Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING

PRELIMINARY HYDROLOGY CALCULATIONS

FOR

HARLEY KNOX COMMERCE CENTER
NANCE STREET
PERRIS, CA

PREPARED FOR

HARLEY KNOX 2021, LLC
11777 SAN VICENTE BOULEVARD, SUITE 780
LOS ANGELES, CA 90049
PHONE: (310) 979-8000
FAX: ((310) 979-7772

DECEMBER 1, 2021

JOB NO. 3951

PREPARED BY

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

PRELIMINARY HYDROLOGY CALCULATIONS

FOR

HARLEY KNOX COMMERCE CENTER

PREPARED UNDER
THE SUPERVISION OF

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

INTRODUCTION

A: PROJECT LOCATION

The project site is located on the west side of Redlands Avenue, north of Nance Street, and south of Harley Knox Boulevard in the City of Perris, California. Please see the following page for a vicinity map.

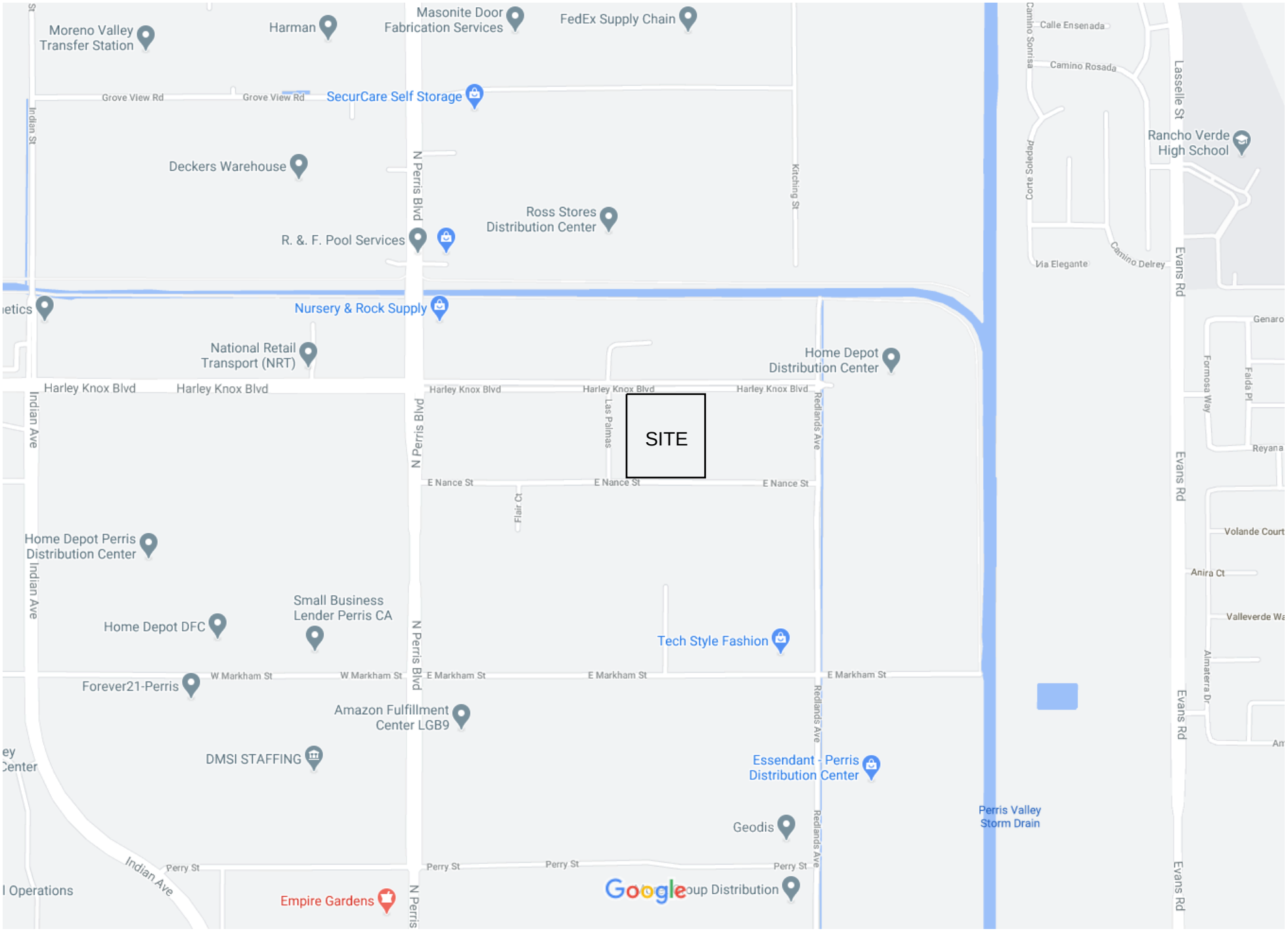
B: STUDY PURPOSE

The purpose of this study is to determine the existing condition and proposed condition 100-year peak flow rates from the project site that drains toward Nance Street.

C: PROJECT STAFF:

Thienes Engineering staff involved in this study include:

Reinhard Stenzel
Brian Weil
Tony Nuñez



Map data ©2021 500 ft

DISCUSSION

Project Description

The project site encompasses approximately 6.45 acres. Proposed improvements to the site include a single commercial/warehouse type building that is approximately 156,094 square feet. There will be a truck dock along the westerly side of the building, vehicle parking will be located west and east of the building, and landscape areas will be street adjacent and throughout the site.

Existing Conditions

Under existing conditions, the site is mostly vacant with natural grasses and sparse vegetation throughout. There are foundations from residential buildings in the southeast and southwest sections of the site. The site generally drains from north to south toward Nance Street. The existing condition 100-year peak flow rates that surface drains to the south is approximately 2.7 cfs from the westerly 2.15 acres (nodes 100-101) and 5.6 cfs from the easterly 4.30 acres (nodes 110-111). The total existing condition 100-year peak flor rate that surface drains to the street is approximately 8.3 cfs (2.7 cfs + 5.6 cfs).

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

Offsite Hydrology

The site may accept offsite runon from a portion of the neighboring site to the west. Potential runon from the west will continue to surface drain onto the project site along the westerly property line, join the onsite system, and discharge from the site via a proposed storm drain system.

Proposed Conditions

In the proposed condition, runoff from the westerly portion of the building, the truck yard, and the southwesterly and northwesterly parking lots will surface drain to several catch basins located within the truck yard (nodes 100-132). Flow from the easterly portion of the building and the parking lot to the east will surface drain to two catch basins within the parking lot (nodes 140-152). Proposed storm drain systems, Lines A and B, will convey stormwater to the south and discharge into a proposed public storm drain system in Nance Street. The southerly and northerly street adjacent landscaping will surface drain directly into the respective street (nodes 160 and 170, respectively). The total proposed condition 100-year peak flow rate is approximately 22.0 cfs (15.6 cfs from the westerly truck yard + 4.6 cfs from the easterly parking lot + 0.9 cfs from the southerly landscaping + 0.9 cfs from the northerly landscaping).

The project site and the westerly neighboring site are modeled as commercial and tabled to an existing 54" RCP, Lateral D-3, in Redlands Avenue per the Hydrology and Hydraulic Analysis report dated August 2013 by Albert A. Webb Associates (WEBB). A proposed public storm drain system in Nance Street will convey stormwater from the site and ultimately discharge to Lateral D-3. The public storm drain system will be sized to adequately convey runoff from the project site and the future development of the adjacent property to the west. The storm drain will convey flows the project site to the east and connect to an existing 54" R.C.P. in Redlands Avenue. A catch basin is proposed in Nance Street along with street improvements for the development of the project site. The proposed onsite and the master plan storm drain facilities are designed for a 100-year storm frequency and do not negatively affect downstream facilities.

See Appendix "B" for the proposed condition hydrology calculations and Appendix "C" for a proposed condition hydrology map.

Methodology

Hydrology calculations were computed using Riverside County rational method program (by AES software). The soil type is "C" per Riverside County Hydrology Manual.

See Appendix "A" for referenced materials.

Water Quality

The project proposes to use underground retention facilities. Roof and surface runoff will sheet flow into inlets where stormwater will be intercepted and diverted into the perforated CMPs for water quality treatment. These systems will utilize infiltration as their primary form of treatment. These systems store stormwater runoff until it gradually exfiltrates into the underlying soil. Pollutant removal occurs through the infiltration of runoff and the adsorption of pollutants into the soil. This practice has high pollutant removal efficiency and can also help recharge groundwater, thus helping to maintain low flows in stream systems. See separate WQMP report, prepared by Thienes Engineering, for more information.

