUCT 6' CHAIN LINK FENCE PER RCFC&WCD STD. DWG. M801
- ~~INSTALL TEMPORARY BARBED WIRE FENCE~~
- INSTALL TEMPORARY 4 STRANDS WIRE FENCE PER RCFC&WCD STD. DWG. M818 AND SECTION 20.5 OF THE DETAILED SPECIFICATIONS.



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

for the location of buried utility lines.

Don't disrupt vital services.

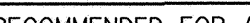
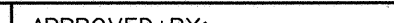
TWO WORKING DAYS BEFORE YOU DIG

PSOMAS

1700 Iowa Avenue, Suite 160
Riverside, CA 92507
(909) 787-8421 (909) 682-3379 (FAX)

PERMANENT BENCH MARK B.M. NO. M-30 AT THE INTERSECTION OF PERRIS BLVD. AND OLEANDER (BRIDGE #5309); 24.0 FEET WEST OF PERRIS BLVD.; 5.5 FEET SOUTH OF THE NORTHERLY END OF A 12 INCH X 48 FOOT CONCRETE HEADWALL; A BRASS DISK SET IN THE TOP OF A CONCRETE HEADWALL AND MARKED M-30 1963 1464.219 EL.

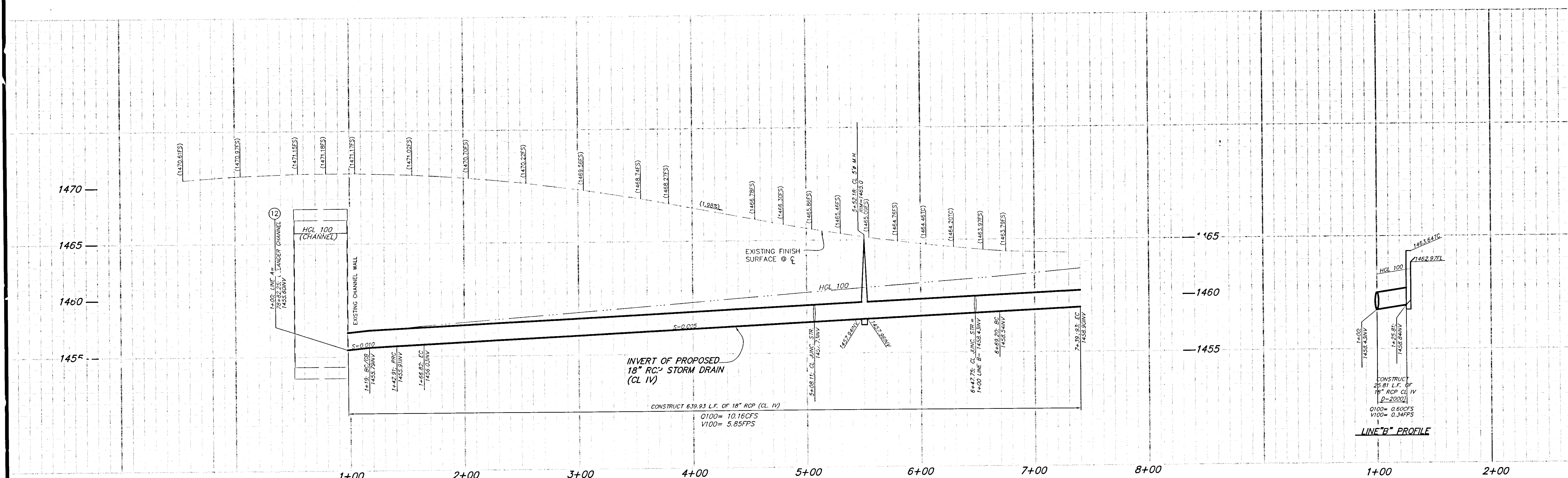
P8/233381	REVISIONS	CL	4/6/04
1	NOTE ADDED	CL	4/6/04
2	NOTE DELETED	CL	4/6/04
3	NOTE ADDED	CL	4/6/04
REF.	DESCRIPTION	APPR.	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT		
DESIGNED BY: MJG	RECOMMENDED FOR APPROVAL BY: 	APPROVED BY: 
DRAWN BY: SC	DESIGN ENGINEER R.E. No. 30539	CHIEF ENGINEER P.E. No. 32336
DATE DRAWN: JUNE 2003	DATE: 7/7/03	DATE: 2/24/04
CHECKED BY: TH		

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

PERRIS VALLEY CHANNEL LATERAL "B" STAGE 2 STA 80+50 TO STA 90+50

PROJECT NO. 4-0-0009
DRAWING NO. 4-791
SHEET NO. 10 OF 62



CONSTRUCTION NOTES:

