PROPOSED HYDROLOGY STUDY

For

Rose Glen

Tentative Tract 20519

City of Upland

County of San Bernardino

November 2021

PREPARED BY: Naila A.Brown

UNDER SUPERVISION OF:

Patrick L. Pagaduan, R.C.E. 56820, Exp. 6/30/23 Date:

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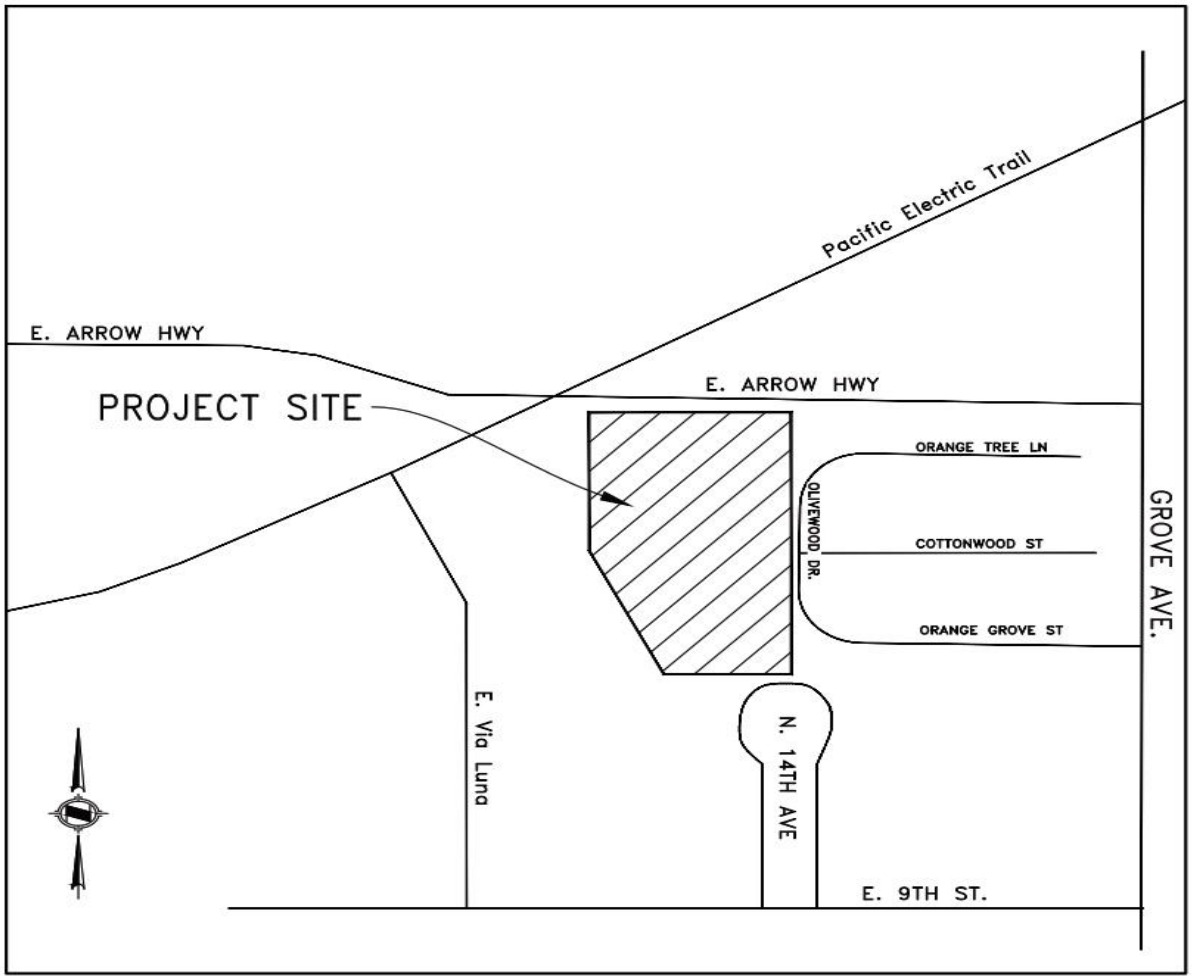
SECTION 1
INTRODUCTION

A. PROJECT LOCATION

The project is Tract Map 20519, also known as Rose Glen. The site is generally bounded by E. Arrow Highway to the north, Grove Avenue to the east, and North 14th Avenue to the Southeast. (See attached vicinity map).

Vicinity Map

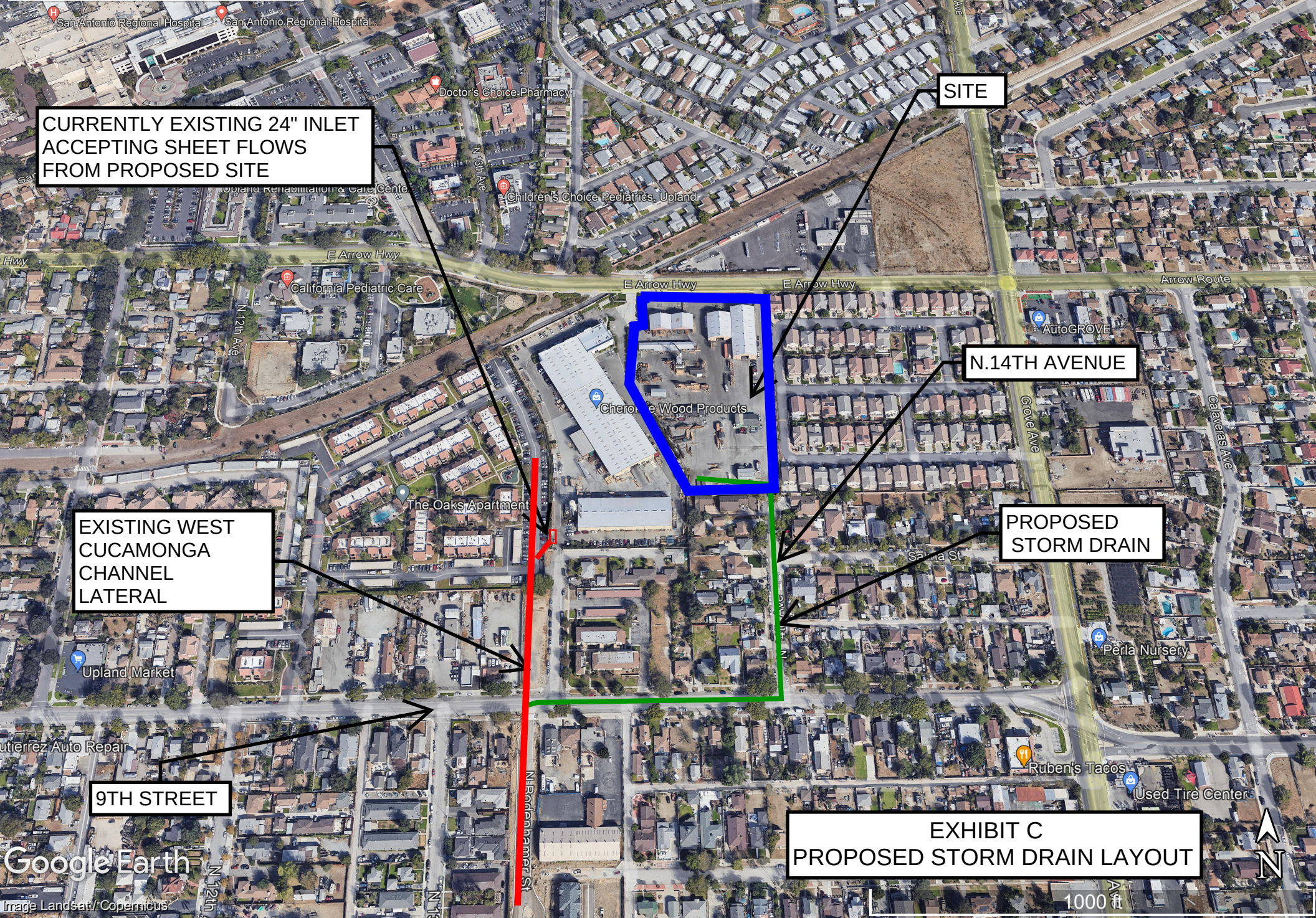


B. BACKGROUND/STUDY PURPOSE

This hydrology study has been prepared by Hunsaker and Associates, Inc, for the proposed development of TTM 20519.

