PRELIMINARY HYDROLOGY STUDY

For

Tentative Tract No. 20394

A.P.N. 1013-211-21-0-000 AND A.P.N. 1013-211-22-0-000

Located in the Unincorporated Territory of
County of San Bernardino

Prepared Date: January 2021
Revised Date: November 2021

Prepared For:
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Prepared By:

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11/2021

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Tentative Tract No. 20394

Located in the Unincorporated Territory of County of San Bernardino

JN 897-04

TABLE OF CONTENTS

A

A. Site/Project Description/Discussion

Tentative Tract Map No. 20394 (TTM) is an 11.9 acres parcel located at the northwest corner of Yorba and Francis Avenues in the unincorporated territory of San Bernardino County. The drainage leaving the parcel is bifurcated by a high point in Francis Avenue that directs the storm water to drain easterly and westerly along the north side of Francis Avenue. The parcel also has a large upstream tributary area (25.6 acres) that flows onto the project along the north boundary of the project. The tributary storm flows are also bifurcated in the same general fashion as the on-tract storm flows. The tributary area is composed of large acreage parcels that are primarily agricultural in nature with most of the parcels being graded flatter with small windrows between parcels. It is highly unlikely that any stormwaters would each the subject parcel currently due to the agricultural grading and flattening of the land and the lack of any definitive stream beds. However the hydrology for the project assumes that storm water would reach the north property line of the parcel, and as such would be captured and routed around the project to maintain the same historic drainage patterns, i.e., flowing easterly and westerly along Francis Avenue.

The westerly tributary flows would be collected in an open channel along the north side of the northerly tier of lots. These westerly tributary storm flows would be directed westerly and enter a storm pipe system that conveys the storm flows southerly to a curb outlet at the southwest corner of the project that will drain to the west in Francis Avenue.

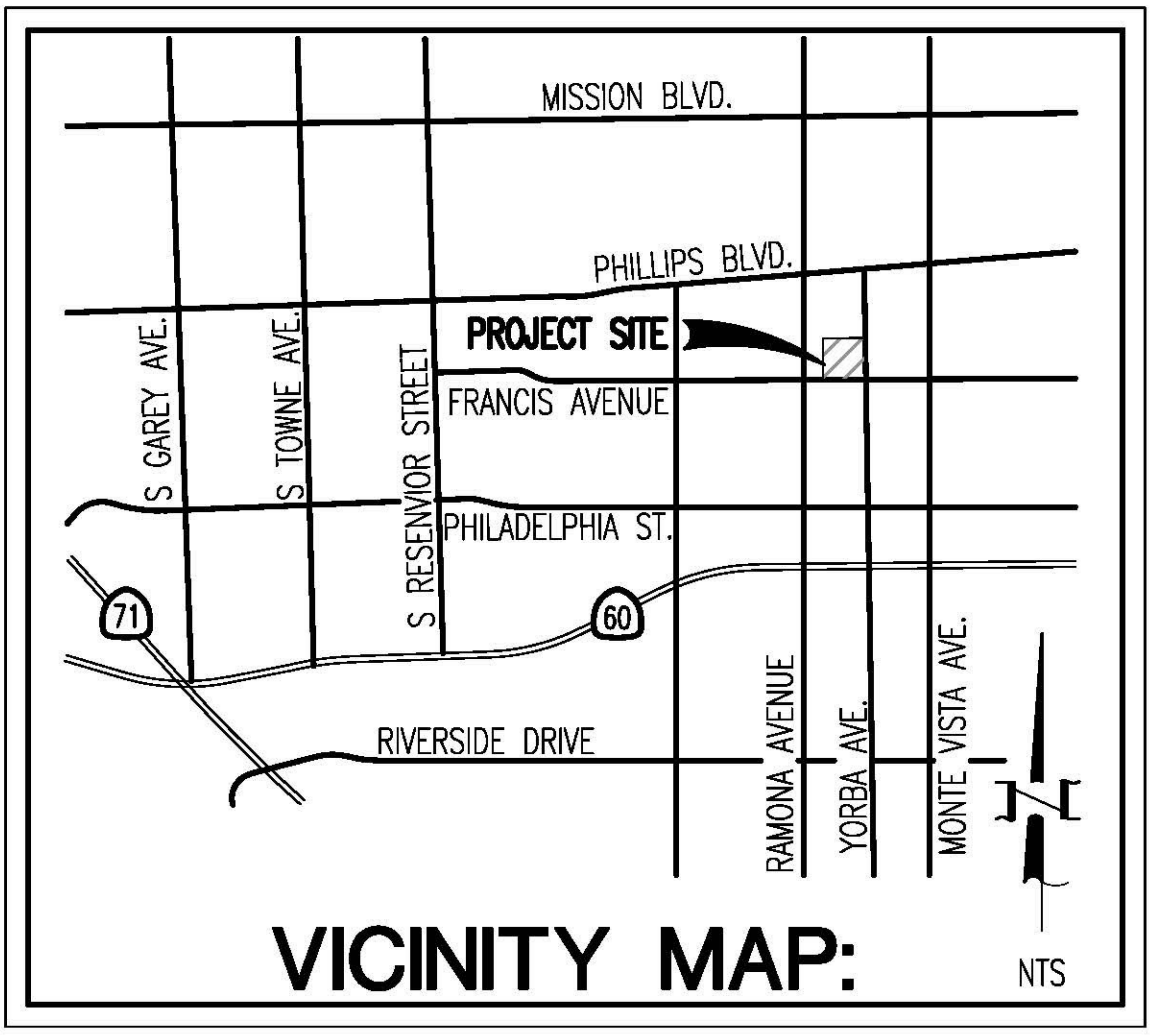
The easterly tributary storm flows will be collected in an open channel along the north side of the north tier of lots. These easterly tributary storm flows would be conveyed to a curb outlet on Yorba Avenue where they would drain southerly in Yorba Avenue to Francis Avenue.

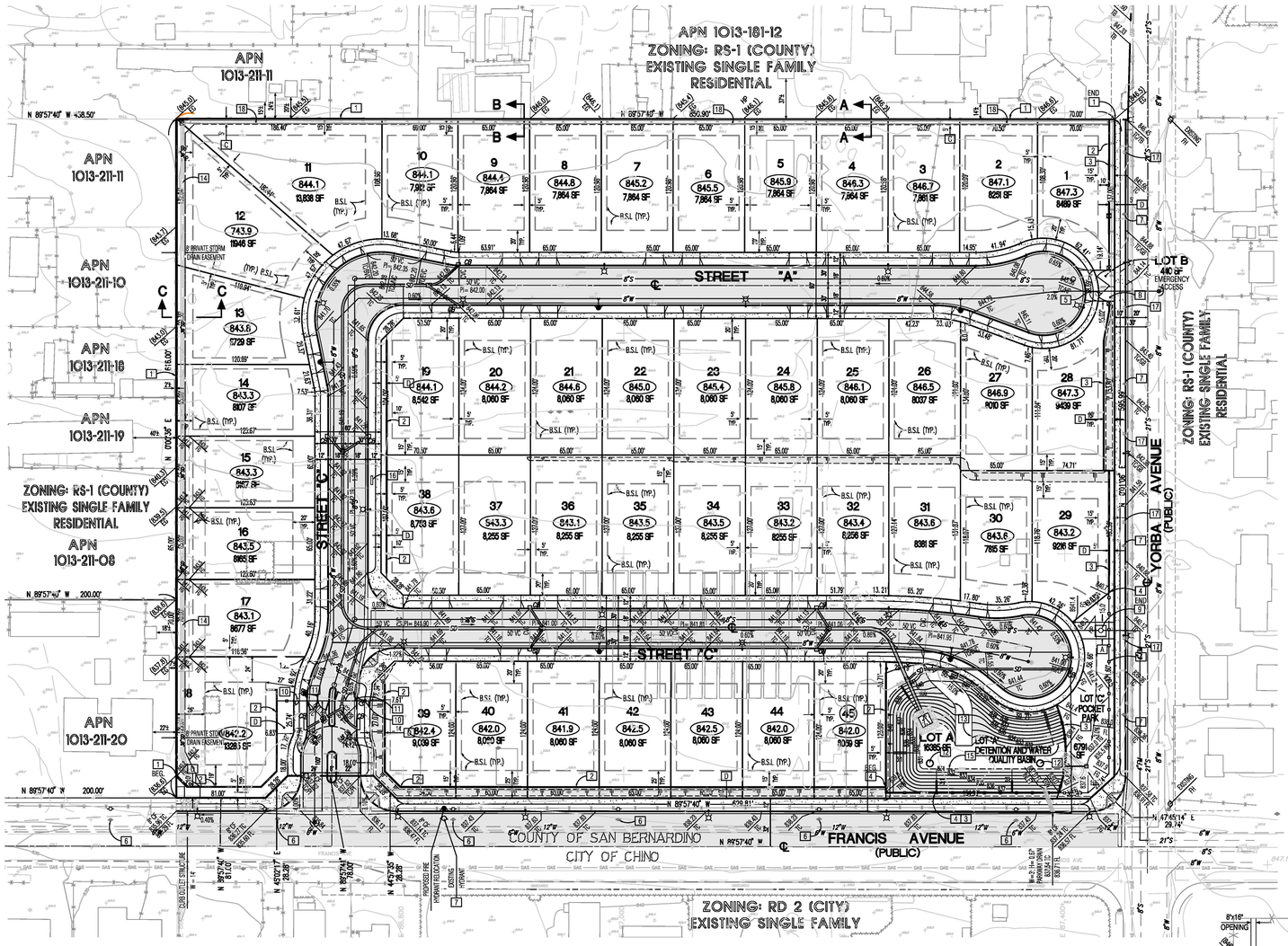
The project on-site storm flows would be collected in a storm drain system and directed to a stormwater detention-water quality basin at the southeast corner of the project. This combination basin would have two Maxwell Drywells to provide both water quality and storm water infiltration for infiltration of the first flush flows and the ultimate infiltration of the detained storm flows.