APPENDIX A

REFERENCE MATERIAL

SITE

0.45"

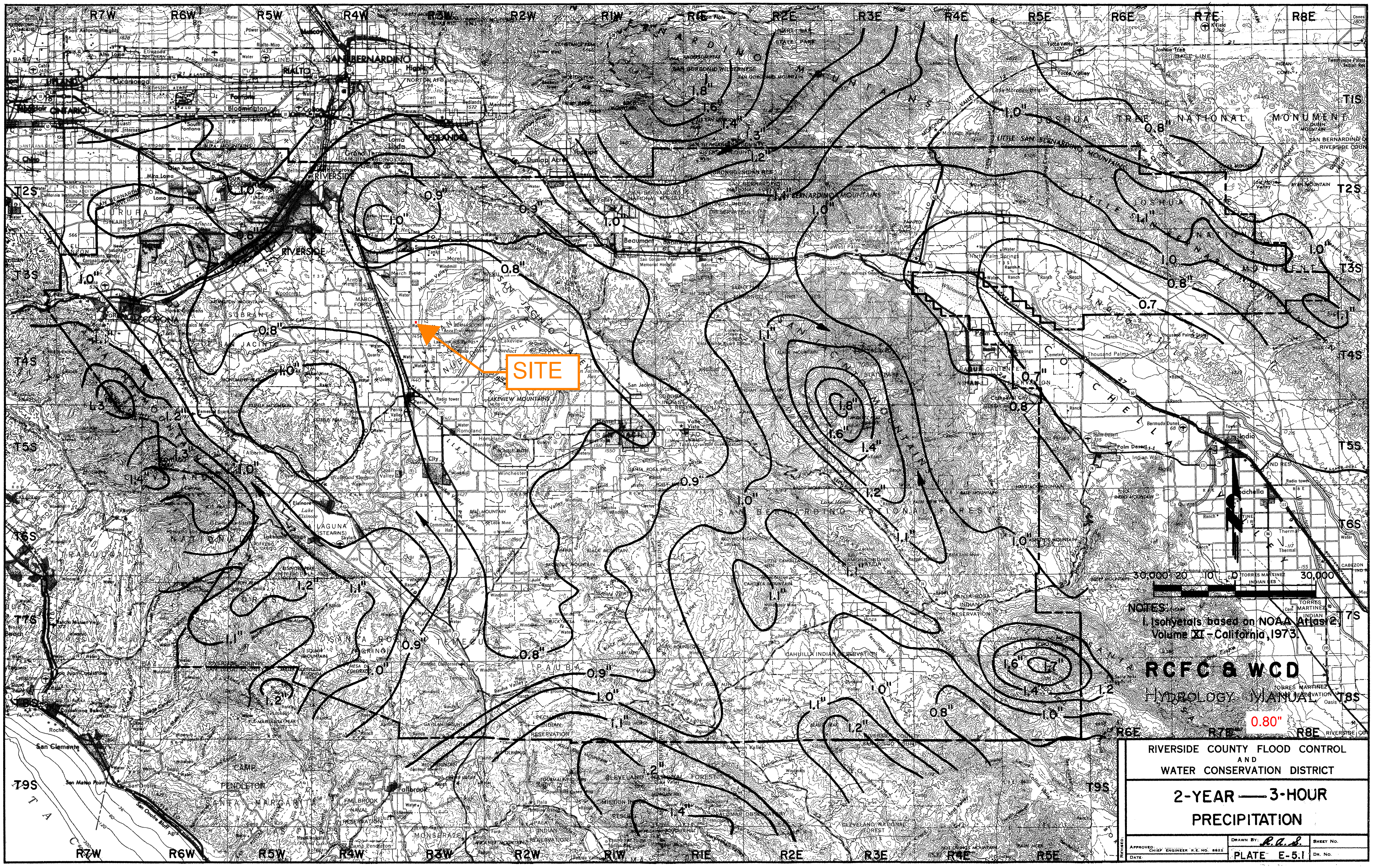
NOTES:
1. Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973

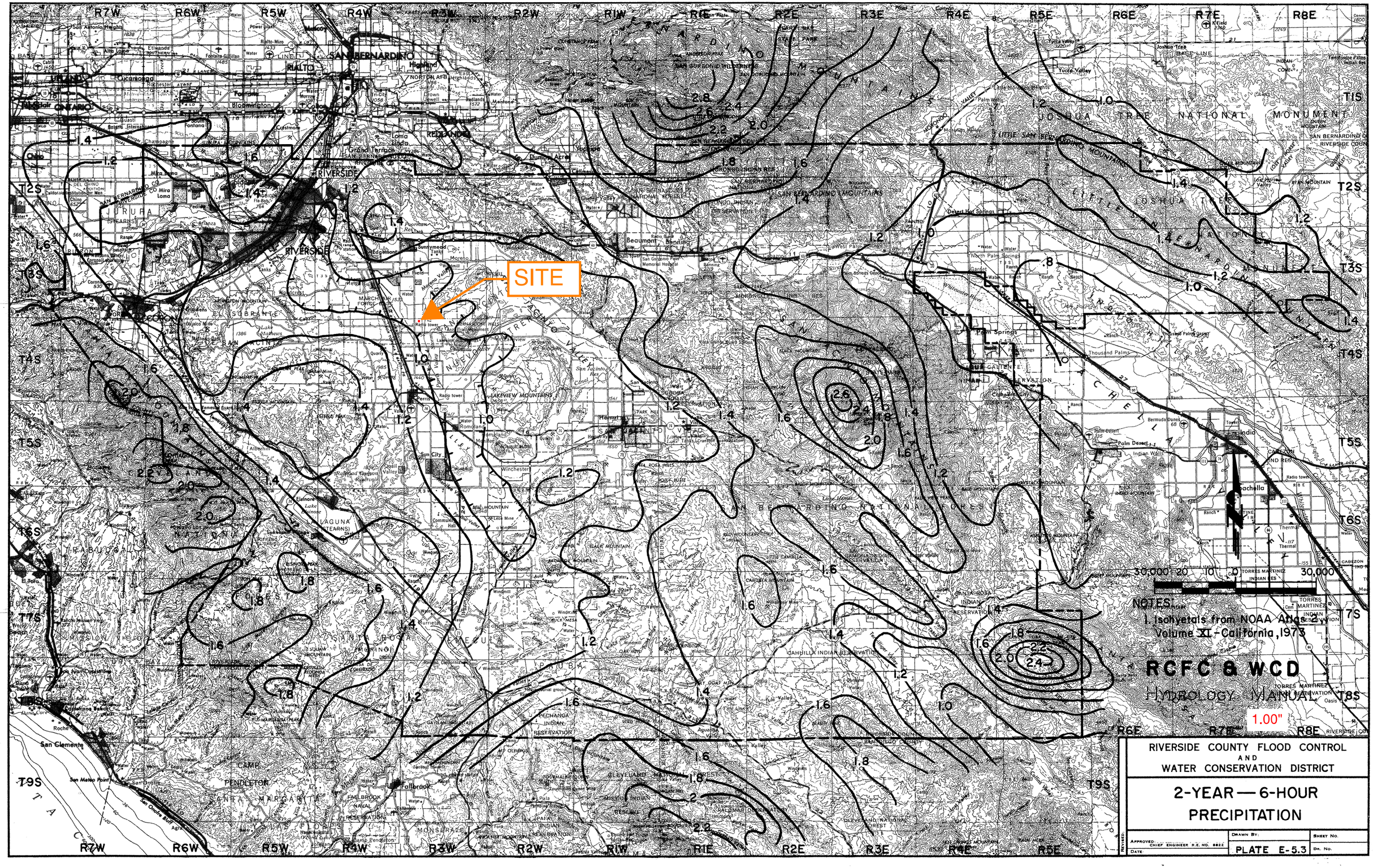
RCFC & WCD
HYDROLOGY MANUAL

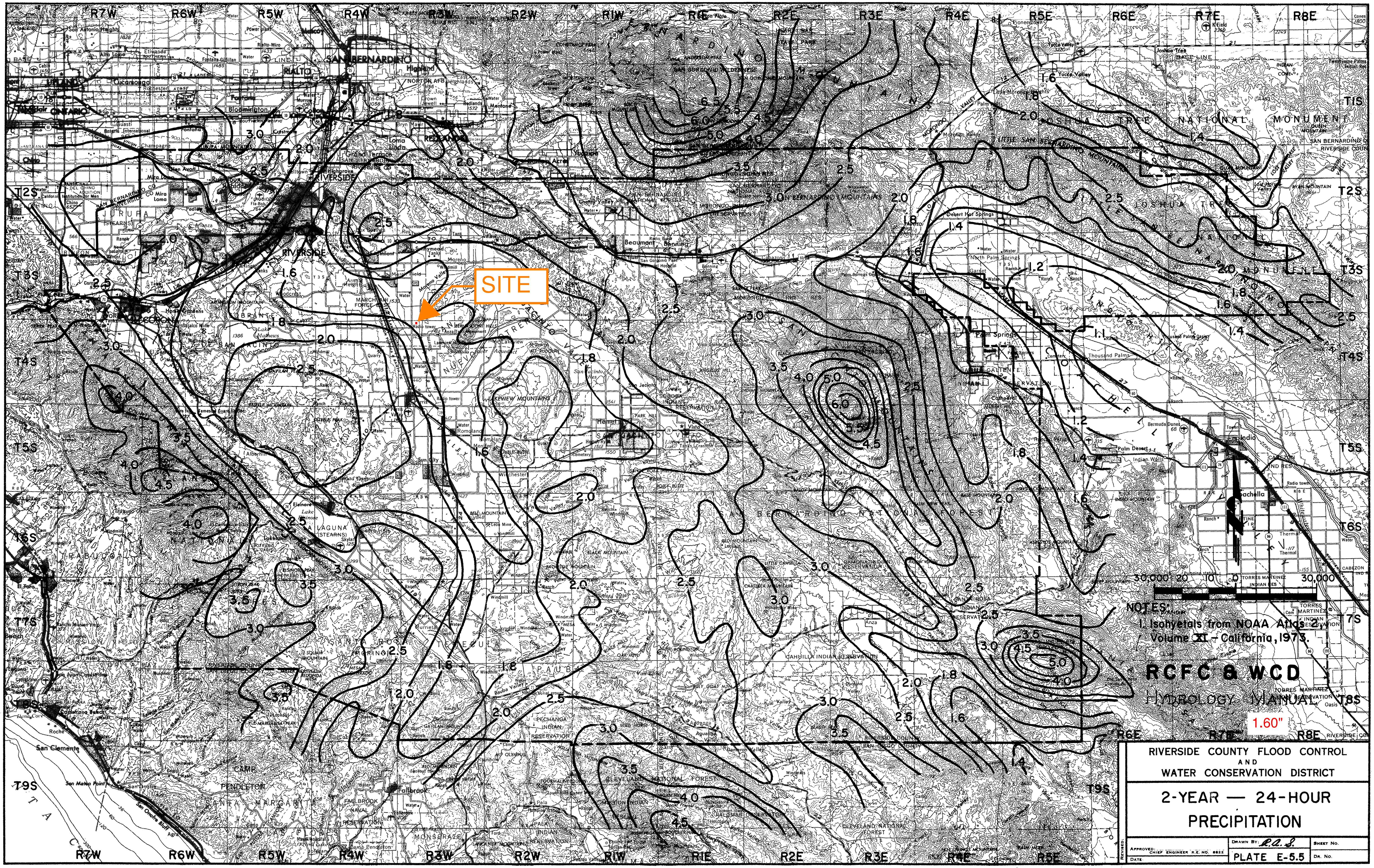
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