The project site encompasses an area of approximately 4.84 acres, with a point of connection to existing 102" RCP at the intersection of 9TH Street and Bodenhamer Avenue, see Exhibit C.

For purposes of this study, 100-year design discharges used are based on the attached hydrology analysis and developed condition hydrology map.


CURRENTLY EXISTING 24" INLET ACCEPTING SHEET FLOWS FROM PROPOSED SITE
SITE
N.14TH AVENUE
PROPOSED STORM DRAIN
EXISTING WEST CUCAMONGA CHANNEL LATERAL
9TH STREET
EXHIBIT C
PROPOSED STORM DRAIN LAYOUT
San Antonio Regional Hospital
Doctor's Choice Pharmacy
Children's Choice Pediatrics, Upland
E Arrow Hwy
California Pediatric Care
N 13th Ave
N 12th Ave
Arrow Route
AutoGROVE
Grove Ave
Calaveras Ave
The Oaks Apartment
Upland Market
Perla Nursery
Ruben's Tacos
Used Tire Center
N Rodenhamer St
Google Earth
Image Landsat / Copernicus
1000 ft
N

Existing Condition

The project site is commercial, currently used for fabrication of construction materials. The majority of the site drains westerly towards the adjacent property, "Cherokee Wood Products", and to the existing 24" RCP headwall inlet that connects to an existing 10' X 6' RCB (see Exhibit C for clarification). There are no storm drain facilities onsite.

The existing hydrology study, is divided into two drainage areas, Area "A-1", approximately 4.69acres which sheets flows towards the existing 24" inlet, and area "A-2", approximate 0.2acres which sheets flows south-easterly towards North 14th Avenue, (see existing hydrology map *Exhibit "B").*

Proposed Condition

In the proposed condition the Project will be a single family residential development, with approximately 64 homes.

Drainage Areas "A-1", of approximately 4.53acres drains westerly to proposed inlet CB#1, and secondary overflow inlet CB#2. Drainage area "A-2", approximately 0.31acres sheets flows towards North.14th Avenue, as shown on Proposed Hydrology Map Exhibit B.

Water quality Lines are proposed to divert low flows to a proposed underground infiltration structure/water quality feature (See Exhibit D) for underground infiltration. As the infiltration rate decreases and the water starts to pond, an emergency escape pipe at a higher elevation will direct flows to the proposed storm drain.

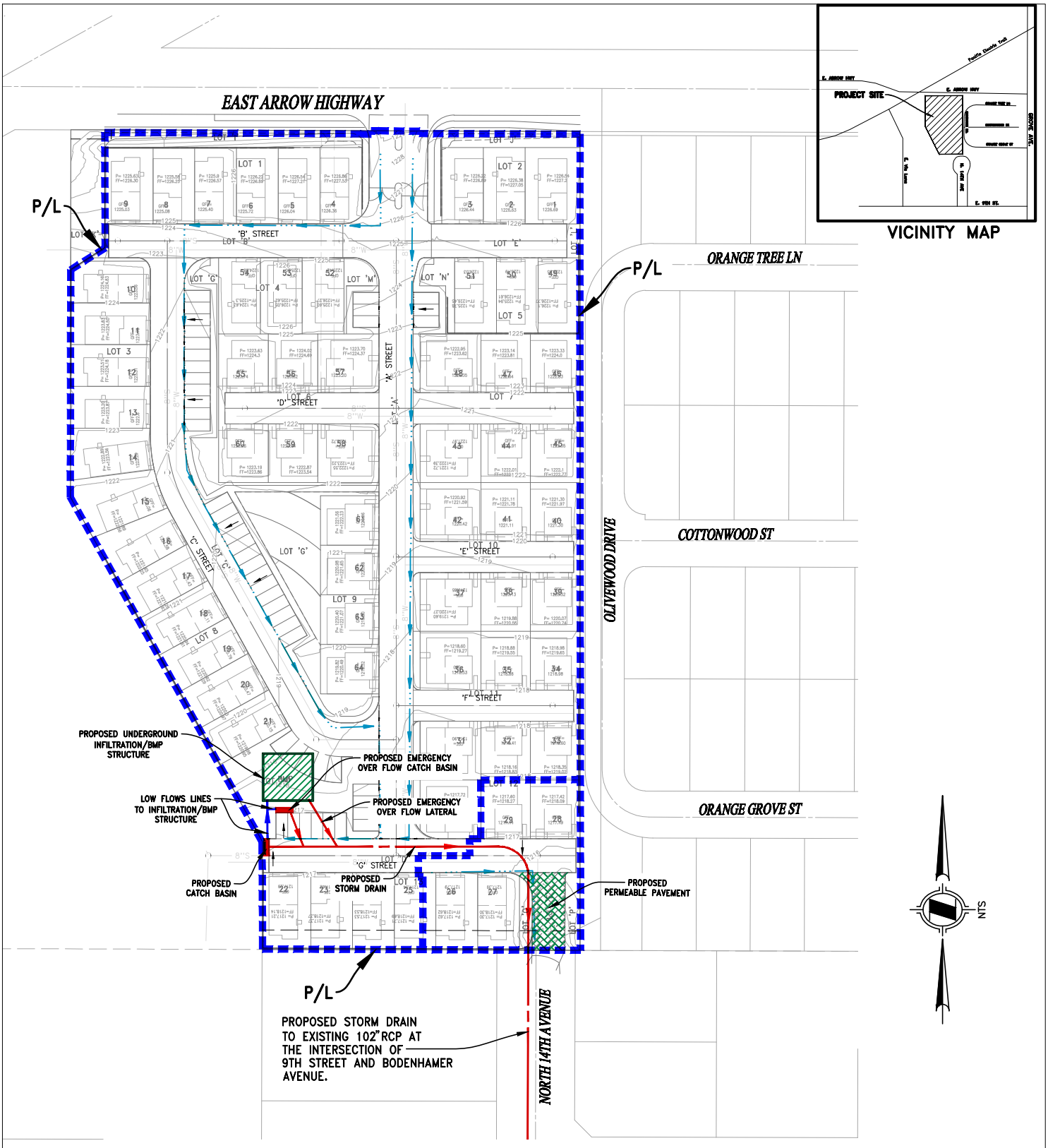


EXHIBIT "D"
PROPOSED DRAINAGE FACILITIES
TTM #20519
UPLAND, SAN BERNADINO, CA

PREPARED FOR:
CENTURY COMMUNITIES
UPLAND 76

PREPARED BY:
HUNSAKER & ASSOCIATES
IRVINE, INC
INLAND EMPIRE REGION
3000 ADAMS STREET, SUITE A-15
RIVERSIDE CA 92504 (951)688-7300
PLANNING/ENGINEERING/SURVEYING/GOVERNMENT RELATIONS

PLOTTED BY: Naila Brown DATE: Nov. 21, 2021 02:48:32 PM FILE: H:\00746\Planning\Hydrology\Maps\Onsite Drainge Facilities Exhibit.dwg

Table 1. Change in flows 100-year Storm Runoff

INLETS/POINT OF CONNECTION ID	EXISTING STUDY		PROPOSED STUDY		Δ FLOWS (CFS)	Findings
	Area (Ac)	Q100 (cfs)	Area (Ac)	Q100 (cfs)		
AREA "A-1"	4.69	18.5	4.53	16.3	-2.20	Area Decrease Q100 decrease
AREA "A-2" (Towards N.14th ST)	0.21	1.2	0.31	1.7	+0.5	Area increases Q100 Increases
TOTAL AREA & FLOWS	+/-4.90	19.7	+/-4.84	18.0	-1.7	Area decreases by +/- 0.06ac Q100 decrease

C. METHODOLOGY

Hydrology Analysis:

The San Bernardino County (SBC) Hydrology Manual was used to develop the hydrology parameters for the rational method. The calculations were performed using the computer program developed by AES VER 23.0.