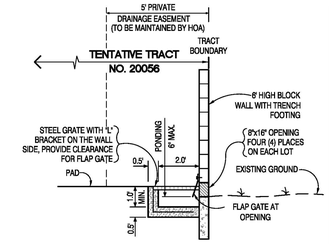
The on-site storm flows and the tributary storm flows would follow the existing drainage patterns with the on-site storm flows attenuated in the detention /infiltration basin to be 80 per cent of the predeveloped storm flows.

The detention/infiltration basin would be landscaped with evaporate-transpiration plantings that would assist in the dewatering of the basins. The low flow drainage channels would direct the low flow (dry weather) flows to the two dry wells as well as provide a path way for vector control personnel to examine the basin for mosquitos etc.

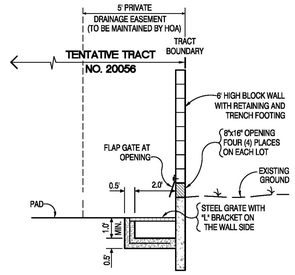
Advanced Engineering Software (AES) was used in running the Rational Method Hydrology. Civil Design Corporation software was used in running the synthetic unit hydrograph and the routing analysis. Parameters used for calculations are per the San Bernardino County Hydrology Manual. The Precipitations used are based on San Bernadino County Flood Control District Isohyetals for Valley Area. A copy of the soil type within the project site is also included in this report.


MISSION BLVD.
PHILLIPS BLVD.
PROJECT SITE
FRANCIS AVENUE
PHILADELPHIA ST.
S GAREY AVE.
S TOWNE AVE.
S RESENVIOR STREET
71
60
RIVERSIDE DRIVE
RAMONA AVENUE
YORBA AVE.
MONTE VISTA AVE.
VICINITY MAP:
NTS

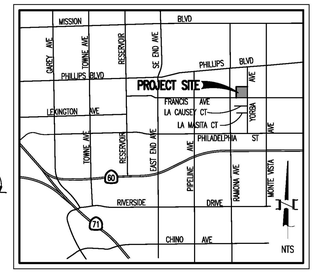




SECTION A-A
RECTANGULAR CHANNEL DETAIL
FOR LOTS 1 - 6
SCALE: 1"=3'



SECTION B-B
RECTANGULAR CHANNEL DETAIL
FOR LOTS 7 - 11
SCALE: 1"=3'



VICINITY MAP

PROJECT SCOPE:

THIS IS AN APPLICATION FOR A GENERAL PLAN AMENDMENT, A CHANGE OF ZONE, AND TENTATIVE TRACT MAP FOR A 13.35 ACRE (GROSS) PARCEL LOCATED AT THE NORTHWEST CORNER OF YORBA AVENUE AND FRANCIS AVENUE IN THE COUNTY OF SAN BERNARDINO. THE GENERAL PLAN AMENDMENT WOULD BE FROM RS-1 TO RS. THE CHANGE OF ZONE WOULD BE FROM RS-1 TO RS (MAXIMUM 4 DU/ACRE). THE PROJECT WILL BE A GATED COMMUNITY WITH 45 RESIDENTIAL LOTS RANGING IN SIZE FROM 7,813 SF TO 13,838 SQUARE FEET AVERAGING 8,509 SF TOGETHER WITH A DUAL PURPOSE WATER QUALITY AND DETENTION BASIN (LOT A, 0.53 ACRES) AND AN EMERGENCY ACCESS TO YORBA AVENUE (LOT B, 0.01 ACRES) THE LOTS RANGE IN WIDTH FROM 65 FEET TO 100 FEET AND DEPTH FROM 100 FEET TO 127 FEET. THE PROJECT WILL TAKE ACCESS FROM FRANCIS AVENUE WITH AN EMERGENCY ACCESS ONTO YORBA AVENUE. THE PERIMETER STREETS WILL HAVE AN ENHANCED LANDSCAPE EASEMENT BETWEEN THE SIDEWALK AND THE RESIDENTIAL LOTS AS WELL AS AN ENHANCED LANDSCAPE ENTRY TO THE PROJECT. THE DEVELOPER WILL BUILD THE PROJECT OUT WITH SINGLE STORY HOMES ON THE LARGE LOTS.

DEVELOPMENT STANDARDS

LOT AREA, MINIMUM	=7,800 SF
LOT WIDTH, MINIMUM	=65 FEET
LOT DEPTH, MINIMUM	=100 FEET
MAXIMUM DENSITY	4 DU/AC
LOT COVERAGE	60%
★ FRONT BUILDING SETBACK. MINIMUM	20 FEET
REAR BUILDING SETBACK	15 FEET
★ INTERIOR SIDE SETBACK MINIMUM	5 FEET ONE SIDE, 5 FEET OTHER
★ LOCAL STREET SIDE SETBACK MINIMUM	10 FEET
COLLECTOR STREET SIDE SETBACK MINIMUM 25 FEET	25 FEET
STORIES	2
MAXIMUM BUILDING HEIGHT	35 FEET
STREET FRONTAGE MINIMUM FOR CUL-DE-SAC OR KNUCKLE LOT	45 FEET
★ VARIANCE REQUIRED	

LOT SIZES:

LARGEST LOT:	13,838 SF
SMALLEST LOT:	7,861 SF
AVERAGE LOT:	8,533 SF

BENCHMARK:

NO. 117-49 ELEVATION: 842.737
LOCATION
BRASS DISC SET IN CONCRETE, STAMPED CITY OF CHINO #117-49 LOCATED AT THE TOP OF CURB OF THE SOUTHWEST CORNER OF THE INTERSECTION OF FRANCIS AND MONTE VISTA AVENUES.

EARTHWORK NOTE

RAW CUT	2,450 C.Y.
RAW FILL	15,687 C.Y.
PAD OVEREXCAVATION	21,318 C.Y.
STREET OVER EXCAVATION	6,802 C.Y.
TOTAL EARTHWORK	49,300 C.Y.
IMPORT	19,483 C.Y.