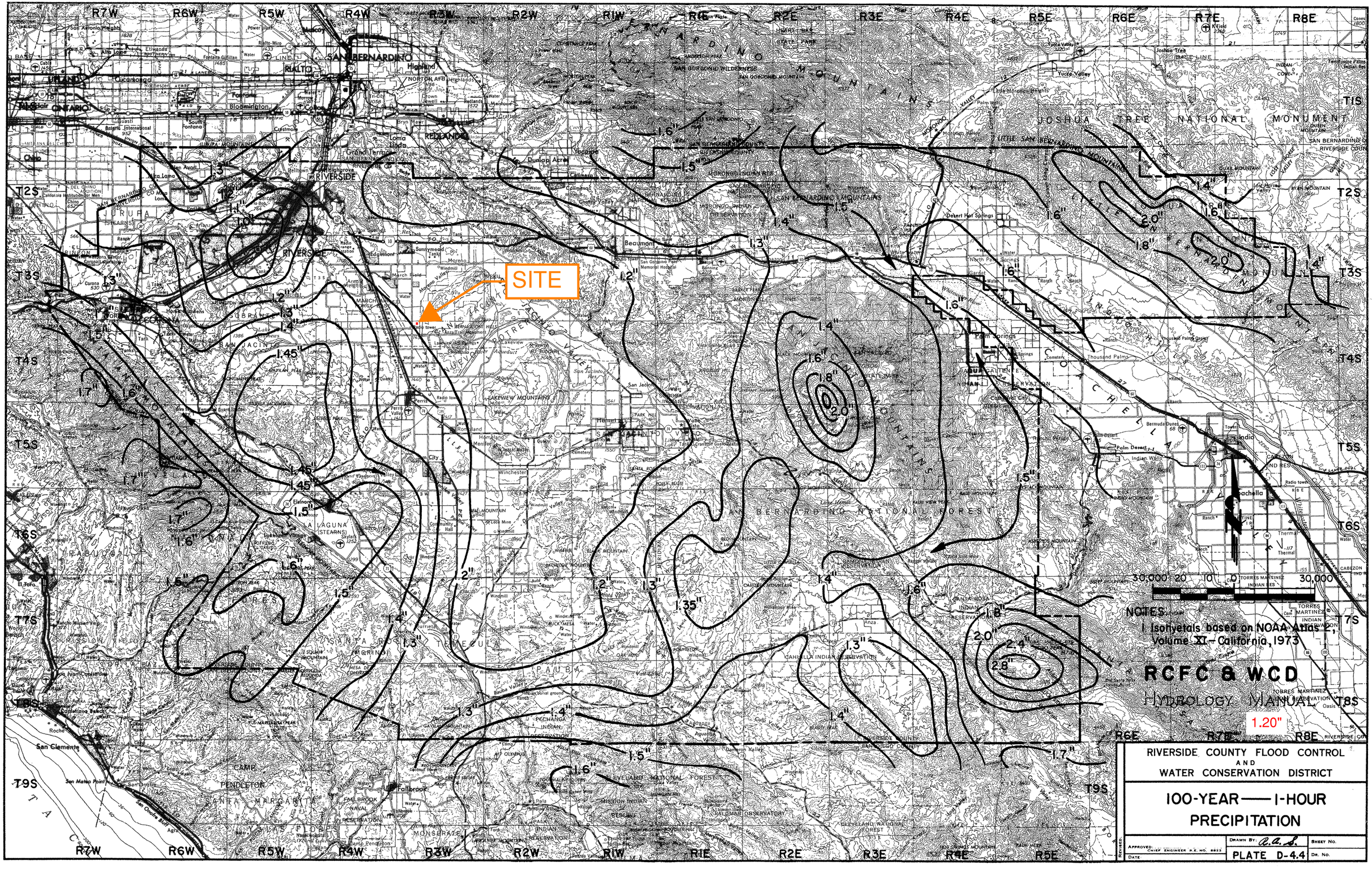
2-YEAR — 1-HOUR
PRECIPITATION

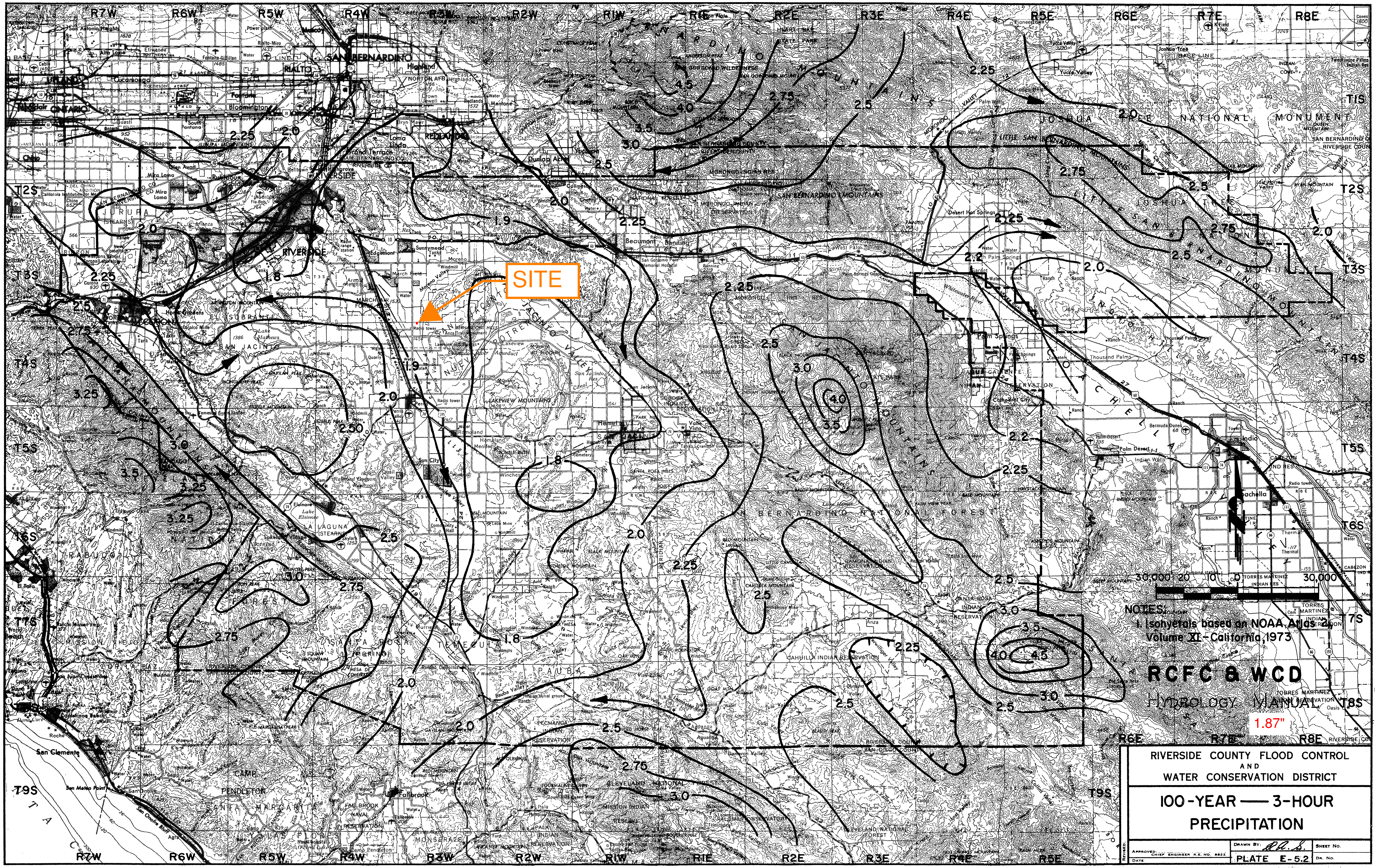
APPROVED CHIEF ENGINEER R.E. NO. 6822
DATE
DRAWN BY: R.A.S.
PLATE D-4.3
SHEET NO.
DR. NO.
REVISED:


SITE
0.80"
NOTES:
1. Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973.
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
2-YEAR — 3-HOUR
PRECIPITATION
PLATE E-5.1