The existing soil type A is shown in hydrology maps and used for this study from SBC Hydrology Manual. High Density residential lots with 80% imperviousness was utilized for the proposed land use.

D. CONCLUSION

The 100-year discharges from the proposed project shows that flows have been reduced due to development of TTM 20519 see Table 1. Above.

During final design, on-site storm flows will be conveyed by proposed inlet CB#1 and by secondary overflow inlet CB#2 to the proposed storm drain line as shown on Exhibit D.

Water quality low flows will be directed to the BMP infiltration structure, via a catch basin inlet diversion structures for treatment and infiltration before being discharged to the downstream storm system. Connector Pipe Screens (CPS) will also be added to filter larger debris and trash.

An-emergency overflow pipe from the infiltration structure will be added to divert flows in the event the BMP structure overflows.

Per Table 1. There will be no impact to the downstream watershed due to proposed project.

SECTION 2

EXISTING HYDROLOGY

```
_____
********************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                               Irvine,Inc
                     Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

--------------------------------------------------------------------------------
  FILE NAME: EX100.DAT
  TIME/DATE OF STUDY: 11:14 11/05/2021
================================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
================================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.5000

  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *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.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

********************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   740.60
  ELEVATION DATA: UPSTREAM(FEET) =   1227.40  DOWNSTREAM(FEET) =   1215.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.761
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.459
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        4.69      0.74     0.100    52    9.76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =     18.51
  TOTAL AREA(ACRES) =      4.69   PEAK FLOW RATE(CFS) =     18.51

********************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   204.90
  ELEVATION DATA: UPSTREAM(FEET) =   1217.00  DOWNSTREAM(FEET) =   1213.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.615
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.214
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.21      0.74     0.100    52    5.62
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.16
  TOTAL AREA(ACRES) =      0.21   PEAK FLOW RATE(CFS) =      1.16
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.2  TC(MIN.) =      5.62
  EFFECTIVE AREA(ACRES) =      0.21  AREA-AVERAGED Fm(INCH/HR)=  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap = 0.100
  PEAK FLOW RATE(CFS)   =       1.16
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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 ************************************************************************
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                           Analysis prepared by:

                           HUNSAKER & ASSOCIATES
                                Irvine,Inc
                      Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* EXISTING STUDY, 10 YEAR STORM                                        *
* UPLAND, SAN BERNADION,CA                                             *
*                                                                      *
 ************************************************************************
  FILE NAME: EX10.DAT
  TIME/DATE OF STUDY: 11:25 11/05/2021
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.0500

  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *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.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   740.60
  ELEVATION DATA: UPSTREAM(FEET) =   1227.40  DOWNSTREAM(FEET) =   1215.50
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.761
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.122
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        4.69      0.98     0.100    32    9.76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =     12.76
  TOTAL AREA(ACRES) =      4.69   PEAK FLOW RATE(CFS) =     12.76

************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   204.90
  ELEVATION DATA: UPSTREAM(FEET) =   1217.00  DOWNSTREAM(FEET) =   1213.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.615
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.350
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.21      0.98     0.100    32    5.62
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.21   PEAK FLOW RATE(CFS) =      0.80
========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.2  TC(MIN.) =      5.62
  EFFECTIVE AREA(ACRES) =      0.21  AREA-AVERAGED Fm(INCH/HR)=  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap = 0.100
  PEAK FLOW RATE(CFS)   =       0.80
========================================================================
========================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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************************************************************************
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                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                               Irvine,Inc
                     Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY STUDY, 2-YEAR STORM                               *
* UPLAND, SAN BERNADINO,CA                                             *
*                                                                      *
 ************************************************************************
  FILE NAME: EX2.DAT
  TIME/DATE OF STUDY: 11:32 11/05/2021
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.6700

  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *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.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   740.60
  ELEVATION DATA: UPSTREAM(FEET) =   1227.40  DOWNSTREAM(FEET) =   1215.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.761
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.992
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        4.69      1.33     0.100    17    9.76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      7.85
  TOTAL AREA(ACRES) =      4.69   PEAK FLOW RATE(CFS) =      7.85

************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   204.90
  ELEVATION DATA: UPSTREAM(FEET) =   1217.00  DOWNSTREAM(FEET) =   1213.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.615
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.775
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.21      1.33     0.100    17    5.62
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.50
  TOTAL AREA(ACRES) =      0.21   PEAK FLOW RATE(CFS) =      0.50
========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.2  TC(MIN.) =      5.62
  EFFECTIVE AREA(ACRES) =      0.21  AREA-AVERAGED Fm(INCH/HR)=  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap = 0.100
  PEAK FLOW RATE(CFS)   =       0.50
========================================================================
========================================================================
  END OF RATIONAL METHOD ANALYSIS
```