EXISTING EASEMENTS AND DISPOSITION

SOUTHERN CALIFORNIA EDISON COMPANY EASEMENT PER BOOK 2422 PAGE227 OFFICIAL RECORDS SAN BERNARDINO COUNTY DATED JUNE 23, 1949. UNPLOTTABLE. TO BE QUITCLAIMED. SOUTHERN CALIFORNIA EDISON COMPANY EASEMENT PER BOOK 4262 PAGE 59 OFFICIAL RECORDS SAN BERNARDINO COUNTY DATED JUNE 21, 1957. UNPLOTTABLE. TO BE QUITCLAIMED

ACCOMPANYING ENTITLEMENTS

GENERAL PLAN AMENDMENT
ZONE CHANGE

BASIS OF BEARINGS

THE BEARINGS SHOWN HERON ARE BASED UPON THE CENTERLINE OF FRANCIS AVENUE AS SHOWN ON PARCEL MAP NO. 2464, ON FILE IN BOOK 221, PAGE 64, OF PARCEL MAPS, BEING NORTH 89°57'40" WEST.

LEGAL DESCRIPTION

PARCELS 2 AND 3 OF PARCEL MAP NO. 2464, IN THE COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AS PER PLAT FILED IN BOOK 21 OF PARCEL MAPS, PAGE 64, IN THE OFFICE OF THE COUNTY RECORDER OF THE COUNTY OF SAN BERNARDINO.

WALL AND FENCING AND MISCELANEOUS NOTES :

1. 6' HIGH BLOCK WALL ON TOP OF 3' MAX. RETAINING WALL (PRECISION ON BOTH SIDE)
2. 6' HIGH ONE SIDE SPLIT FACE BLOCK WALL (PRECISION - SIDE FACES HOMEOWNER)
3. 3' MAX. RETAINING BLOCK WALL (SPLIT FACE ON STREET SIDE)
4. 5'-6" HIGH TUBULAR STEEL FENCE
5. EVA GATE WITH KNOX BOX
6. EXISTING POWER POLE TO BE RELOCATED
7. EXISTING POWER POLE TO REMAIN
8. EXISTING FIRE HYDRANT TO BE RELOCATED
9. SEWER LIFT STATION
10. PEDESTRIAN GATE
11. GATED VEHICULAR ENTRANCE
12. PROPOSED MAXWELL IV DRAINAGE SYSTEM
13. PROPOSED 15' WIDE CONCRETE ACCESS RAMP (15% MAX. SLOPE), HEAVY BROOM FINISH
14. PROPOSED 36" PRIVATE STORM DRAIN FOR OFF-SITE RUN-OFF
15. FLAT BASIN BOTTOM WITH NATIVE GRASS. BOTTOM OF BASIN WILL BE HYDROCONSOLIDATED PER SOIL'S ENGINEER'S SPECIFICATIONS.
16. PROPOSED NEIGHBORHOOD MAIL BOXES
17. EXISTING NEIGHBORHOOD MAIL BOXES TO BE RELOCATED
18. PROPOSED RECTANGULAR CHANNEL WITH STEEL GRATED COVER

FOR OFFICIAL USE ONLY:

GENERAL NOTES:

1. THIS PROJECT IS DESIGNED FOR A DEVELOPER BUILDOUT
2. THERE ARE 1,720 LINEAR FEET OF NEW STREETS.
3. THE SITE IS NOT SUBJECT TO FLOODING, OVERFLOW OR INUNDATION

COMPOSITE DEVELOPMENT PLAN (CDP) NOTE

THE BUILDING SETBACKS NOTED HEREON WILL BE DELINEATED ON THE CDP FOR THIS PROJECT. IN ADDITION, THE CDP WILL BE RECORDED AS A PART OF THE CC & R'S FOR THE PROJECT.

FEMA NOTE

THE PROJECT IS LOCATED IN ZONE X (AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANGE FLOODPLAIN) PER FLOOD INSURANCE RATE MAP NUMBER 06071C8615H DATED AUGUST 28, 2008.

LAND USE SUMMARY:

LOTS 1-45	8.81	ACRES
LOT A	0.51	ACRES
LOT B	0.008	ACRES
STREETS "A", "B" & "C"	2.66	ACRES
YORBA AVENUE	0.41	ACRES
FRANCIS AVENUE	0.95	ACRES
TOTAL	13.348	ACRES
GROSS ACREAGE	13.35	ACRES (12.03 NET)
RESIDENTIAL LOTS	45	LOTS
GROSS DENSITY	3.37	DU/AC
EXISTING ZONING		RS-1
PROPOSED ZONING		RS

SERVICES

SEWER:
MONTE VISTA WATER DISTRICT
10575 CENTRAL AVENUE
MONTCLAIR, CA. 91763
PH: (909) 624-0035

WATER:
MONTE VISTA WATER DISTRICT
10575 CENTRAL AVENUE
MONTCLAIR, CA. 91763
PH: (909) 624-0035

GAS:
THE GAS COMPAY
PH: (800) 427-2200

CABLE:
TIME WARNER
5977 SYCAMORE COURT
CHINO, CA. 91710
PH: (800) 892-2253

TELEPHONE:
VERIZON CALIFORNIA
PH: (800) 483-4000

ELECTRIC:
SOUTHERN CALIFORNIA EDISON
1351 FRANCIS STREET
ONTARIO, CA. 91761
PH: (800) 655-4555

ASSESSOR'S PARCEL NUMBERS:

1013-211-21-0-000 AND 1013-211-22-0-000

APPLICANT:

YORBA VILLAS, LLC
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ERIK PFAHLER
SENIOR VICE PRESIDENT
(310)-582-1991 EXT. 203
(310)-864-3330 MOBILE
Erik@borsteinenterprises.com

PROPERTY OWNERS:

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PREPARED BY:

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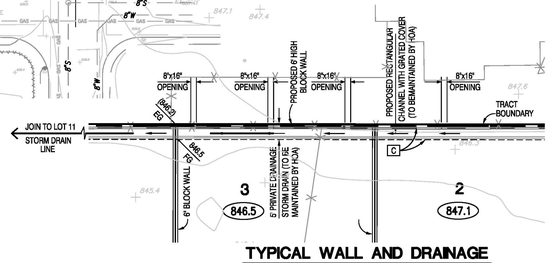
IRVINE, CA 92614
(949) 251-8821
Email: smorse@mdsconsulting.net
STANLEY C MORSE, P.E., L.S.

EASEMENT NOTES

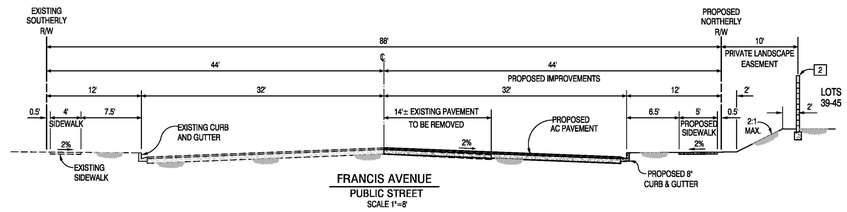
- [A] SEWER EASEMENT
- [B] WATER EASEMENT
- [C] PRIVATE STORM DRAIN EASEMENT
- [D] PRIVATE LANDSCAPE EASEMENT

LEGEND/ABBREVIATIONS

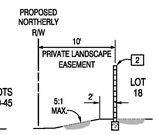
RS-1	COUNTY OF SAN BERNARDINO ZONING		FIRE HYDRANT
			PROPOSED STREET LIGHT
RD-2	CITY OF CHINO ZONING		RELOCATED POWER POLE
BEG.	BEGIN		
B.S.L.	BUILDING SETBACK LINE		EXISTING POWER POLE TO BE RELOCATED/REMOVED (BY OTHERS)
SF	FEET		
FL	FLOW LINE		
TC	TOP OF CURB	CB	CATCH BASIN
CF	FACE OF CURB	8"S	PROPOSED SEWER LINE
CB	CATCH BASIN	8"W	PROPOSED MAIN WATER
LP	LOW POINT	SD	PROPOSED STORM DRAIN
HP	HIGH POINT	GAS	EXISTING GAS LINE
VC	VERTICAL CURVE	8"W	EXISTING WATER LINE
BVC	BEGIN VERTICAL CURVE	21"S	EXISTING SEWER LINE
MVC	MIDDLE OF VERTICAL CURVE		
EVC	END OF VERTICAL CURVE		
PI	POINT OF INTERSECTION		
FS	FINISH SURFACE		
TR	TRACT		
FM	FORCE MAIN		