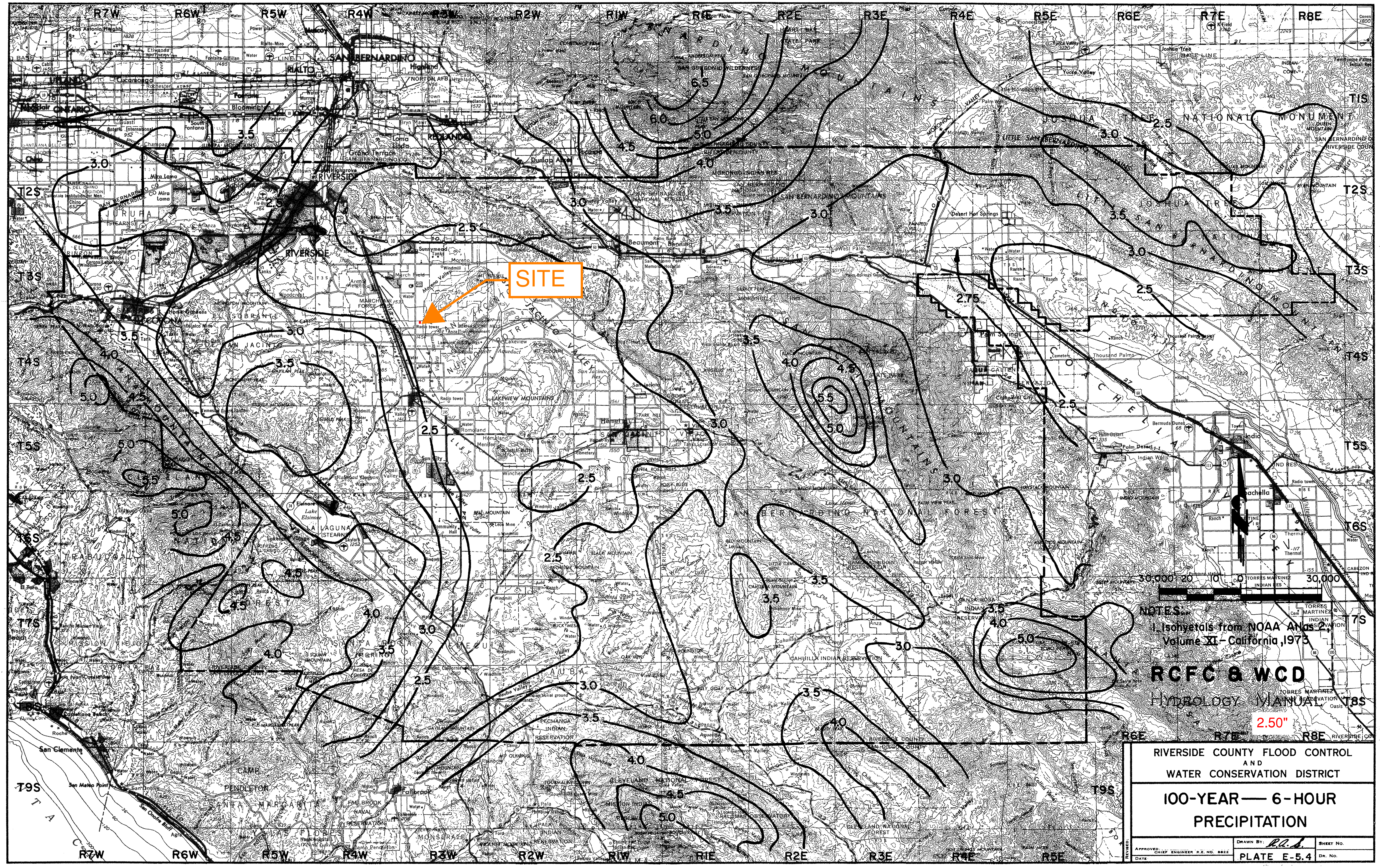

SITE
NOTES:
1. Isohyetals from NOAA Atlas 2, Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
1.00"
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
2-YEAR — 6-HOUR PRECIPITATION
DRAWN BY:
PLATE E-5.3
SHEET NO.
DR. NO.
APPROVED CHIEF ENGINEER R.E. NO. 8822
DATE
REVISED

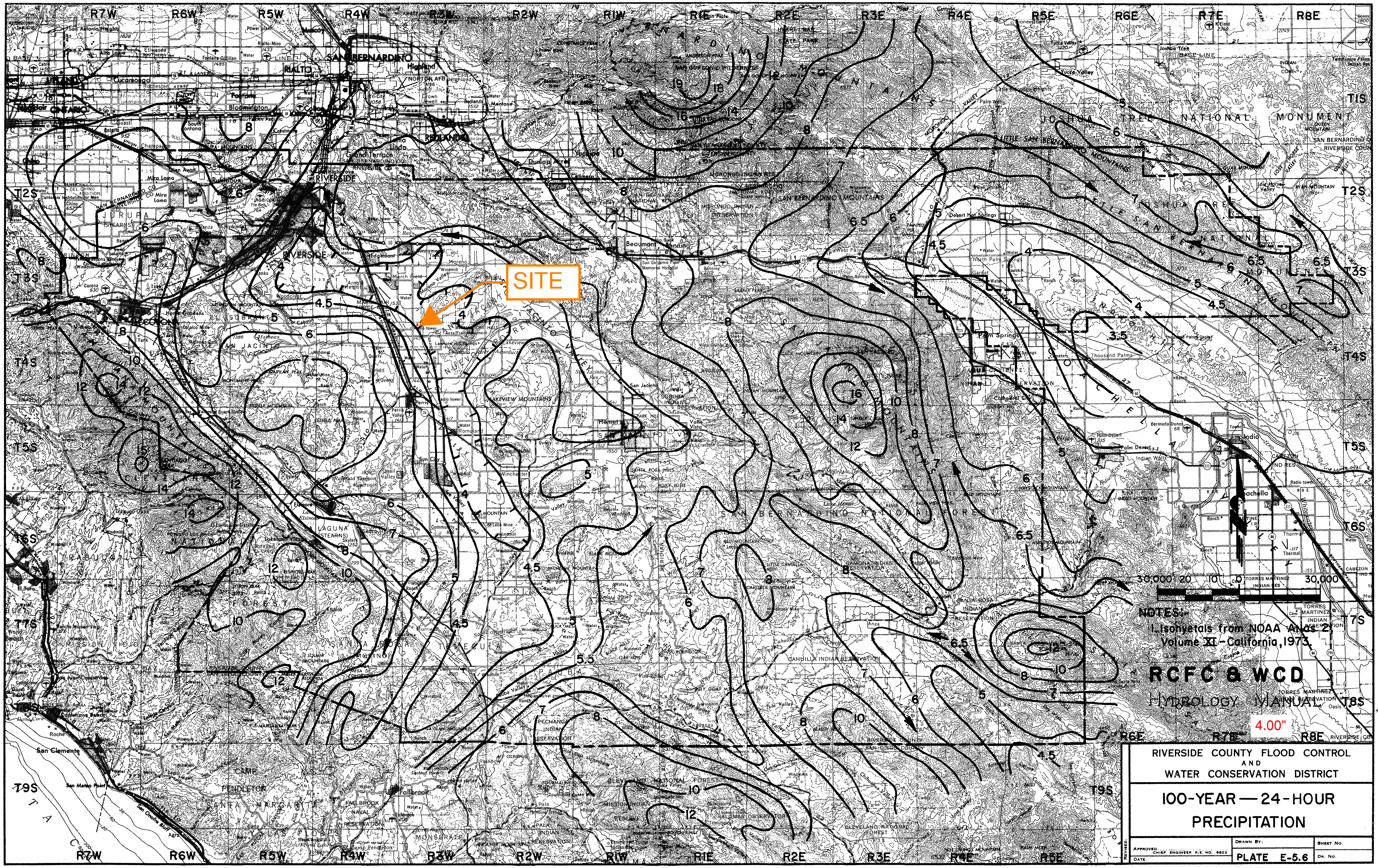

SITE
NOTES:
1. Isohyetals from NOAA Atlas 2, Volume XI - California, 1973.
RCFC & WCD
HYDROLOGY MANUAL
1.60"
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
2-YEAR — 24-HOUR PRECIPITATION
PLATE E-5.5
SAN BERNARDINO
RIVERSIDE
Beaumont
Palm Springs
Palm Desert
Hemet
Fallbrook
San Clemente
JOSHUA TREE NATIONAL MONUMENT