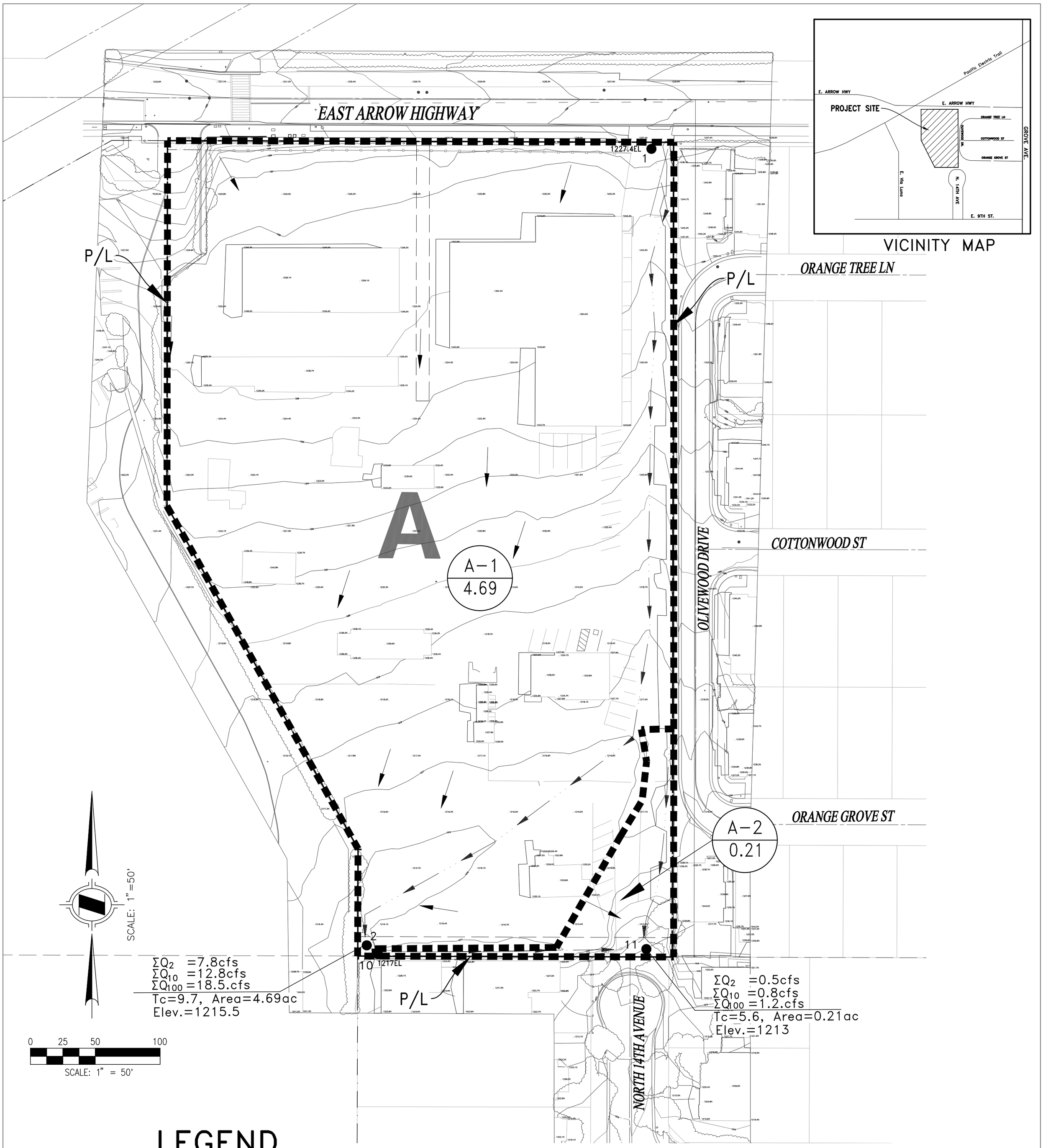

VICINITY MAP

LEGEND

- DRAINAGE BOUNDARY
- NODE NUMBER
- A / 1.20 — AREA DESIGNATION / AREA ACREAGE
- ΣQ100 =8.0cfs / t=15.0 — PEAK CONFLUENCE FLOW RATE / TIME OF CONCENTRATION
- FLOW LINE
- A — SOIL GROUP

EXHIBIT "A"
EXISTING HYDROLOGY
TTM#20519
UPLAND, SAN BERNADINO, CA

PREPARED FOR:
CENTURY COMMUNITIES
UPLAND 76

PREPARED BY:
HUNSAKER & ASSOCIATES
IRVINE, INC
INLAND EMPIRE REGION
2900 ADAMS STREET, SUITE A-15
RIVERSIDE CA 92504 (951)352-7200
PLANNING/ENGINEERING/SURVEYING/GOVERNMENT RELATIONS

PLOTTED BY: Naila Brown DATE: Nov. 21, 2021 10:20:59 AM FILE: H:\00746\Planning\Hydrology\Maps\Existing Hydro Map.dwg

SECTION 3

PROPOSED HYDROLOGY

```
************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        (c) Copyright 1983-2016 Advanced Engineering Software (aes)
            Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                               Irvine,Inc
                     Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* PROPOSED HYDROLOGY STUDY, 100 YEAR STORM                              *
* UPLAND, SAN BERNADINO,CA                                              *
*                                                                       *
 ************************************************************************
        FILE NAME: PRO100.DAT
  TIME/DATE OF STUDY: 13:22 11/05/2021
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.5000

  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *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.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<ED
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   844.00
  ELEVATION DATA: UPSTREAM(FEET) =   1229.30  DOWNSTREAM(FEET) =   1216.35
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.064
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.137
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        4.53      0.74     0.200    52   11.06
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =     16.26
  TOTAL AREA(ACRES) =      4.53   PEAK FLOW RATE(CFS) =     16.26

+------------------------------------------------------------------------+
| AREA A-2 TOWARDS 14TH AVENUE                                           |
|                                                                        |
|                                                                        |
+------------------------------------------------------------------------+

************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   190.00
  ELEVATION DATA: UPSTREAM(FEET) =   1218.60  DOWNSTREAM(FEET) =   1214.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.562
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.249
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        0.31      0.74     0.200    52    5.56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      1.70
  TOTAL AREA(ACRES) =      0.31   PEAK FLOW RATE(CFS) =      1.70
========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.3  TC(MIN.) =      5.56
  EFFECTIVE AREA(ACRES) =      0.31  AREA-AVERAGED Fm(INCH/HR)=  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap = 0.200
  PEAK FLOW RATE(CFS)   =       1.70
========================================================================
========================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
 ************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                               Irvine,Inc
                     Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* PROPOSED HYDROLOGY STUDY, 10 YEAR STORM                              *
* UPLAND, SAN BERNADINO,CA                                             *
*                                                                      *
************************************************************************
  FILE NAME: PRO10.DAT
  TIME/DATE OF STUDY: 14:00 11/05/2021
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.0500

  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *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 0.0312 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.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   844.00
  ELEVATION DATA: UPSTREAM(FEET) =   1229.30  DOWNSTREAM(FEET) =   1216.35

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.064
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.896
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        4.53      0.98     0.200    32   11.06
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =     11.01
  TOTAL AREA(ACRES) =      4.53   PEAK FLOW RATE(CFS) =     11.01

************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   190.00
  ELEVATION DATA: UPSTREAM(FEET) =   1218.60  DOWNSTREAM(FEET) =   1214.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.562
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.375
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        0.31      0.98     0.200    32    5.56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      1.17
  TOTAL AREA(ACRES) =      0.31   PEAK FLOW RATE(CFS) =      1.17
========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.3  TC(MIN.) =      5.56
  EFFECTIVE AREA(ACRES) =      0.31  AREA-AVERAGED Fm(INCH/HR)=  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap = 0.200
  PEAK FLOW RATE(CFS)   =       1.17
========================================================================
========================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
 ************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                               Irvine,Inc
                     Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

  ************************* DESCRIPTION OF STUDY *************************
 * PROPOSED HYDROLOGY STUDY, 2YEAR STORM
*  UPLAND, SAN BERNADINO, CA
  ************************************************************************
  FILE NAME: PRO2.DAT
  TIME/DATE OF STUDY: 14:08 11/05/2021
 ========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
 ========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.6700

  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *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.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

 ************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
 ------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   844.00
  ELEVATION DATA: UPSTREAM(FEET) =   1229.30  DOWNSTREAM(FEET) =   1216.35

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.064
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.848
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        4.53      1.33     0.200    17   11.06
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      6.45
  TOTAL AREA(ACRES) =      4.53   PEAK FLOW RATE(CFS) =      6.45

 ************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
 ------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   190.00
  ELEVATION DATA: UPSTREAM(FEET) =   1218.60  DOWNSTREAM(FEET) =   1214.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.562
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.791
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        0.31      1.33     0.200    17    5.56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      0.70
  TOTAL AREA(ACRES) =      0.31   PEAK FLOW RATE(CFS) =      0.70
 ========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.3  TC(MIN.) =      5.56
  EFFECTIVE AREA(ACRES) =      0.31  AREA-AVERAGED Fm(INCH/HR)=  0.27
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap = 0.200
  PEAK FLOW RATE(CFS)   =       0.70
 ========================================================================
 ========================================================================
  END OF RATIONAL METHOD ANALYSIS
```
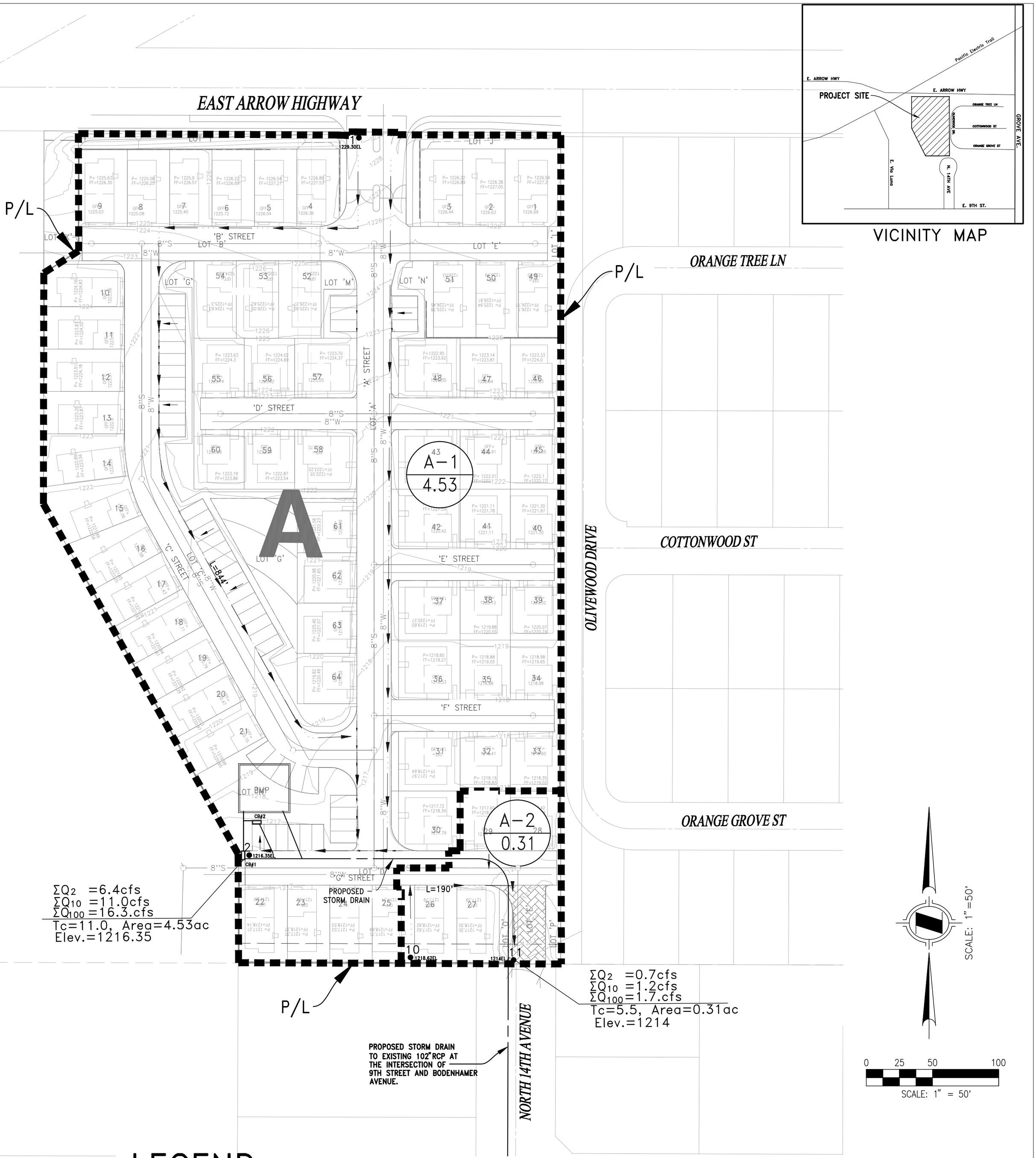