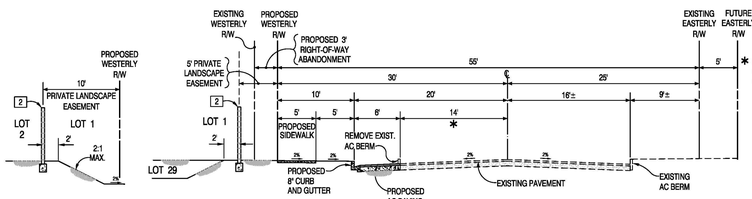


TYPICAL WALL AND DRAINAGE
FOR LOTS 1-11
SCALE: 1"=20'

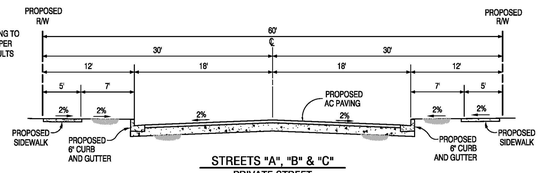


FRANCIS AVENUE
PUBLIC STREET
SCALE 1"=8'

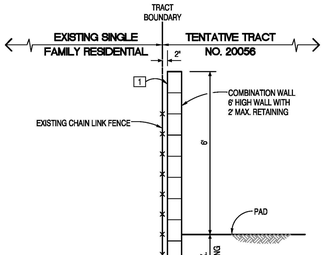




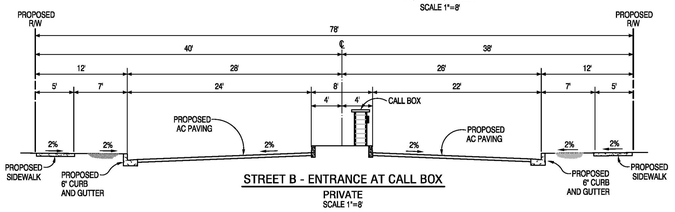
YORBA AVENUE
PUBLIC STREET
SCALE 1"=8'



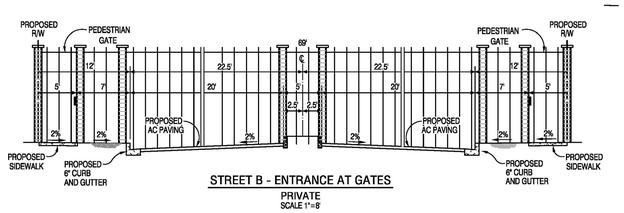
STREETS "A", "B" & "C"
PRIVATE STREET
SCALE 1"=8'



SECTION C-C
SCALE: 1"=2'



STREET B - ENTRANCE AT CALL BOX
PRIVATE
SCALE 1"=8'



STREET B - ENTRANCE AT GATES
PRIVATE
SCALE 1"=8'

REGISTERED PROFESSIONAL ENGINEER — STANLEY C. MORSE — No. 20596 — Exp. 9-30-23 — CIVIL — STATE OF CALIFORNIA

STANLEY C. MORSE DATE: NOVEMBER 9, 2021

PREPARED FOR:

BORSTEIN ENTERPRISES

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PLANNERS ENGINEERS SURVEYORS

DATE PREPARED: NOVEMBER 8, 2021

VESTING TENTATIVE TRACT NO. 20394
COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA
SHEET 1 OF 1