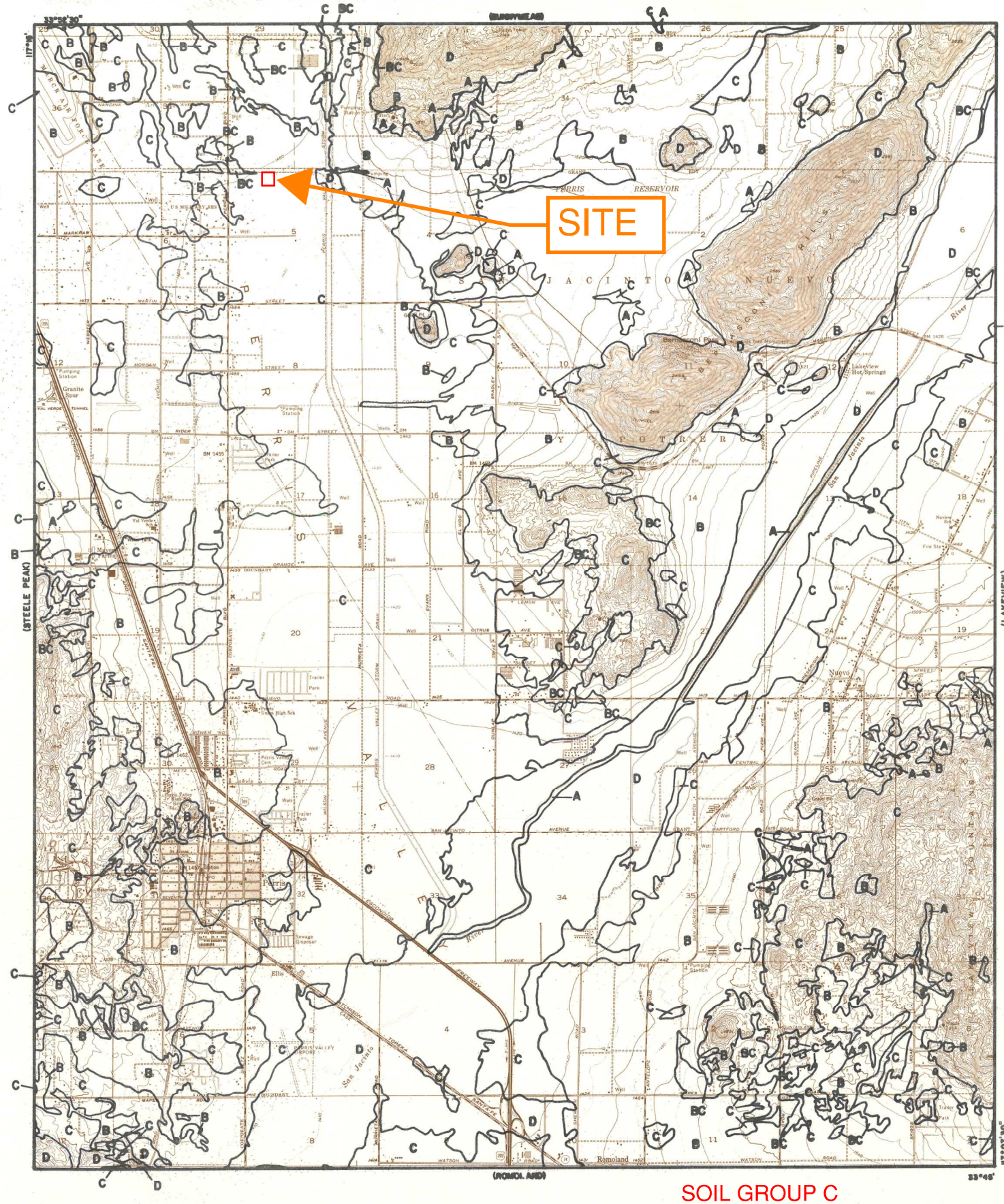

SITE
1.20"
NOTES:
1. Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
100-YEAR — 1-HOUR PRECIPITATION
PLATE D-4.4
DRAWN BY: A.A.S.
APPROVED: CHIEF ENGINEER R.E. NO. 6822
DATE
REVISED
SHEET NO.
DR. NO.



SITE
1.87"
NOTES:
1. Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
100-YEAR — 3-HOUR PRECIPITATION
PLATE E-5.2
SAN BERNARDINO
RIVERSIDE
CORONA
Palm Springs
Indio
Hemet
San Jacinto
Beaumont
Banning
Temecula
Lake Elsinore
San Clemente
Fallbrook
SAN BERNARDINO NATIONAL FOREST
JOSHUA TREE NATIONAL MONUMENT
CAMP PENDLETON


SITE
2.50"
NOTES:
1. Isohyetals from NOAA Atlas 2 Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
100-YEAR — 6-HOUR PRECIPITATION
PLATE E-5.4


SITE
NOTES:
1. Isoyetals from NOAA Atlas 2 Volume XI - California, 1973.
RCFC & WCD
HYDROLOGY MANUAL
4.00"
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
100-YEAR — 24-HOUR PRECIPITATION
PLATE E-5.6



LEGEND

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

RCFC&WCD

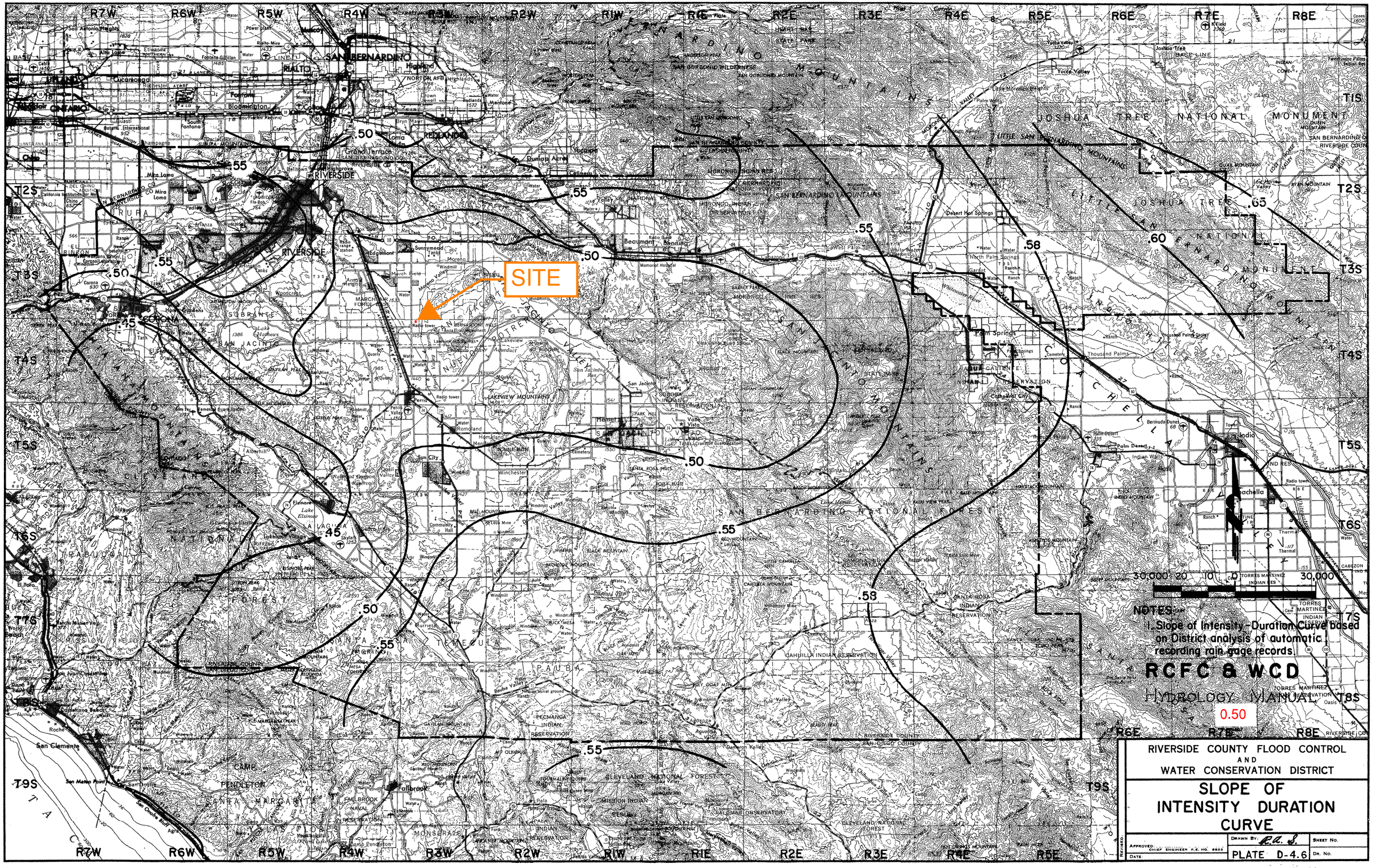
HYDROLOGY MANUAL

N

0 FEET 5000

HYDROLOGIC SOILS GROUP MAP FOR PERRIS

PLATE C-1.30



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. 6822	DRAWN BY: R.A.J.	SHEET NO.
DATE	PLATE D-4.6	DR. NO.

REVISED:

HYDROLOGY & HYDRAULIC ANALYSIS

PERRIS VALLEY MDP
PORTION OF STORM DRAIN LINE D, LATERAL D-2, & LATERAL D-3

CITY OF PERRIS
COUNTY OF RIVERSIDE
CALIFORNIA

PREPARED FOR:
Stratford Ranch Partners, LLC
3649 Mission Inn Avenue
Riverside, CA 92501
Phone: (951) 778-2999 – Fax: (951) 778-0889

PREPARED BY:

ALBERT A. WEBB ASSOCIATES
3788 McCray Street
Riverside, CA 92506
Phone: (951) 686-1070 – Fax: (951) 788-1256

DATE PREPARED:
May 30, 2008
March 2013
April 2013
June 2013
REVISED: August 2013

W.O.:
2012-0072

HYDROLOGY & HYDRAULIC ANALYSIS FOR PORTION OF STORM DRAIN LINE D, LATERAL D-2, & LATERAL D-3

CITY OF PERRIS
COUNTY OF RIVERSIDE
CALIFORNIA

PREPARED FOR:
Stratford Ranch Partners, LLC
3649 Mission Inn Avenue
Riverside, CA 92501
Phone: (951) 778-2999 – Fax: (951) 778-0889

PREPARED BY:

ALBERT A. WEBB ASSOCIATES

3788 McCray Street
Riverside, CA 92506
Phone: (951) 686-1070
Fax: (951) 788-1256

This report has been prepared by or under the direction of the following registered civil engineer who attests to the technical information contained herein. The register engineer has also judged the qualifications of any technical specialists providing engineering data upon which recommendations, conclusions and decisions are based.