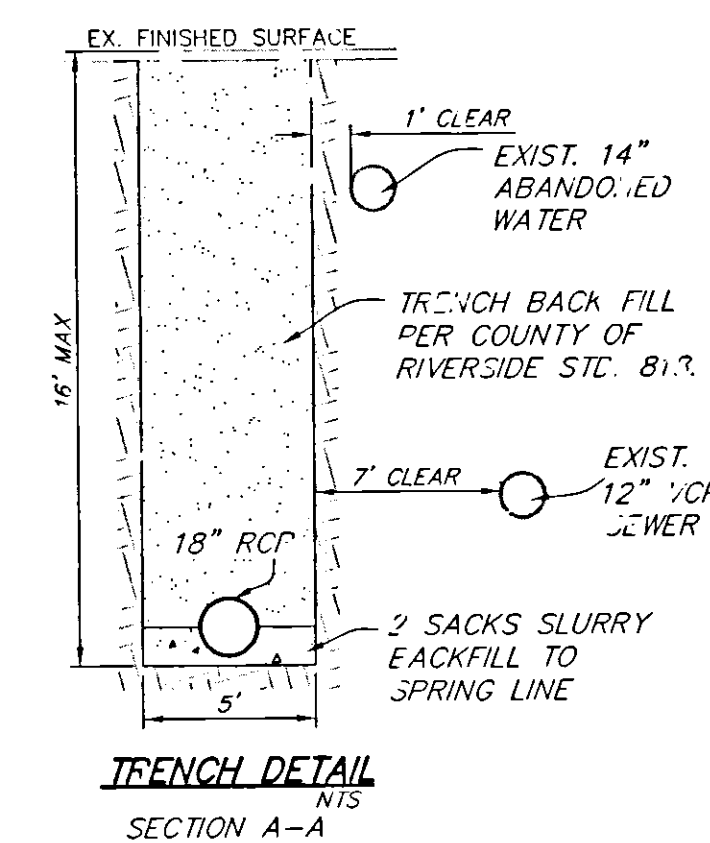
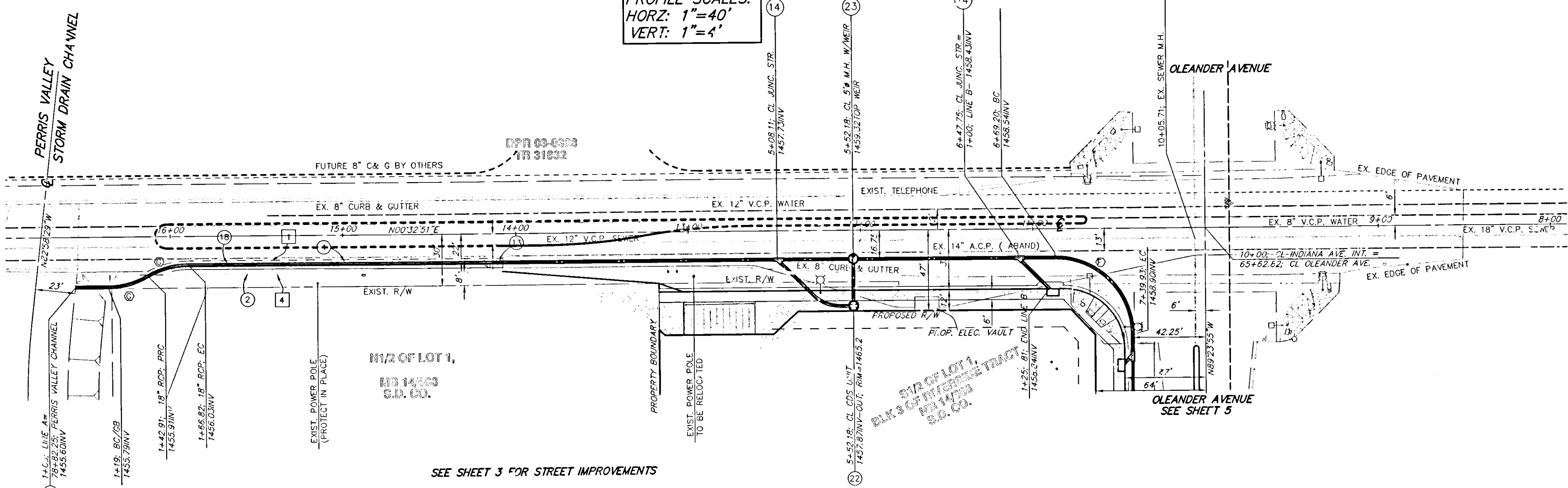
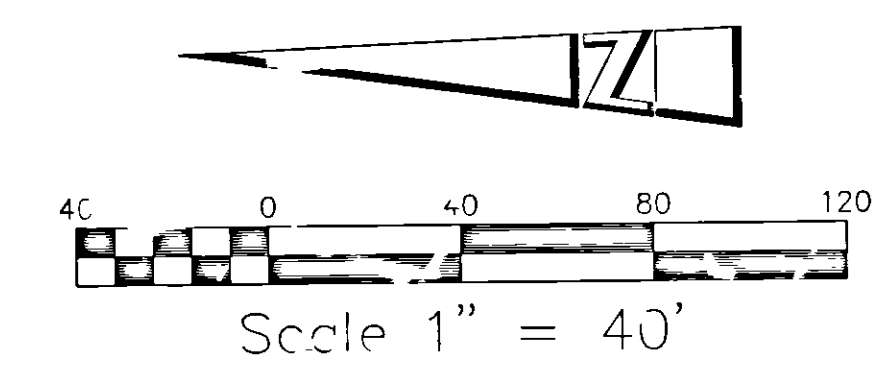
1. CONSTRUCT 18" RCP OVER 1.8" C.I. S.S. W. A.B. R-VALUE TO BE VERIFIED BY JOBS ENGINEER.
2. CONSTRUCT JUNCTION STRUCTURE PER DETAIL CV SHEET 5.
3. CONSTRUCT 18" RCP STORM DRAIN (CL IV).
4. CONSTRUCT JUNCTION STRUCTURE PER RCP STD. DWG. NO. 2.
5. CONSTRUCT TRENCH BACK FILL PER COUNTY OF RIVERSIDE STD. 818.
6. CONSTRUCT 18" RCP PER DETAIL 2N SHEET 5.
7. CONSTRUCT PRE-CAST MANHOLE PER RIVERSIDE COUNTY STD. 606. (MODIFIED FOR 5')