TENTATIVE TRACT NO. 20056

E:\89704\PLANNING\Plans\TTM 20394.dwg 11/08/21

B

B. Rational Method Hydrology Calculations

- 2-Year Storm Pre-Developed Condition
- 100-Year Pre-Developed Condition
- 2-Year Storm Post-Developed Condition
- 10-Year Storm Post-Developed Condition
- 100-Year Storm Post-Developed Condition

```
**************************************************************************
            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 1269

                          Analysis prepared by:

                              MDS Consulting
                17320 Redhill Avenue, Suite 350, Irvine, CA 92614
                              Phone: (949) 251-8821
                        Email: mdsirvine@mdsconsulting.net

 ************************ DESCRIPTION OF STUDY ************************
* Existing Condition                                                  *
* 2-Year Storm                                                        *
*                                                                     *
 **********************************************************************

  FILE NAME: C:\AES2016\HYDROSFT\RATSCX\89704\X.DAT
  TIME/DATE OF STUDY: 10:08 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) = 0.6000

  *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     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) =   525.00
  ELEVATION DATA: UPSTREAM(FEET) =    866.70  DOWNSTREAM(FEET) =    860.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.742
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.453
  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
  "1 DWELLING/ACRE"          A        1.80      0.98     0.800    32   13.74
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  SUBAREA RUNOFF(CFS) =      1.09
  TOTAL AREA(ACRES) =      1.80   PEAK FLOW RATE(CFS) =      1.09

************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  52
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    860.00  DOWNSTREAM(FEET) =    847.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   994.00   CHANNEL SLOPE =  0.0131
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.09
  FLOW VELOCITY(FEET/SEC) =   1.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   9.50   Tc(MIN.) =   23.24
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =    1519.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   23.24
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.060
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "1 DWELLING/ACRE"          A        5.90      0.98     0.800    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  SUBAREA AREA(ACRES) =     5.90      SUBAREA RUNOFF(CFS) =     1.49
  EFFECTIVE AREA(ACRES) =      7.70   AREA-AVERAGED Fm(INCH/HR) =  0.78
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.80
  TOTAL AREA(ACRES) =        7.7       PEAK FLOW RATE(CFS) =       1.94

************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     22.00 IS CODE =  52
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    847.00  DOWNSTREAM(FEET) =    837.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   606.00   CHANNEL SLOPE =  0.0165
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.94
  FLOW VELOCITY(FEET/SEC) =   2.20 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.60   Tc(MIN.) =   27.84
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     22.00 =    2125.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   27.84
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.951
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "1 DWELLING/ACRE"          A        4.00      0.98     0.800    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  SUBAREA AREA(ACRES) =    4.00      SUBAREA RUNOFF(CFS) =    0.68
  EFFECTIVE AREA(ACRES) =     11.70   AREA-AVERAGED Fm(INCH/HR) =  0.78
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.80
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TOTAL AREA(ACRES) =       11.7       PEAK FLOW RATE(CFS) =       2.00

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 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.) =   27.84
  RAINFALL INTENSITY(INCH/HR) =   0.95
  AREA-AVERAGED Fm(INCH/HR) =  0.78
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.80
  EFFECTIVE STREAM AREA(ACRES) =      11.70
  TOTAL STREAM AREA(ACRES) =      11.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.00

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   937.00
  ELEVATION DATA: UPSTREAM(FEET) =    866.50  DOWNSTREAM(FEET) =    855.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.318
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.632
  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        0.80      0.98     0.100    32   11.32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.10
  TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      1.10

********************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  62
--------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  855.00  DOWNSTREAM ELEVATION(FEET) =  837.00
  STREET LENGTH(FEET) =  1380.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.94
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =    8.41
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.36
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.74
  STREET FLOW TRAVEL TIME(MIN.) =   9.75   Tc(MIN.) =   21.07
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.124
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.80      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.80      SUBAREA RUNOFF(CFS) =    1.66
  EFFECTIVE AREA(ACRES) =      2.60    AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.6        PEAK FLOW RATE(CFS) =       2.40
```

```
  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =   9.41
  FLOW VELOCITY(FEET/SEC.) =  2.44   DEPTH*VELOCITY(FT*FT/SEC.) =   0.81
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     22.00 =    2317.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 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.) =   21.07
  RAINFALL INTENSITY(INCH/HR) =   1.12
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       2.60
  TOTAL STREAM AREA(ACRES) =       2.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.40

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        2.00   27.84    0.951  0.98( 0.78) 0.80      11.7      10.00
      2        2.40   21.07    1.124  0.98( 0.10) 0.10       2.6      20.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        4.41   21.07    1.124  0.98( 0.63) 0.64      11.5      20.00
      2        4.01   27.84    0.951  0.98( 0.66) 0.67      14.3      10.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       4.41    Tc(MIN.) =    21.07
  EFFECTIVE AREA(ACRES) =      11.46   AREA-AVERAGED Fm(INCH/HR) =  0.63
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.64
  TOTAL AREA(ACRES) =       14.3
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     22.00 =    2317.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     31.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   730.00
  ELEVATION DATA: UPSTREAM(FEET) =    866.70  DOWNSTREAM(FEET) =    857.00
```

```
 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.553
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.349
 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
 "1 DWELLING/ACRE"          A        6.70      0.98     0.800    32   15.55
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
 SUBAREA RUNOFF(CFS) =      3.43
 TOTAL AREA(ACRES) =      6.70   PEAK FLOW RATE(CFS) =      3.43

****************************************************************************
 FLOW PROCESS FROM NODE     31.00 TO NODE     32.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    857.00  DOWNSTREAM(FEET) =    845.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1032.00   CHANNEL SLOPE =  0.0116
 CHANNEL FLOW THRU SUBAREA(CFS) =       3.43
 FLOW VELOCITY(FEET/SEC) =   2.09 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   8.25   Tc(MIN.) =   23.80
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     32.00 =    1762.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     32.00 TO NODE     32.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   23.80
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.045
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "1 DWELLING/ACRE"          A       11.20      0.98     0.800    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
 SUBAREA AREA(ACRES) =   11.20      SUBAREA RUNOFF(CFS) =    2.67
 EFFECTIVE AREA(ACRES) =     17.90   AREA-AVERAGED Fm(INCH/HR) =  0.78
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.80
 TOTAL AREA(ACRES) =       17.9       PEAK FLOW RATE(CFS) =       4.27

****************************************************************************
 FLOW PROCESS FROM NODE     32.00 TO NODE     33.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    845.00  DOWNSTREAM(FEET) =    837.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   630.00   CHANNEL SLOPE =  0.0127
 CHANNEL FLOW THRU SUBAREA(CFS) =       4.27
```

```
 FLOW VELOCITY(FEET/SEC) =   2.29 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   4.58   Tc(MIN.) =   28.38
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     33.00 =    2392.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   28.38
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.940
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL POOR COVER
 "BARREN"                   A        1.30      0.42     1.000    78
 COMMERCIAL                 A        6.57      0.98     0.100    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.249
 SUBAREA AREA(ACRES) =    7.87      SUBAREA RUNOFF(CFS) =    5.60
 EFFECTIVE AREA(ACRES) =     25.77   AREA-AVERAGED Fm(INCH/HR) =  0.59
 AREA-AVERAGED Fp(INCH/HR) =  0.93  AREA-AVERAGED Ap =  0.63
 TOTAL AREA(ACRES) =       25.8       PEAK FLOW RATE(CFS) =       8.18
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =       25.8  TC(MIN.) =     28.38
 EFFECTIVE AREA(ACRES) =     25.77  AREA-AVERAGED Fm(INCH/HR)=  0.59
 AREA-AVERAGED Fp(INCH/HR) =  0.93  AREA-AVERAGED Ap = 0.632
 PEAK FLOW RATE(CFS)   =       8.18
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
******************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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                          Analysis prepared by:

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 ************************* DESCRIPTION OF STUDY *************************
* Existing Condition                                                     *
* 100-Year Storm                                                         *
*                                                                        *
 ************************************************************************

  FILE NAME: C:\AES2016\HYDROSFT\RATSCX\89704\X.DAT
  TIME/DATE OF STUDY: 11:42 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) = 1.3000

  *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     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) =   525.00
  ELEVATION DATA: UPSTREAM(FEET) =    866.70  DOWNSTREAM(FEET) =    860.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.742
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.148
  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
  "1 DWELLING/ACRE"          A        1.80      0.74     0.800    52   13.74
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  SUBAREA RUNOFF(CFS) =      4.14
  TOTAL AREA(ACRES) =      1.80   PEAK FLOW RATE(CFS) =      4.14

************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  52
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    860.00  DOWNSTREAM(FEET) =    847.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   994.00   CHANNEL SLOPE =  0.0131
  CHANNEL FLOW THRU SUBAREA(CFS) =       4.14
  FLOW VELOCITY(FEET/SEC) =   2.31 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.18   Tc(MIN.) =   20.92
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =    1519.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   20.92
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.446
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "1 DWELLING/ACRE"          A        5.90      0.74     0.800    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  SUBAREA AREA(ACRES) =     5.90      SUBAREA RUNOFF(CFS) =     9.84
  EFFECTIVE AREA(ACRES) =      7.70   AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.80
  TOTAL AREA(ACRES) =        7.7       PEAK FLOW RATE(CFS) =      12.84

************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     22.00 IS CODE =  52
```

```
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    847.00  DOWNSTREAM(FEET) =    837.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   606.00   CHANNEL SLOPE =  0.0165
  CHANNEL FLOW THRU SUBAREA(CFS) =      12.84
  FLOW VELOCITY(FEET/SEC) =   3.42 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.95   Tc(MIN.) =   23.87
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     22.00 =    2125.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   23.87
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.260
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "1 DWELLING/ACRE"          A        4.00      0.74     0.800    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  SUBAREA AREA(ACRES) =    4.00      SUBAREA RUNOFF(CFS) =    6.00
  EFFECTIVE AREA(ACRES) =     11.70   AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.80
  TOTAL AREA(ACRES) =       11.7       PEAK FLOW RATE(CFS) =      17.55

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 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.) =   23.87
  RAINFALL INTENSITY(INCH/HR) =   2.26
  AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.80
  EFFECTIVE STREAM AREA(ACRES) =      11.70
  TOTAL STREAM AREA(ACRES) =      11.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      17.55

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   937.00
  ELEVATION DATA: UPSTREAM(FEET) =    866.50  DOWNSTREAM(FEET) =    855.00
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.318
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.536
  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        0.80      0.74     0.100    52   11.32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      2.49
  TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      2.49

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  855.00  DOWNSTREAM ELEVATION(FEET) =  837.00
  STREET LENGTH(FEET) =  1380.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.52
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.39
    HALFSTREET FLOOD WIDTH(FEET) =   12.62
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.80
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.09
  STREET FLOW TRAVEL TIME(MIN.) =   8.22   Tc(MIN.) =   19.54
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.548
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.80      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.80      SUBAREA RUNOFF(CFS) =    4.01
  EFFECTIVE AREA(ACRES) =      2.60    AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.6        PEAK FLOW RATE(CFS) =       5.79

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  14.02
  FLOW VELOCITY(FEET/SEC.) =  2.97   DEPTH*VELOCITY(FT*FT/SEC.) =   1.23
```

LONGEST FLOWPATH FROM NODE 20.00 TO NODE 22.00 = 2317.00 FEET.

****
FLOW PROCESS FROM NODE 22.00 TO NODE 22.00 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.) = 19.54
RAINFALL INTENSITY(INCH/HR) = 2.55
AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.74
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 2.60
TOTAL STREAM AREA(ACRES) = 2.60
PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.79

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	17.55	23.87	2.260	0.74(0.59)	0.80	11.7	10.00
2	5.79	19.54	2.548	0.74(0.07)	0.10	2.6	20.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	22.64	19.54	2.548	0.74(0.48)	0.65	12.2	20.00
2	22.66	23.87	2.260	0.74(0.50)	0.67	14.3	10.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 22.66 Tc(MIN.) = 23.87
EFFECTIVE AREA(ACRES) = 14.30 AREA-AVERAGED Fm(INCH/HR) = 0.50
AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED Ap = 0.67
TOTAL AREA(ACRES) = 14.3
LONGEST FLOWPATH FROM NODE 20.00 TO NODE 22.00 = 2317.00 FEET.