Joseph C. Caldwell, P.E.	**Date**	**Stamp**
Senior Engineer		
Albert A. Webb Associates		

LEGEND

HYD BOUNDRY	
HYD SUB-AREA	
STORMDRAIN	
NODE / ELEVATION	105 / 83.0
AREA / LENGTH	9.5 AC / 700'

GRAPHIC SCALE 1"=200'

LINE D HYDROLOGY

PERRIS VALLEY COMMERCE CENTER
SPECIFIC PLAN
LINE D
HYDROLOGY MAP

ALBERT A. WEBB ASSOCIATES
CIVIL ENGINEERS
3788 McCRAY ST.
RIVERSIDE CA. 92506
(951) 686-1070

SCALE 1" = 200
DATE 5/4/2009
SHEET 1 OF 1 SHEETS

SECTION 3

Ultimate Developed Condition

100-Year Rational Method Hydrology Analysis

Areas Tributary to Storm Drain Lateral D, Lateral D-2,

& Lateral D-3

```
Runoff from this stream =     38.230(CFS)
Time of concentration =   33.98 min.
Rainfall intensity =     1.585(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      136.800 to Point/Station      136.900
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   893.000(Ft.)
Top (of initial area) elevation =  1457.500(Ft.)
Bottom (of initial area) elevation =  1455.500(Ft.)
Difference in elevation =     2.000(Ft.)
Slope =    0.00224  s(percent)=       0.22
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.397 min.
Rainfall intensity =      2.337(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.882
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =     20.603(CFS)
Total initial stream area =       10.000(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      136.900 to Point/Station      136.700
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
Top of natural channel elevation =   1455.500(Ft.)
End of natural channel elevation =   1454.500(Ft.)
Length of natural channel  =   786.000(Ft.)
Estimated mean flow rate at midpoint of channel =     33.067(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.23(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0013
Corrected/adjusted channel slope =  0.0013
Travel time =   10.67 min.     TC =   26.07  min.


 Adding area flow to channel
COMMERCIAL subarea type
Runoff Coefficient = 0.878
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      1.805(In/Hr) for a   100.0 year storm
Subarea runoff =     19.171(CFS) for     12.100(Ac.)
Total runoff =     39.774(CFS)        Total area =      22.100(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      136.900 to Point/Station      136.700
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 2
Stream flow area =     22.100(Ac.)
```

SECTION 3

Ultimate Developed Condition

10-Year Rational Method Hydrology Analysis

Areas Tributary to Storm Drain Lateral D, Lateral D-2

& Lateral D-3

```
Time of concentration =   35.04 min.
Rainfall intensity =     1.271(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      136.800 to Point/Station      136.900
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance =   893.000(Ft.)
Top (of initial area) elevation =  1457.500(Ft.)
Bottom (of initial area) elevation =  1455.500(Ft.)
Difference in elevation =     2.000(Ft.)
Slope =    0.00224  s(percent)=       0.22
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.397 min.
Rainfall intensity =      1.901(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.878
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =     16.702(CFS)
Total initial stream area =       10.000(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      136.900 to Point/Station      136.700
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
Top of natural channel elevation =   1455.500(Ft.)
End of natural channel elevation =   1454.500(Ft.)
Length of natural channel  =   786.000(Ft.)
Estimated mean flow rate at midpoint of channel =     26.807(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   1.16(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0013
Corrected/adjusted channel slope =  0.0013
Travel time =   11.32 min.     TC =   26.71  min.


 Adding area flow to channel
COMMERCIAL subarea type
Runoff Coefficient = 0.874
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =      1.451(In/Hr) for a    10.0 year storm
Subarea runoff =     15.345(CFS) for     12.100(Ac.)
Total runoff =     32.047(CFS)        Total area =      22.100(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      136.900 to Point/Station      136.700
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 2 in normal stream number 2
Stream flow area =     22.100(Ac.)
Runoff from this stream =     32.047(CFS)
```

SECTION 3

Revised Ultimate Developed Condition

100-Year Rational Method Hydrology Analysis

Street Flow tributary to Redlands Avenue

Areas A, B, C & D

LINE D HYDROLOGY MAP

PERRIS VALLEY COMMERCE CENTER
SPECIFIC PLAN

LINE D HYDROLOGY

ALBERT A. WEBB ASSOCIATES
CIVIL ENGINEERS
3788 MCCRAY ST.
RIVERSIDE CA. 92506
(951) 686-1070

GRAPHIC SCALE 1"=150'
150 75 0 150 300 450

LEGEND

- HYD BOUNDRY
- HYD SUB-AREA
- STORMDRAIN
- NODE / ELEVATION (105 / 83.0)
- AREA / LENGTH (9.5 AC / 700')

N

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 *************************
* NANCE STREET INDUSTRIAL DEVELOPMENT                                    *
* EXISTING CONDITION 100-YEAR                                            *
* NODES 100-101                                                          *
 **************************************************************************

  FILE NAME: W:\3951\E100.DAT
  TIME/DATE OF STUDY: 18:15 03/12/2021
--------------------------------------------------------------------------
  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) =  0.450
  100-YEAR, 1-HOUR PRECIPITATION(INCH) =  1.200
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.200
  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    100.00 TO NODE    101.00 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) =   611.00
  UPSTREAM ELEVATION(FEET) =   1456.95
  DOWNSTREAM ELEVATION(FEET) =   1456.02
  ELEVATION DIFFERENCE(FEET) =      0.93
  TC = 0.533*[(  611.00**3)/(     0.93)]**.2 =   25.371
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.845
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .6794
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      2.70
  TOTAL AREA(ACRES) =      2.15   TOTAL RUNOFF(CFS) =      2.70
==========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        2.2  TC(MIN.) =     25.37
  PEAK FLOW RATE(CFS)   =       2.70
==========================================================================
==========================================================================
  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 *************************
* NANCE STREET INDUSTRIAL DEVELOPMENT                                    *
* EXISTING CONDITION 100-YEAR                                            *
* NODES 110-111                                                          *
 **************************************************************************

  FILE NAME: W:\3951\E110.DAT
  TIME/DATE OF STUDY: 18:25 03/12/2021
--------------------------------------------------------------------------
  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) =  0.450
  100-YEAR, 1-HOUR PRECIPITATION(INCH) =  1.200
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.200
  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    110.00 TO NODE    111.00 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) =   593.00
  UPSTREAM ELEVATION(FEET) =   1456.80
  DOWNSTREAM ELEVATION(FEET) =   1455.57
  ELEVATION DIFFERENCE(FEET) =      1.23
  TC = 0.533*[(  593.00**3)/(     1.23)]**.2 =   23.564
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.915
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .6855
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      5.64
  TOTAL AREA(ACRES) =      4.30   TOTAL RUNOFF(CFS) =      5.64
==========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        4.3  TC(MIN.) =     23.56
  PEAK FLOW RATE(CFS)   =       5.64
==========================================================================
==========================================================================
  END OF RATIONAL METHOD ANALYSIS
```

PROPOSED 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 *************************
* NANCE STREET INDUSTRIAL DEVELOPMENT                                    *
* PROPOSED CONDITION 100-YEAR                                            *
* NODES 100-132                                                          *
 ************************************************************************

  FILE NAME: W:\3951\P100.DAT
  TIME/DATE OF STUDY: 16:34 04/27/2021
------------------------------------------------------------------------------
  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) =  0.450
  100-YEAR, 1-HOUR PRECIPITATION(INCH) =  1.200
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.200
  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    100.00 TO NODE    101.00 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) =   139.00
  UPSTREAM ELEVATION(FEET) =   1456.22
  DOWNSTREAM ELEVATION(FEET) =   1453.17
  ELEVATION DIFFERENCE(FEET) =      3.05
  TC = 0.303*[(  139.00**3)/(     3.05)]**.2 =    4.683
  COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.157
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8887
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      4.99
  TOTAL AREA(ACRES) =      1.35   TOTAL RUNOFF(CFS) =      4.99

******************************************************************************
  FLOW PROCESS FROM NODE    101.00 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) =  1450.58  DOWNSTREAM(FEET) =  1450.34
  FLOW LENGTH(FEET) =   121.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.32
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.99
  PIPE TRAVEL TIME(MIN.) =   0.61    Tc(MIN.) =    5.61
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    112.00 =     260.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE    112.00 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.) =    5.61
  RAINFALL INTENSITY(INCH/HR) =   3.93
  TOTAL STREAM AREA(ACRES) =     1.35
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.99

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

```
 FLOW PROCESS FROM NODE    110.00 TO NODE    111.00 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) =   116.00
 UPSTREAM ELEVATION(FEET) =   1455.01
 DOWNSTREAM ELEVATION(FEET) =   1453.17
 ELEVATION DIFFERENCE(FEET) =      1.84
 TC = 0.303*[(  116.00**3)/(     1.84)]**.2 =    4.648
 COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.157
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8887
 SOIL CLASSIFICATION IS "C"
 SUBAREA RUNOFF(CFS) =      3.32
 TOTAL AREA(ACRES) =      0.90   TOTAL RUNOFF(CFS) =      3.32

****************************************************************************
 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) =  1450.67  DOWNSTREAM(FEET) =  1450.59
 FLOW LENGTH(FEET) =    23.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  15.0 INCH PIPE IS  10.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.66
 ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.32
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    5.10
 LONGEST FLOWPATH FROM NODE    110.00 TO NODE    112.00 =     139.00 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.) =    5.10
 RAINFALL INTENSITY(INCH/HR) =   4.11
 TOTAL STREAM AREA(ACRES) =     0.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.32

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc       INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
     1        4.99     5.61        3.925          1.35
     2        3.32     5.10        4.114          0.90