REMOVAL NOTES:

1. SAWCUT AND REMOVE A.C. PAVEMENT.
2. REMOVE EXISTING CURB & GUTTER.

LEGEND

- ASPHALT PAVING
- REMOVAL



STORM DRAIN CURVE DATA

STATION	DELTA	RADIUS	LENGTH	TANGENT
1+00	90°31'44"	45.00'	70.71'	41.04'
2+00	30°26'19"	45.00'	23.91'	12.24'
3+00	45°00'00"	22.50'	17.67'	9.32'

- NOTE:**
1. CITY ENGINEER TO DETERMINE LIMIT OF PAVEMENT REMOVAL AT TIME OF CONSTRUCTION.
 2. ALL WORK WITHIN THE FLOOD CONTROL RIGHT-OF-WAY SHALL REQUIRE A PERMIT FROM RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT.

DIGALERT
DIAL TOLL FREE
1-800-227-2600
AT LEAST TWO DAYS
BEFORE YOU DIG
UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA



PREPARED UNDER THE SUPERVISION OF:
KEVIN J. RICHER
P.E. 43714 LIC. EXP. 03/31/07

LAND DEVELOPMENT DESIGN CORPORATION
2312 East Chilaria, Ste. F
Ontario, CA 91764
(909) 390-1468
FAX (909) 930-1468
PLANNING CIVIL SURVEYING

DRAWN BY: KJR
DESIGN BY: KJR
CHECK BY: KJR
RECOMMENDED BY:

DATE: 08/05/05
DATE: 08/05/05
DATE: 08/05/05
DATE:

BENCH MARK:
AT THE INTERSECTION OF PERRIS BLVD. AND
OLEANDER AVENUE (BRIDGE #3308), 24.0 FEET WEST
OF PERRIS BLVD., 5.0 FEET SOUTH OF THE
NORTHERLY END OF A 12 INCH X 48 FOOT
CONCRETE HEADWALL, A BRASS DISK SET IN
THE TOP OF A CONCRETE HEADWALL AND
MARKED M-30 1962.
ELEVATION = 1464.213

CITY OF PERRIS
APPROVED BY: *[Signature]*
CITY ENGINEER
DATE: 8-5-06

STORM DRAIN PLAN AND PROFILE
**S1/2 OF LOT 1, BLK 3
RIVERSIDE TR.
MB 14/688 S.D. C.O.**
OLEANDER AVENUE

SHEET NO. 1
OF 6 SHEETS
CITY FILE NO. 3-795