****
FLOW PROCESS FROM NODE 30.00 TO NODE 31.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==
INITIAL SUBAREA FLOW-LENGTH(FEET) = 730.00
ELEVATION DATA: UPSTREAM(FEET) = 866.70 DOWNSTREAM(FEET) = 857.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 15.553
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.922
SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL "1 DWELLING/ACRE"	A	6.70	0.74	0.800	52	15.55

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.800
SUBAREA RUNOFF(CFS) = 14.04
TOTAL AREA(ACRES) = 6.70 PEAK FLOW RATE(CFS) = 14.04

****
FLOW PROCESS FROM NODE 31.00 TO NODE 32.00 IS CODE = 52

>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 857.00 DOWNSTREAM(FEET) = 845.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 1032.00 CHANNEL SLOPE = 0.0116
CHANNEL FLOW THRU SUBAREA(CFS) = 14.04
FLOW VELOCITY(FEET/SEC) = 2.94 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) = 5.85 Tc(MIN.) = 21.40
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 32.00 = 1762.00 FEET.

****
FLOW PROCESS FROM NODE 32.00 TO NODE 32.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========
MAINLINE Tc(MIN.) = 21.40
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.413
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
RESIDENTIAL "1 DWELLING/ACRE"	A	11.20	0.74	0.800	52

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.800
SUBAREA AREA(ACRES) = 11.20 SUBAREA RUNOFF(CFS) = 18.34
EFFECTIVE AREA(ACRES) = 17.90 AREA-AVERAGED Fm(INCH/HR) = 0.59
AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED Ap = 0.80
TOTAL AREA(ACRES) = 17.9 PEAK FLOW RATE(CFS) = 29.31