VICINITY MAP

LEGEND

- DRAINAGE BOUNDARY
- NODE NUMBER
- AREA DESIGNATION / AREA ACREAGE
- PEAK CONFLUENCE FLOW RATE / TIME OF CONCENTRATION
- FLOW LINE
- CB — CATCH BASIN
- SOIL GROUP

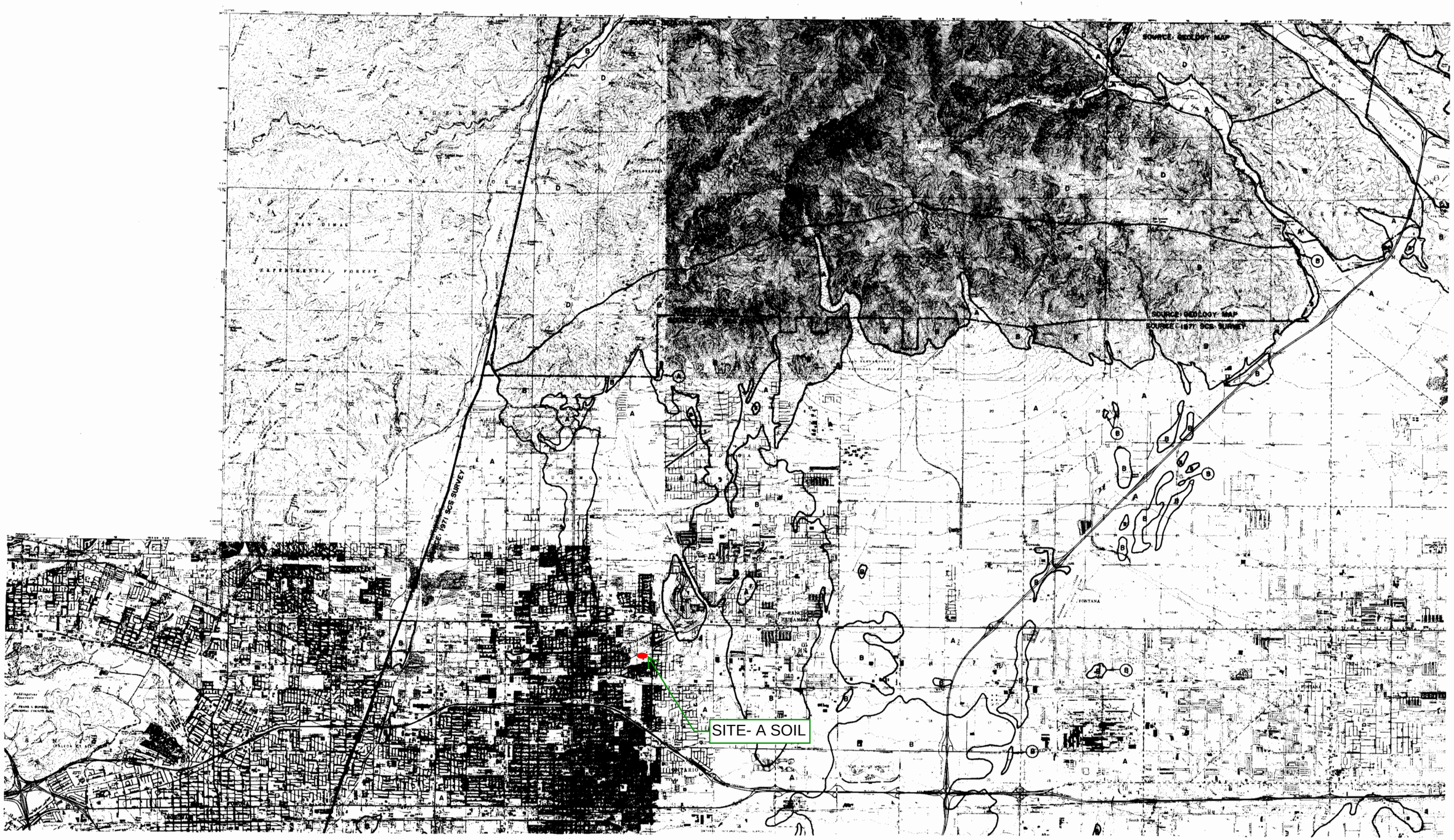
EXHIBIT "B"
PROPOSED HYDROLOGY
TTM#20519
UPLAND, SAN BERNADINO, CA

PREPARED FOR:
CENTURY COMMUNITIES
UPLAND 76

PREPARED BY:
HUNSAKER & ASSOCIATES
IRVINE, INC
INLAND EMPIRE REGION
2900 ADAMS STREET, SUITE A-15
RIVERSIDE CA 92504 (951)352-7200
PLANNING/ENGINEERING/SURVEYING/GOVERNMENT RELATIONS