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1        7.86     5.10       4.114
     2        8.16     5.61       3.925

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       8.16   Tc(MIN.) =    5.61
 TOTAL AREA(ACRES) =        2.2
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    112.00 =     260.00 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) =  1450.33  DOWNSTREAM(FEET) =  1450.13
 FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.74
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       8.16
 PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =    6.05
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    122.00 =     360.00 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.) =    6.05
 RAINFALL INTENSITY(INCH/HR) =   3.78
 TOTAL STREAM AREA(ACRES) =     2.25
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.16

****************************************************************************
 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) =   116.00
  UPSTREAM ELEVATION(FEET) =   1455.01
  DOWNSTREAM ELEVATION(FEET) =   1453.17
  ELEVATION DIFFERENCE(FEET) =      1.84
  TC = 0.303*[(  116.00**3)/(     1.84)]**.2 =    4.648
  COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.157
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8887
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      3.32
  TOTAL AREA(ACRES) =      0.90   TOTAL RUNOFF(CFS) =      3.32

****************************************************************************
  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) =  1450.67  DOWNSTREAM(FEET) =  1450.39
  FLOW LENGTH(FEET) =    24.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.78
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.32
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =    5.07
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    122.00 =     140.00 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.) =    5.07
  RAINFALL INTENSITY(INCH/HR) =   4.13
  TOTAL STREAM AREA(ACRES) =     0.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.32

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        7.86     5.55        3.944          2.25
      1        8.16     6.05        3.778          2.25
      2        3.32     5.07        4.128          0.90

  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       10.50     5.07       4.128
      2       11.04     5.55       3.944
      3       11.20     6.05       3.778

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      11.20   Tc(MIN.) =    6.05
  TOTAL AREA(ACRES) =        3.2
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    122.00 =     360.00 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) =  1450.13  DOWNSTREAM(FEET) =  1449.94
  FLOW LENGTH(FEET) =    96.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.04
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.20
  PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =    6.45
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    132.00 =     456.00 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.) =    6.45
  RAINFALL INTENSITY(INCH/HR) =   3.66
  TOTAL STREAM AREA(ACRES) =     3.15
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.20

****************************************************************************
  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) =   152.00
```

```
  UPSTREAM ELEVATION(FEET) =   1456.11
  DOWNSTREAM ELEVATION(FEET) =   1453.17
  ELEVATION DIFFERENCE(FEET) =      2.94
  TC = 0.303*[(  152.00**3)/(     2.94)]**.2 =    4.978
  COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.157
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8887
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      4.99
  TOTAL AREA(ACRES) =      1.35   TOTAL RUNOFF(CFS) =      4.99

****************************************************************************
  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) =  1450.67  DOWNSTREAM(FEET) =  1450.45
  FLOW LENGTH(FEET) =    23.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.96
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.99
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    5.06
  LONGEST FLOWPATH FROM NODE    130.00 TO NODE    132.00 =     175.00 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.) =    5.06
  RAINFALL INTENSITY(INCH/HR) =   4.13
  TOTAL STREAM AREA(ACRES) =     1.35
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.99

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       10.50     5.48        3.969          3.15
      1       11.04     5.95        3.810          3.15
      1       11.20     6.45        3.660          3.15
      2        4.99     5.06        4.130          1.35

  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       14.69     5.06       4.130
      2       15.30     5.48       3.969
      3       15.64     5.95       3.810
      4       15.62     6.45       3.660

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      15.64   Tc(MIN.) =    5.95
  TOTAL AREA(ACRES) =        4.5
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    132.00 =     456.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        4.5  TC(MIN.) =      5.95
  PEAK FLOW RATE(CFS)   =      15.64
  *** PEAK FLOW RATE TABLE ***
         Q(CFS)    Tc(MIN.)
  1       14.69       5.06
  2       15.30       5.48
  3       15.64       5.95
  4       15.62       6.45
============================================================================
============================================================================
  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 *************************
* NANCE STREET INDUSTRIAL DEVELOPMENT                                    *
* PROPOSED CONDITION 100-YEAR                                            *
* NODES 140-152                                                          *
 ************************************************************************

  FILE NAME: W:\3951\P140.DAT
  TIME/DATE OF STUDY: 16:42 04/27/2021
------------------------------------------------------------------------------
  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) =  0.450
  100-YEAR, 1-HOUR PRECIPITATION(INCH) =  1.200
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.200
  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    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) =   169.00
  UPSTREAM ELEVATION(FEET) =   1456.42
  DOWNSTREAM ELEVATION(FEET) =   1454.50
  ELEVATION DIFFERENCE(FEET) =      1.92
  TC = 0.303*[(  169.00**3)/(     1.92)]**.2 =    5.776
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.867
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8879
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      2.23
  TOTAL AREA(ACRES) =      0.65   TOTAL RUNOFF(CFS) =      2.23

******************************************************************************
  FLOW PROCESS FROM NODE    141.00 TO NODE    152.00 IS CODE =  31
------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1451.16  DOWNSTREAM(FEET) =  1450.16
  FLOW LENGTH(FEET) =   334.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.18
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.23
  PIPE TRAVEL TIME(MIN.) =   1.75    Tc(MIN.) =    7.53
  LONGEST FLOWPATH FROM NODE    140.00 TO NODE    152.00 =     503.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE    152.00 TO NODE    152.00 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.) =    7.53
  RAINFALL INTENSITY(INCH/HR) =   3.39
  TOTAL STREAM AREA(ACRES) =     0.65
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.23

******************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    151.00 IS CODE =  21
```

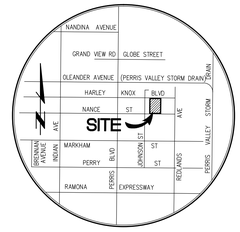
```
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
================================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   286.00
  UPSTREAM ELEVATION(FEET) =   1456.04
  DOWNSTREAM ELEVATION(FEET) =   1453.67
  ELEVATION DIFFERENCE(FEET) =      2.37
  TC = 0.303*[(  286.00**3)/(     2.37)]**.2 =    7.594
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.373
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8864
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      2.39
  TOTAL AREA(ACRES) =      0.80   TOTAL RUNOFF(CFS) =      2.39

****************************************************************************
  FLOW PROCESS FROM NODE    151.00 TO NODE    152.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1450.59  DOWNSTREAM(FEET) =  1450.38
  FLOW LENGTH(FEET) =     5.00   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   4.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.66
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.39
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    7.60
  LONGEST FLOWPATH FROM NODE    150.00 TO NODE    152.00 =     291.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    152.00 TO NODE    152.00 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.) =    7.60
  RAINFALL INTENSITY(INCH/HR) =   3.37
  TOTAL STREAM AREA(ACRES) =     0.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.39

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        2.23     7.53        3.388          0.65
      2        2.39     7.60        3.371          0.80

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        4.60     7.53       3.388
      2        4.61     7.60       3.371

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       4.61   Tc(MIN.) =    7.60
  TOTAL AREA(ACRES) =        1.5
  LONGEST FLOWPATH FROM NODE    140.00 TO NODE    152.00 =     503.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.5  TC(MIN.) =      7.60
  PEAK FLOW RATE(CFS)   =       4.61
  *** PEAK FLOW RATE TABLE ***
         Q(CFS)   Tc(MIN.)
  1        4.60       7.53
  2        4.61       7.60
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