****
FLOW PROCESS FROM NODE 32.00 TO NODE 33.00 IS CODE = 52

>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 845.00 DOWNSTREAM(FEET) = 837.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 630.00 CHANNEL SLOPE = 0.0127
CHANNEL FLOW THRU SUBAREA(CFS) = 29.31
FLOW VELOCITY(FEET/SEC) = 3.75 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) = 2.80 Tc(MIN.) = 24.20
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 33.00 = 2392.00 FEET.

```
**************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   24.20
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.241
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL POOR COVER
  "BARREN"                   A        1.30      0.18     1.000    93
  COMMERCIAL                 A        6.57      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.37
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.249
  SUBAREA AREA(ACRES) =    7.87      SUBAREA RUNOFF(CFS) =   15.23
  EFFECTIVE AREA(ACRES) =     25.77   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.70  AREA-AVERAGED Ap =  0.63
  TOTAL AREA(ACRES) =       25.8       PEAK FLOW RATE(CFS) =      41.77
==========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       25.8  TC(MIN.) =     24.20
  EFFECTIVE AREA(ACRES) =     25.77  AREA-AVERAGED Fm(INCH/HR)=  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.70  AREA-AVERAGED Ap = 0.632
  PEAK FLOW RATE(CFS)   =      41.77
==========================================================================
==========================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
******************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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                          Analysis prepared by:

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 ************************* DESCRIPTION OF STUDY *************************
* TENTATIVE TRACT 20394                                                 *
* PROPOSED HYDROLOGY                                                    *
* 2-YEAR STORM                                                          *
 ************************************************************************

  FILE NAME: C:\AES2016\HYDROSFT\RATSCX\89704\89704.DAT
  TIME/DATE OF STUDY: 09:58 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) = 0.6000

  *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      3.00 IS CODE =  21
```

```
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   703.00
  ELEVATION DATA: UPSTREAM(FEET) =    847.30  DOWNSTREAM(FEET) =    842.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.074
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.374
  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
  "3-4 DWELLINGS/ACRE"       A        4.62      0.98     0.600    32   15.07
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      3.28
  TOTAL AREA(ACRES) =      4.62   PEAK FLOW RATE(CFS) =      3.28

************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      6.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   835.00  DOWNSTREAM(FEET) =   833.80
  FLOW LENGTH(FEET) =   218.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.14
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.28
  PIPE TRAVEL TIME(MIN.) =   0.88    Tc(MIN.) =   15.95
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =     921.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 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.) =   15.95
  RAINFALL INTENSITY(INCH/HR) =   1.33
  AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =       4.62
  TOTAL STREAM AREA(ACRES) =       4.62
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.28

************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  21
```

```
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   346.00
  ELEVATION DATA: UPSTREAM(FEET) =    844.10  DOWNSTREAM(FEET) =    840.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.830
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.676
  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
  "3-4 DWELLINGS/ACRE"       A        1.54      0.98     0.600    32   10.83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      1.51
  TOTAL AREA(ACRES) =      1.54   PEAK FLOW RATE(CFS) =      1.51

********************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 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.) =   10.83
  RAINFALL INTENSITY(INCH/HR) =   1.68
  AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.97
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =       1.54
  TOTAL STREAM AREA(ACRES) =       1.54
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.51

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        3.28   15.95    1.328  0.98( 0.59) 0.60       4.6       1.00
      2        1.51   10.83    1.676  0.97( 0.59) 0.60       1.5       5.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        4.78   10.83    1.676  0.98( 0.59) 0.60       4.7       5.00
      2        4.31   15.95    1.328  0.97( 0.58) 0.60       6.2       1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       4.78    Tc(MIN.) =    10.83
```

```
  EFFECTIVE AREA(ACRES) =       4.68   AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        6.2
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =     921.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   833.80  DOWNSTREAM(FEET) =   833.10
  FLOW LENGTH(FEET) =   182.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.95
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.78
  PIPE TRAVEL TIME(MIN.) =   0.77    Tc(MIN.) =   11.60
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    1103.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 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.) =   11.60
  RAINFALL INTENSITY(INCH/HR) =   1.61
  AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =       4.68
  TOTAL STREAM AREA(ACRES) =       6.16
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.78

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    843.50  DOWNSTREAM(FEET) =    840.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.133
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.744
  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
  "3-4 DWELLINGS/ACRE"       A        1.14      0.98     0.600    32   10.13
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
```

```
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
 SUBAREA RUNOFF(CFS) =      1.19
 TOTAL AREA(ACRES) =      1.14   PEAK FLOW RATE(CFS) =      1.19

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   835.00  DOWNSTREAM(FEET) =   833.10
 FLOW LENGTH(FEET) =    82.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.22
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.19
 PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =   10.39
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     15.00 =     382.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 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.) =   10.39
 RAINFALL INTENSITY(INCH/HR) =   1.72
 AREA-AVERAGED Fm(INCH/HR) =  0.59
 AREA-AVERAGED Fp(INCH/HR) =  0.98
 AREA-AVERAGED Ap =  0.60
 EFFECTIVE STREAM AREA(ACRES) =       1.14
 TOTAL STREAM AREA(ACRES) =       1.14
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.19

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        4.78   11.60    1.608  0.98( 0.59) 0.60       4.7       5.00
     1        4.31   16.74    1.291  0.97( 0.58) 0.60       6.2       1.00
     2        1.19   10.39    1.718  0.98( 0.59) 0.60       1.1       8.00

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        5.93   10.39    1.718  0.98( 0.59) 0.60       5.3       8.00
     2        5.86   11.60    1.608  0.98( 0.59) 0.60       5.8       5.00
     3        5.05   16.74    1.291  0.98( 0.59) 0.60       7.3       1.00
```

```
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       5.93    Tc(MIN.) =    10.39
 EFFECTIVE AREA(ACRES) =       5.33   AREA-AVERAGED Fm(INCH/HR) =  0.59
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.60
 TOTAL AREA(ACRES) =        7.3
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    1103.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     17.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   833.10  DOWNSTREAM(FEET) =   832.50
 FLOW LENGTH(FEET) =   150.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.16
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.93
 PIPE TRAVEL TIME(MIN.) =   0.60    Tc(MIN.) =   11.00
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.00 =    1253.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 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.) =   11.00
 RAINFALL INTENSITY(INCH/HR) =   1.66
 AREA-AVERAGED Fm(INCH/HR) =  0.59
 AREA-AVERAGED Fp(INCH/HR) =  0.98
 AREA-AVERAGED Ap =  0.60
 EFFECTIVE STREAM AREA(ACRES) =       5.33
 TOTAL STREAM AREA(ACRES) =       7.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.93

****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   247.00
 ELEVATION DATA: UPSTREAM(FEET) =    843.60  DOWNSTREAM(FEET) =    840.50

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.959
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.878
 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
```

```
  "3-4 DWELLINGS/ACRE"       A        1.79      0.98     0.600    32    8.96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      2.08
  TOTAL AREA(ACRES) =      1.79   PEAK FLOW RATE(CFS) =      2.08

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 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.) =    8.96
  RAINFALL INTENSITY(INCH/HR) =   1.88
  AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =       1.79
  TOTAL STREAM AREA(ACRES) =       1.79
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.08

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        5.93   11.00    1.661  0.98( 0.59) 0.60       5.3       8.00
      1        5.86   12.20    1.560  0.98( 0.59) 0.60       5.8       5.00
      1        5.05   17.35    1.263  0.98( 0.59) 0.60       7.3       1.00
      2        2.08    8.96    1.878  0.98( 0.59) 0.60       1.8      16.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        7.89    8.96    1.878  0.98( 0.59) 0.60       6.1      16.00
      2        7.67   11.00    1.661  0.98( 0.59) 0.60       7.1       8.00
      3        7.43   12.20    1.560  0.98( 0.59) 0.60       7.6       5.00
      4        6.15   17.35    1.263  0.98( 0.58) 0.60       9.1       1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       7.89    Tc(MIN.) =     8.96
  EFFECTIVE AREA(ACRES) =       6.13   AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        9.1
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.00 =    1253.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     25.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   832.50  DOWNSTREAM(FEET) =   831.60
  FLOW LENGTH(FEET) =   260.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.25
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.89
  PIPE TRAVEL TIME(MIN.) =   1.02    Tc(MIN.) =    9.98
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     25.00 =    1513.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 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.) =    9.98
  RAINFALL INTENSITY(INCH/HR) =   1.76
  AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =       6.13
  TOTAL STREAM AREA(ACRES) =       9.09
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.89

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     25.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   255.00
  ELEVATION DATA: UPSTREAM(FEET) =    843.50  DOWNSTREAM(FEET) =    840.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.254
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.842
  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
  "3-4 DWELLINGS/ACRE"       A        1.47      0.98     0.600    32    9.25
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      1.66
  TOTAL AREA(ACRES) =      1.47   PEAK FLOW RATE(CFS) =      1.66

****************************************************************************
  FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 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.) =    9.25
 RAINFALL INTENSITY(INCH/HR) =   1.84
 AREA-AVERAGED Fm(INCH/HR) =  0.59
 AREA-AVERAGED Fp(INCH/HR) =  0.98
 AREA-AVERAGED Ap =  0.60
 EFFECTIVE STREAM AREA(ACRES) =       1.47
 TOTAL STREAM AREA(ACRES) =       1.47
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.66

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        7.89    9.98    1.760  0.98( 0.59) 0.60       6.1      16.00
     1        7.67   12.02    1.574  0.98( 0.59) 0.60       7.1       8.00
     1        7.43   13.23    1.486  0.98( 0.59) 0.60       7.6       5.00
     1        6.15   18.42    1.219  0.98( 0.58) 0.60       9.1       1.00
     2        1.66    9.25    1.842  0.98( 0.59) 0.60       1.5      24.00

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        9.49    9.25    1.842  0.98( 0.59) 0.60       7.2      24.00
     2        9.45    9.98    1.760  0.98( 0.59) 0.60       7.6      16.00
     3        8.97   12.02    1.574  0.98( 0.59) 0.60       8.6       8.00
     4        8.62   13.23    1.486  0.98( 0.59) 0.60       9.1       5.00
     5        6.98   18.42    1.219  0.98( 0.58) 0.60      10.6       1.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       9.49    Tc(MIN.) =     9.25
 EFFECTIVE AREA(ACRES) =       7.16   AREA-AVERAGED Fm(INCH/HR) =  0.59
 AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.60
 TOTAL AREA(ACRES) =       10.6
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     25.00 =    1513.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     25.00 TO NODE     28.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   831.60  DOWNSTREAM(FEET) =   831.20
 FLOW LENGTH(FEET) =    98.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.67
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       9.49
 PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =    9.60
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     28.00 =    1611.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     28.00 TO NODE     28.00 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.) =    9.60
  RAINFALL INTENSITY(INCH/HR) =   1.80
  AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.97
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =       7.16
  TOTAL STREAM AREA(ACRES) =      10.56
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.49

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     27.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   298.00
  ELEVATION DATA: UPSTREAM(FEET) =    843.60  DOWNSTREAM(FEET) =    840.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.027
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.755
  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
  "3-4 DWELLINGS/ACRE"       A        0.80      0.98     0.600    32   10.03
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      0.84
  TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      0.84

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     28.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   834.50  DOWNSTREAM(FEET) =   831.20