PLOTTED BY: Naila Brown DATE: Nov. 21, 2021 10:28:09 AM FILE: H:\00746\Planning\Hydrology\Maps\Proposed Hydrology Map.dwg

SECTION 4
REFERENCE

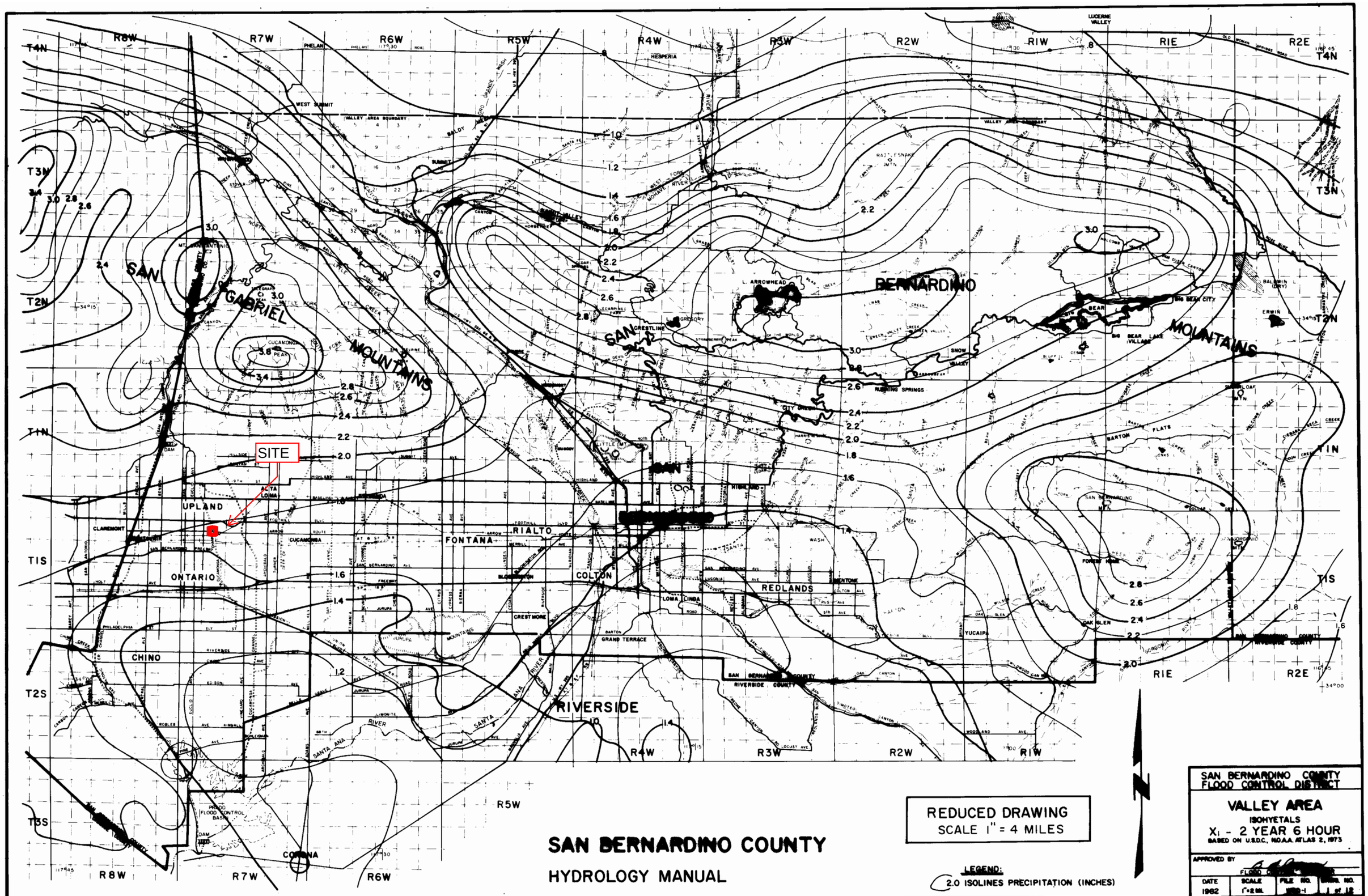


SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

SCALE REDUCED BY 1/2

HYDROLOGIC SOILS GROUP MAP
FOR
SOUTHWEST-A AREA

FIGURE C-13



SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

REDUCED DRAWING
SCALE 1" = 4 MILES

LEGEND:
2.0 ISOLINES PRECIPITATION (INCHES)

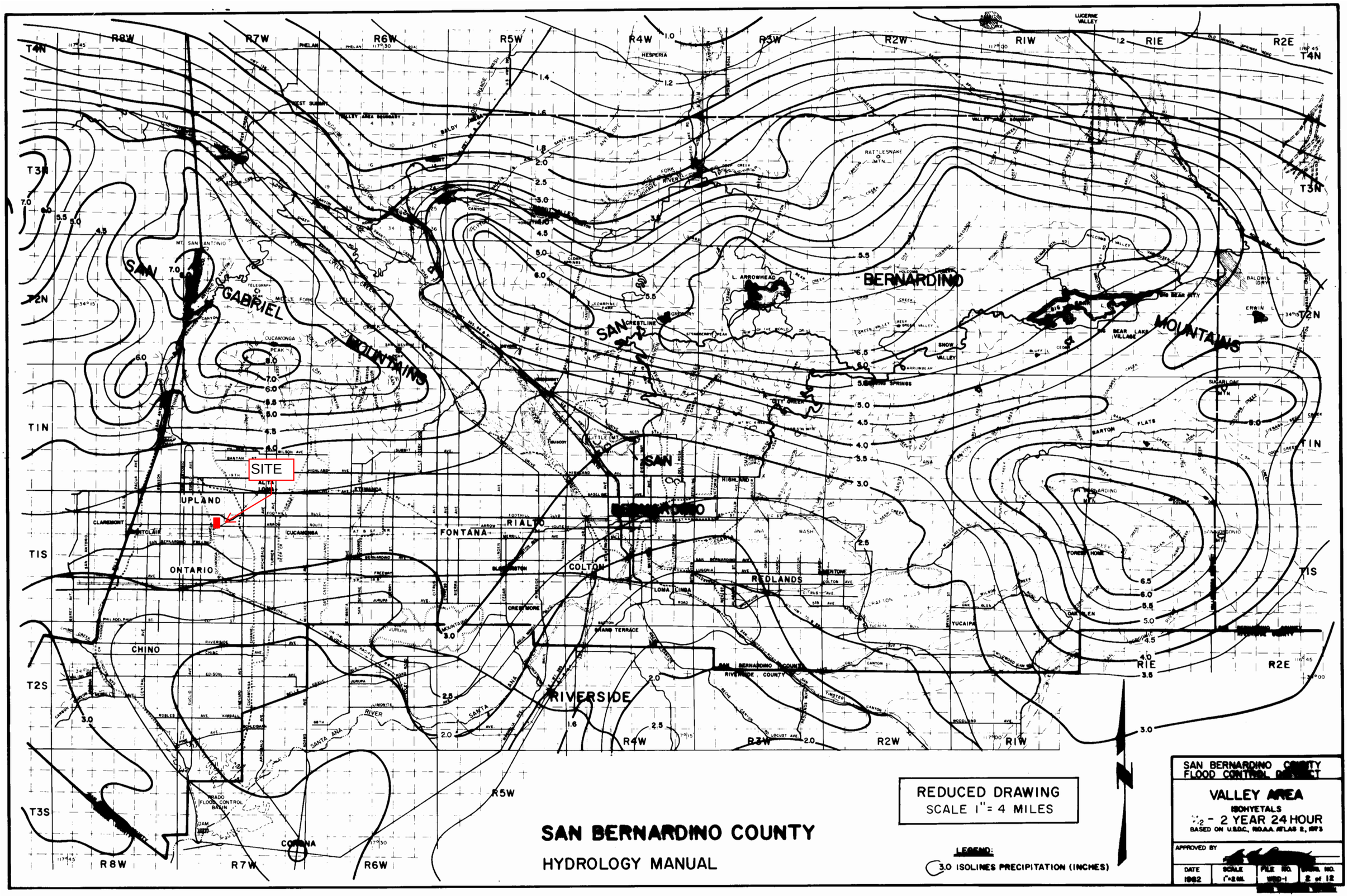
SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT