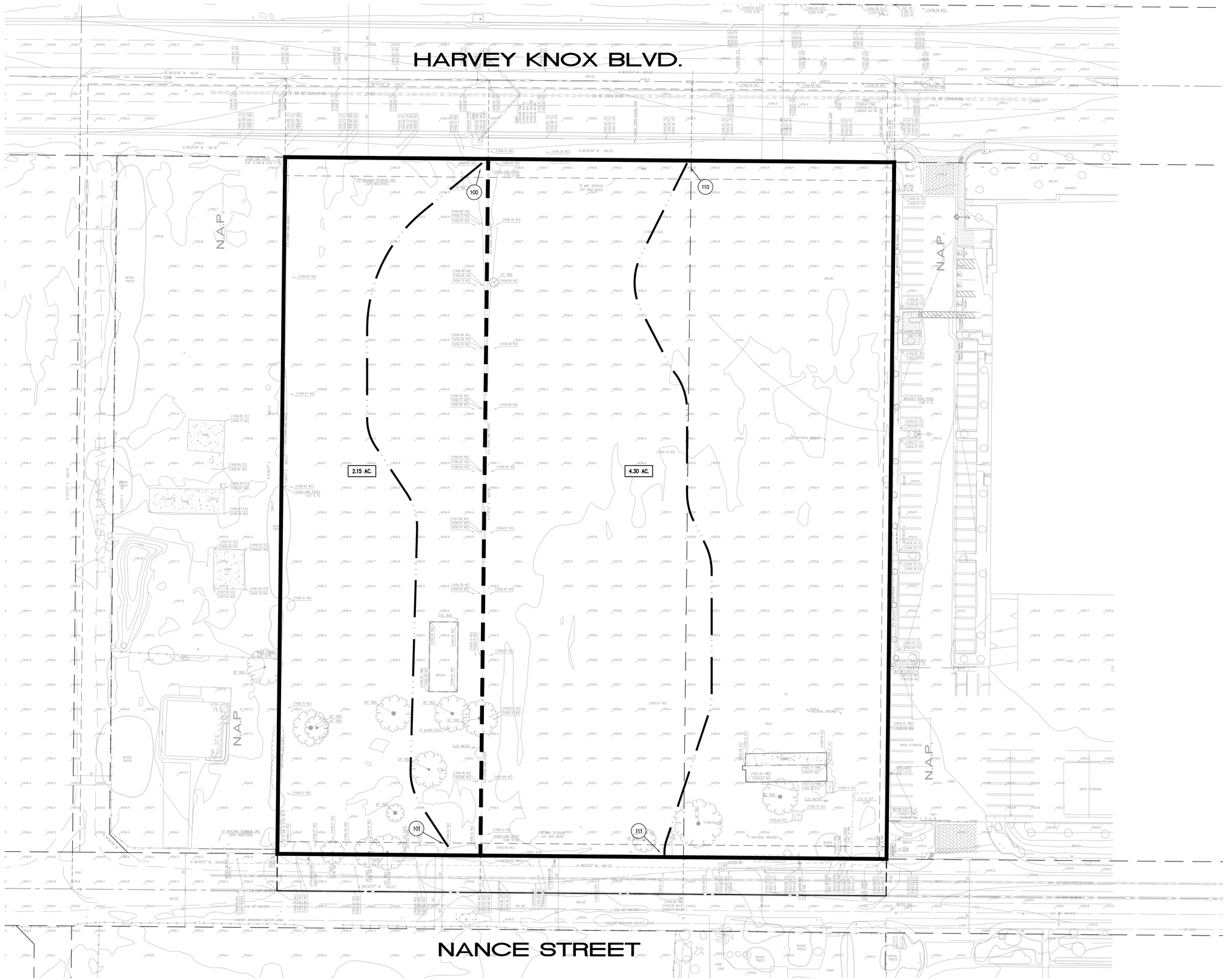
```
******************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                     (RCFC&WCD)  1978 HYDROLOGY MANUAL
         (c) Copyright 1982-2016 Advanced Engineering Software (aes)
                     (Rational Tabling Version 23.0)
                Release Date: 07/01/2016  License ID 1435

                          Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* NANCE STREET INDUSTRIAL DEVELOPMENT                                    *
* PROPOSED CONDITION 100-YEAR                                            *
* NODE 160                                                               *
 ************************************************************************

  FILE NAME: W:\3951\P160.DAT
  TIME/DATE OF STUDY: 16:47 04/27/2021
------------------------------------------------------------------------------
  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) =  0.450
  100-YEAR, 1-HOUR PRECIPITATION(INCH) =  1.200
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.200
  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    160.00 TO NODE    160.00 IS CODE =  22
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.157
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8887
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      0.92
  TOTAL AREA(ACRES) =      0.25   TOTAL RUNOFF(CFS) =      0.92
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.2  TC(MIN.) =      5.00
  PEAK FLOW RATE(CFS)   =       0.92
==============================================================================
==============================================================================
  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 *************************
* NANCE STREET INDUSTRIAL DEVELOPMENT                                    *
* PROPOSED CONDITION 100-YEAR                                            *
* NODE 170                                                               *
 ************************************************************************

  FILE NAME: W:\3951\P170.DAT
  TIME/DATE OF STUDY: 10:20 04/28/2021
------------------------------------------------------------------------------
  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) =  0.450
  100-YEAR, 1-HOUR PRECIPITATION(INCH) =  1.200
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.200
  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    170.00 TO NODE    170.00 IS CODE =  22
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  USER SPECIFIED Tc(MIN.) =    5.000
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.157
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8887
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      0.92
  TOTAL AREA(ACRES) =      0.25   TOTAL RUNOFF(CFS) =      0.92
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.2  TC(MIN.) =      5.00
  PEAK FLOW RATE(CFS)   =       0.92
==============================================================================
==============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

APPENDIX C

HYDROLOGY MAPS





VICINITY MAP

N.T.S.

LEGEND

▬▬▬▬	PROJECT BOUNDARY
▬ ▬ ▬	SUBAREA BOUNDARY
▬ ¦¦¦ ▬	FLOW PATH
1.00 AC.	SUBAREA AREA
(101)	NODE NUMBER

SCALE: 1"=30'

Last Update: 5/17/21
O:\3900-3999\3951\3951HYD-EX.dwg

PREPARED FOR:

HARLEY KNOX 2021, LLC
11777 SAN VICENTE BLVD., STE. 780
LOS ANGELES, CA. 90049
PHONE: (949) 296-7006

Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

CITY OF PERRIS
PUBLIC WORKS DEPARTMENT

EXISTING CONDITION HYDROLOGY MAP
HARLEY KNOX COMMERCE CENTER

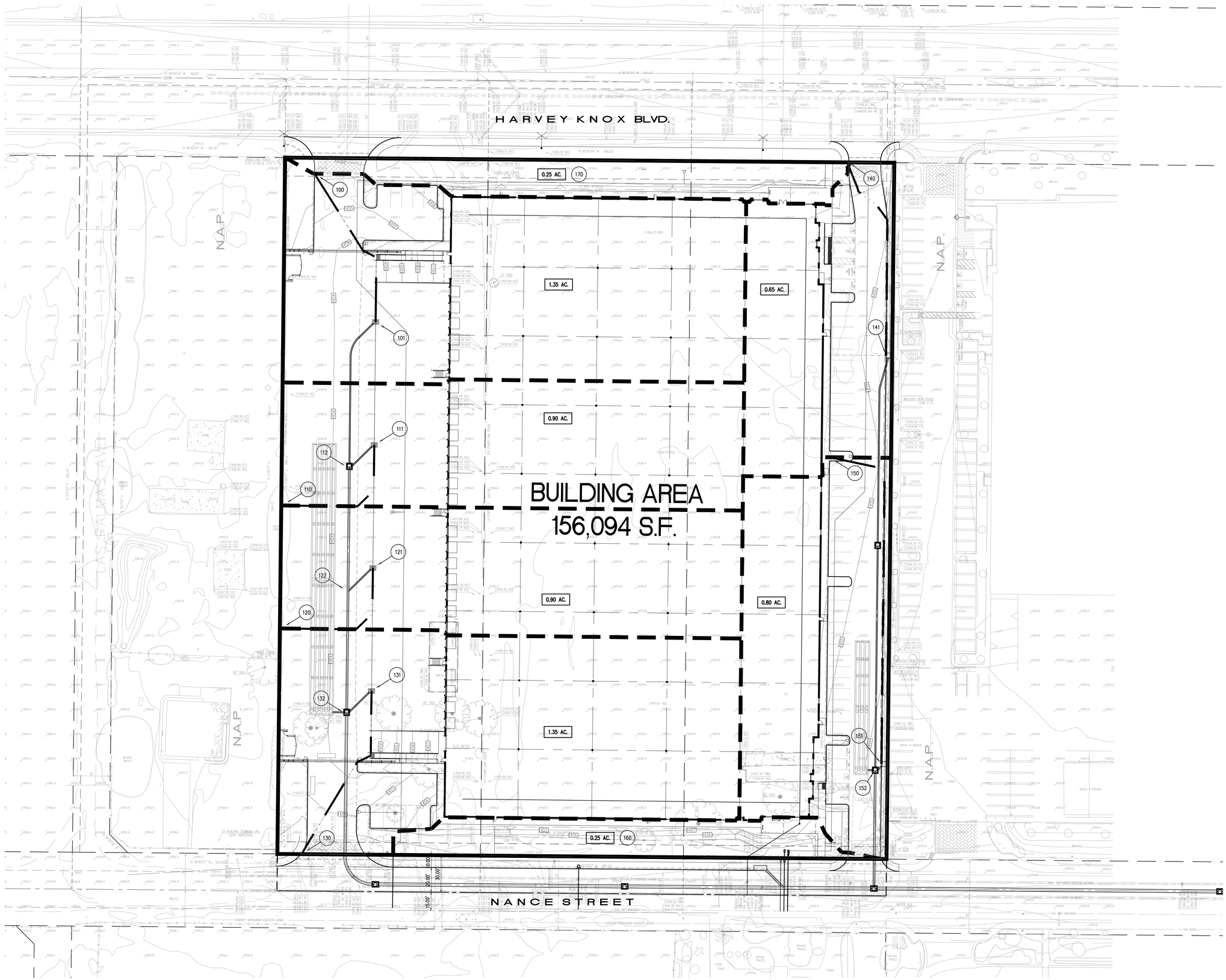
Designed by ________
Date ________
Checked by ________
Date ________
Designed by ________
Date ________
Checked by ________
Date ________

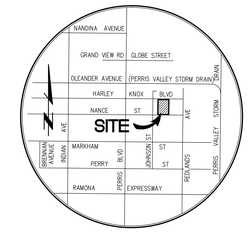
Approved by
Date ________

Public Works Director
R.C.E. XXXXX

Sheet 1 of 1 Sheets

3951/1 OF 1 SHEET





VICINITY MAP
N.T.S.

LEGEND

- PROJECT BOUNDARY
- SUBAREA BOUNDARY
- FLOW PATH
- 1.00 AC. — SUBAREA AREA
- 101 — NODE NUMBER

Last Update:12/1/21
O:\3900-3999\3951\3951HYD.dwg

CITY OF PERRIS
PUBLIC WORKS DEPARTMENT

PROPOSED CONDITION HYDROLOGY MAP
HARLEY KNOX COMMERCE CENTER

3951/1 OF 1 SHEET

PREPARED FOR:
HARLEY KNOX 2021, LLC
11777 SAN VICENTE BLVD., STE. 780
LOS ANGELES, CA. 90049
PHONE: (949) 296-7006

Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH:(714)521-4811 FAX:(714)521-4173

Designed by _____ Date _____
Checked by _____ Date _____
Designed by _____ Date _____
Checked by _____ Date _____

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

Sheet 1 of 1 Sheets