VALLEY AREA
ISOHYETALS
X_1 - 2 YEAR 6 HOUR
BASED ON U.S.D.C., N.O.A.A. ATLAS 2, 1973

APPROVED BY
FLOOD CONTROL ENGINEER

DATE	SCALE	FILE NO.	DRWG. NO.
1982	1"=2 MI.		1 of 12

FIGURE B-1



REDUCED DRAWING
SCALE 1" = 4 MILES

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

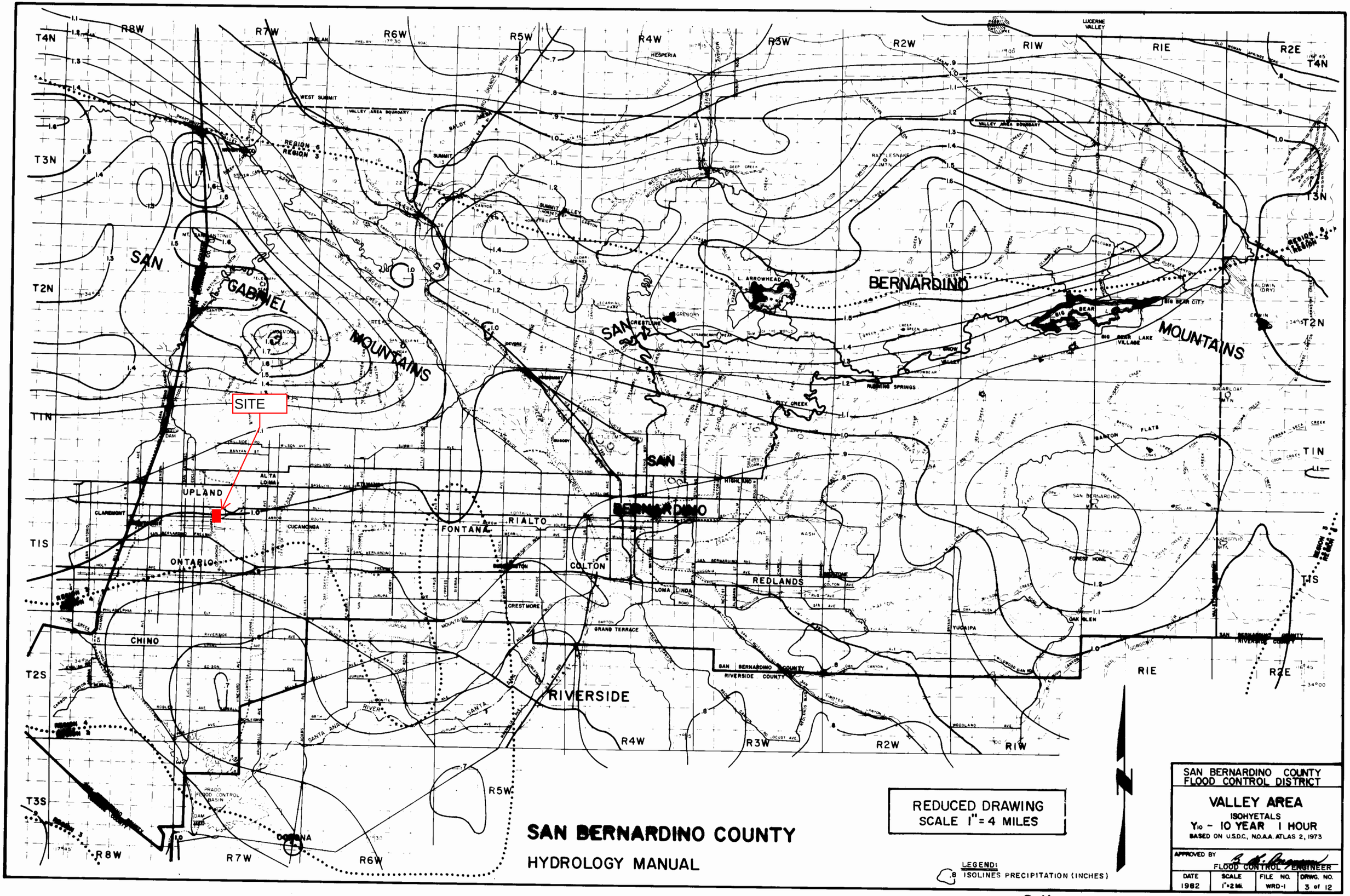
SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT

VALLEY AREA
ISOHYETALS
½ - 2 YEAR 24 HOUR
BASED ON U.S.D.C., N.O.A.A. ATLAS 2, 1973

APPROVED BY

DATE	SCALE	FILE NO.	DWG. NO.
1982	1"=2 MI.	HYD-1	2 of 12

FIGURE B-2



SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

REDUCED DRAWING
SCALE 1" = 4 MILES

LEGEND:
.8 ISOLINES PRECIPITATION (INCHES)

SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT

VALLEY AREA
ISOHYETALS
Y_{10} - 10 YEAR 1 HOUR
BASED ON U.S.D.C., N.O.A.A. ATLAS 2, 1973

APPROVED BY _____ FLOOD CONTROL ENGINEER

DATE	SCALE	FILE NO.	DRWG. NO.
1982	1"=2 Mi.	WRD-1	3 of 12

FIGURE B-3

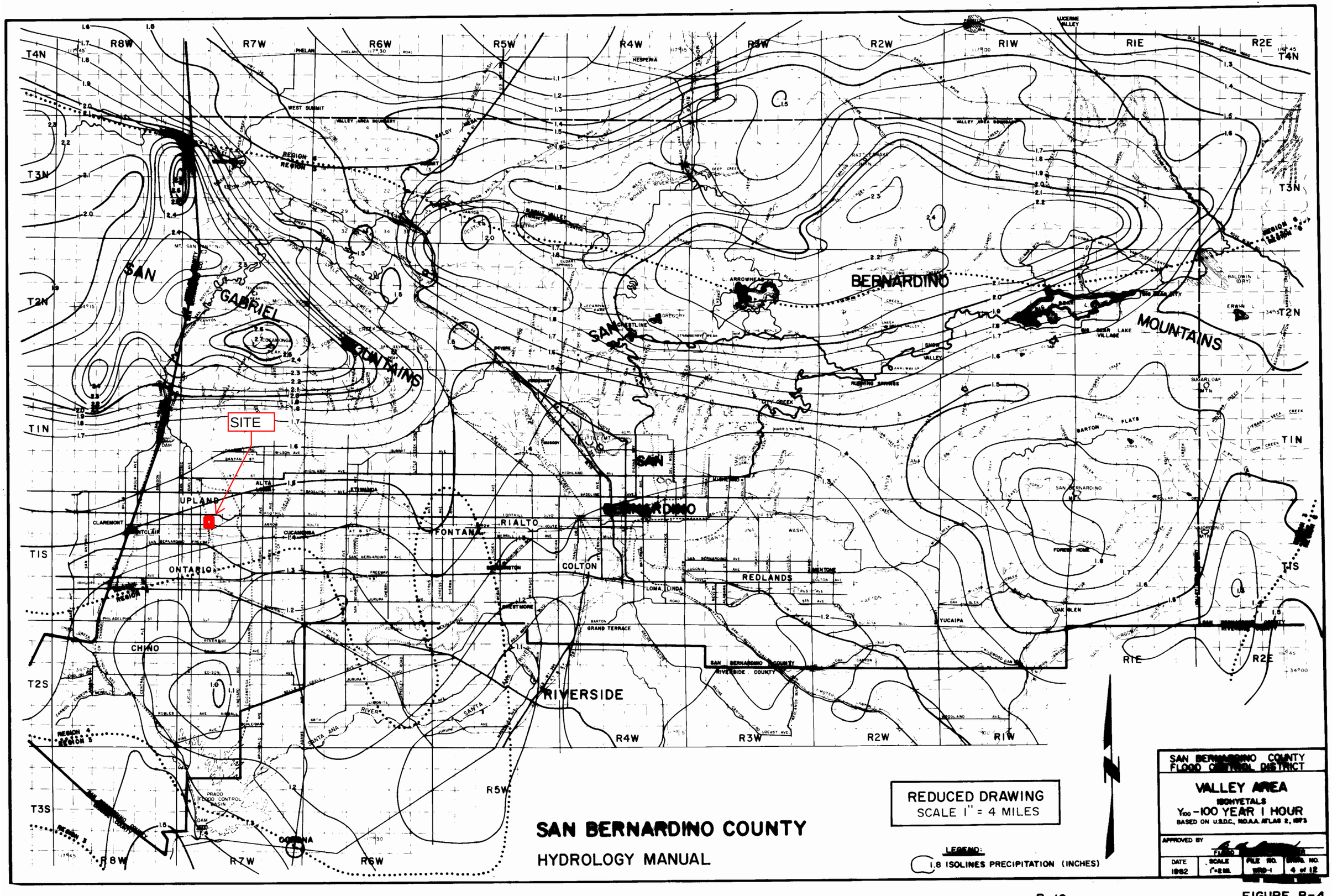
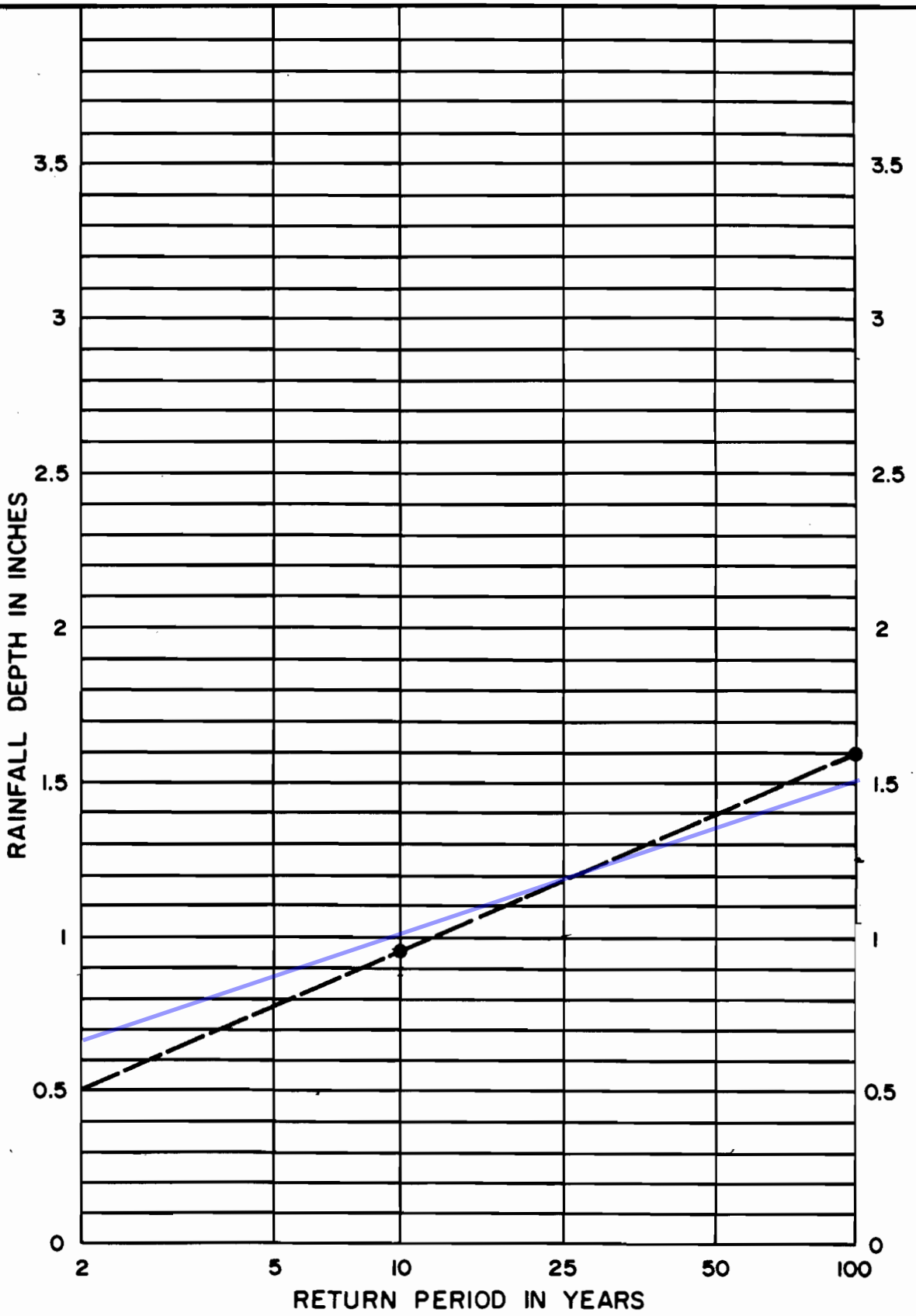

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL
REDUCED DRAWING
SCALE 1" = 4 MILES
LEGEND:
1.8 ISOLINES PRECIPITATION (INCHES)
SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT
VALLEY AREA
ISOHYETALS
Y100 -100 YEAR 1 HOUR
BASED ON U.S.D.C., N.O.A.A. ATLAS 2, 1973
APPROVED BY
DATE 1982
SCALE 1"=2 MI.
FILE NO. WRD-1
DWG. NO. 4 of 12
SITE
SAN GABRIEL MOUNTAINS
SAN BERNARDINO MOUNTAINS
UPLAND
ONTARIO
CHINO
FONTANA
RIALTO
COLTON
REDLANDS
RIVERSIDE
CORONA
CLAREMONT
CUCAMONGA
LOMA LINDA
YUCAIPA
GRAND TERRACE
SAN BERNARDINO COUNTY
RIVERSIDE COUNTY
T4N
T3N
T2N
T1N
T1S
T2S
T3S
R8W
R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E

FIGURE B-4



NOTE:

1. FOR INTERMEDIATE RETURN PERIODS PLOT 10-YEAR AND 100-YEAR ONE HOUR VALUES FROM MAPS, THEN CONNECT POINTS AND READ VALUE FOR DESIRED RETURN PERIOD. FOR EXAMPLE GIVEN 10-YEAR ONE HOUR = 0.95" AND 100-YEAR ONE HOUR = 1.60", 25-YEAR ONE HOUR = 1.18".

REFERENCE: NOAA ATLAS 2, VOLUME XI - CAL., 1973

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

RAINFALL DEPTH VERSUS RETURN PERIOD FOR PARTIAL DURATION SERIES

FIGURE D-2