  FLOW LENGTH(FEET) =   150.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.62
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.84
  PIPE TRAVEL TIME(MIN.) =   0.54    Tc(MIN.) =   10.57
  LONGEST FLOWPATH FROM NODE     26.00 TO NODE     28.00 =     448.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     28.00 TO NODE     28.00 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.) =   10.57
  RAINFALL INTENSITY(INCH/HR) =   1.70
  AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =       0.80
  TOTAL STREAM AREA(ACRES) =       0.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.84

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        9.49    9.60    1.801  0.98( 0.59) 0.60       7.2      24.00
      1        9.45   10.33    1.724  0.98( 0.59) 0.60       7.6      16.00
      1        8.97   12.37    1.547  0.98( 0.59) 0.60       8.6       8.00
      1        8.62   13.58    1.463  0.98( 0.59) 0.60       9.1       5.00
      1        6.98   18.79    1.204  0.98( 0.58) 0.60      10.6       1.00
      2        0.84   10.57    1.701  0.98( 0.59) 0.60       0.8      26.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       10.32    9.60    1.801  0.98( 0.59) 0.60       7.9      24.00
      2       10.29   10.33    1.724  0.98( 0.59) 0.60       8.4      16.00
      3       10.23   10.57    1.701  0.98( 0.59) 0.60       8.5      26.00
      4        9.70   12.37    1.547  0.98( 0.59) 0.60       9.4       8.00
      5        9.28   13.58    1.463  0.98( 0.59) 0.60       9.9       5.00
      6        7.45   18.79    1.204  0.98( 0.58) 0.60      11.4       1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      10.32    Tc(MIN.) =     9.60
  EFFECTIVE AREA(ACRES) =       7.89   AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =       11.4
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     28.00 =    1611.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     28.00 TO NODE     29.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   831.20  DOWNSTREAM(FEET) =   831.00
```

```
  FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.85
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.32
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    9.69
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     29.00 =    1641.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     29.00 TO NODE     29.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.69
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.792
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                A        0.50      0.98     0.850    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    0.43
  EFFECTIVE AREA(ACRES) =      8.39   AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.61
  TOTAL AREA(ACRES) =       11.9       PEAK FLOW RATE(CFS) =      10.32
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

+----------------------------------------------------------------------------+
| Offsite area                                                               |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     51.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   525.00
  ELEVATION DATA: UPSTREAM(FEET) =    866.70  DOWNSTREAM(FEET) =    860.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.742
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.453
  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
  "1 DWELLING/ACRE"          A        1.80      0.98     0.800    32   13.74
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  SUBAREA RUNOFF(CFS) =      1.09
  TOTAL AREA(ACRES) =      1.80   PEAK FLOW RATE(CFS) =      1.09
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     51.00 TO NODE     52.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    860.00  DOWNSTREAM(FEET) =    847.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   994.00   CHANNEL SLOPE =  0.0131
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.09
  FLOW VELOCITY(FEET/SEC) =   1.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   9.50   Tc(MIN.) =   23.24
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     52.00 =    1519.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     52.00 TO NODE     52.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   23.24
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.060
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "1 DWELLING/ACRE"          A        5.90      0.98     0.800    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  SUBAREA AREA(ACRES) =    5.90      SUBAREA RUNOFF(CFS) =    1.49
  EFFECTIVE AREA(ACRES) =      7.70   AREA-AVERAGED Fm(INCH/HR) =  0.78
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.80
  TOTAL AREA(ACRES) =        7.7       PEAK FLOW RATE(CFS) =       1.94

****************************************************************************
  FLOW PROCESS FROM NODE     52.00 TO NODE     62.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    845.00  DOWNSTREAM(FEET) =    843.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   500.00   CHANNEL SLOPE =  0.0030
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.94
  FLOW VELOCITY(FEET/SEC) =   0.94 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   8.90   Tc(MIN.) =   32.14
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     62.00 =    2019.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     62.00 TO NODE     62.00 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.) =   32.14
```

```
 RAINFALL INTENSITY(INCH/HR) =   0.87
 AREA-AVERAGED Fm(INCH/HR) =  0.78
 AREA-AVERAGED Fp(INCH/HR) =  0.98
 AREA-AVERAGED Ap =  0.80
 EFFECTIVE STREAM AREA(ACRES) =       7.70
 TOTAL STREAM AREA(ACRES) =       7.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.94

****************************************************************************
 FLOW PROCESS FROM NODE     60.00 TO NODE     61.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   730.00
 ELEVATION DATA: UPSTREAM(FEET) =    866.70  DOWNSTREAM(FEET) =    857.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.553
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.349
 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
 "1 DWELLING/ACRE"          A        6.70      0.98     0.800    32   15.55
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
 SUBAREA RUNOFF(CFS) =      3.43
 TOTAL AREA(ACRES) =      6.70   PEAK FLOW RATE(CFS) =      3.43

****************************************************************************
 FLOW PROCESS FROM NODE     61.00 TO NODE     62.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    857.00  DOWNSTREAM(FEET) =    846.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1070.00   CHANNEL SLOPE =  0.0103
 CHANNEL FLOW THRU SUBAREA(CFS) =       3.43
 FLOW VELOCITY(FEET/SEC) =   1.96 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   9.09   Tc(MIN.) =   24.64
 LONGEST FLOWPATH FROM NODE     60.00 TO NODE     62.00 =    1800.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     62.00 TO NODE     62.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   24.64
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.023
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
```

```
  "1 DWELLING/ACRE"          A       11.20      0.98     0.800    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  SUBAREA AREA(ACRES) =   11.20      SUBAREA RUNOFF(CFS) =    2.45
  EFFECTIVE AREA(ACRES) =     17.90   AREA-AVERAGED Fm(INCH/HR) =  0.78
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.80
  TOTAL AREA(ACRES) =       17.9       PEAK FLOW RATE(CFS) =       3.92

****************************************************************************
  FLOW PROCESS FROM NODE     62.00 TO NODE     62.00 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.) =   24.64
  RAINFALL INTENSITY(INCH/HR) =   1.02
  AREA-AVERAGED Fm(INCH/HR) =  0.78
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.80
  EFFECTIVE STREAM AREA(ACRES) =      17.90
  TOTAL STREAM AREA(ACRES) =      17.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.92

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        1.94   32.14    0.873  0.98( 0.78) 0.80       7.7      50.00
      2        3.92   24.64    1.023  0.98( 0.78) 0.80      17.9      60.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        5.86   24.64    1.023  0.98( 0.78) 0.80      23.8      60.00
      2        4.75   32.14    0.873  0.98( 0.78) 0.80      25.6      50.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.86    Tc(MIN.) =    24.64
  EFFECTIVE AREA(ACRES) =      23.80   AREA-AVERAGED Fm(INCH/HR) =  0.78
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.80
  TOTAL AREA(ACRES) =       25.6
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     62.00 =    2019.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     62.00 TO NODE     64.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    843.50  DOWNSTREAM(FEET) =    842.00
```

```
 CHANNEL LENGTH THRU SUBAREA(FEET) =   340.00   CHANNEL SLOPE =  0.0044
 CHANNEL FLOW THRU SUBAREA(CFS) =       5.86
 FLOW VELOCITY(FEET/SEC) =   1.46 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   3.89   Tc(MIN.) =   28.54
 LONGEST FLOWPATH FROM NODE     50.00 TO NODE     64.00 =    2359.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     64.00 TO NODE     69.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   837.00  DOWNSTREAM(FEET) =   835.30
 FLOW LENGTH(FEET) =   596.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.72
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.86
 PIPE TRAVEL TIME(MIN.) =   2.67    Tc(MIN.) =   31.21
 LONGEST FLOWPATH FROM NODE     50.00 TO NODE     69.00 =    2955.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     69.00 TO NODE     69.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   31.21
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.888
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        0.20      0.98     0.100    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
 * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
 SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.14
 EFFECTIVE AREA(ACRES) =     24.00   AREA-AVERAGED Fm(INCH/HR) =  0.77
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.79
 * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
 * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
 TOTAL AREA(ACRES) =       25.8       PEAK FLOW RATE(CFS) =       5.86
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =       25.8  TC(MIN.) =     31.21
 EFFECTIVE AREA(ACRES) =     24.00  AREA-AVERAGED Fm(INCH/HR)=  0.77
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap = 0.794
 PEAK FLOW RATE(CFS)   =       5.86

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        5.86   31.21    0.888  0.98( 0.77) 0.79      24.0      60.00
```

```
                                        DEV2
      2        4.75    39.08     0.776  0.98( 0.77) 0.79      25.8       50.00
================================================================================
================================================================================
  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 1269

                          Analysis prepared by:

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 ************************* DESCRIPTION OF STUDY *************************
* TENTATIVE TRACT 20394                                                 *
* PROPOSED HYDROLOGY                                                    *
* 10-YEAR STORM                                                         *
 ************************************************************************

  FILE NAME: C:\AES2016\HYDROSFT\RATSCX\89704\89704.DAT
  TIME/DATE OF STUDY: 09:57 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) = 0.9000

  *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      3.00 IS CODE =  21
```

```
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   703.00
  ELEVATION DATA: UPSTREAM(FEET) =    847.30  DOWNSTREAM(FEET) =    842.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.074
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.062
  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
  "3-4 DWELLINGS/ACRE"       A        4.62      0.98     0.600    32   15.07
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      6.14
  TOTAL AREA(ACRES) =      4.62   PEAK FLOW RATE(CFS) =      6.14

************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      6.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   835.00  DOWNSTREAM(FEET) =   833.80
  FLOW LENGTH(FEET) =   218.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.78
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.14
  PIPE TRAVEL TIME(MIN.) =   0.76    Tc(MIN.) =   15.83
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =     921.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 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.) =   15.83
  RAINFALL INTENSITY(INCH/HR) =   2.00
  AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =       4.62
  TOTAL STREAM AREA(ACRES) =       4.62
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.14

************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  21
------------------------------------------------------------------------
```

```
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   346.00
  ELEVATION DATA: UPSTREAM(FEET) =    844.10  DOWNSTREAM(FEET) =    840.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.830
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.514
  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
  "3-4 DWELLINGS/ACRE"       A        1.54      0.98     0.600    32   10.83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      2.67
  TOTAL AREA(ACRES) =      1.54   PEAK FLOW RATE(CFS) =      2.67

******************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 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.) =   10.83
  RAINFALL INTENSITY(INCH/HR) =   2.51
  AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.97
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =       1.54
  TOTAL STREAM AREA(ACRES) =       1.54
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.67

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        6.14   15.83    2.002  0.98( 0.59) 0.60       4.6       1.00
      2        2.67   10.83    2.514  0.97( 0.59) 0.60       1.5       5.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        8.39   10.83    2.514  0.98( 0.59) 0.60       4.7       5.00
      2        8.10   15.83    2.002  0.97( 0.58) 0.60       6.2       1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       8.39    Tc(MIN.) =    10.83
  EFFECTIVE AREA(ACRES) =       4.70   AREA-AVERAGED Fm(INCH/HR) =  0.59
```

```
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.60
 TOTAL AREA(ACRES) =        6.2
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =     921.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   833.80  DOWNSTREAM(FEET) =   833.10
 FLOW LENGTH(FEET) =   182.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.49
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       8.39
 PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =   11.51
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    1103.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 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.) =   11.51
 RAINFALL INTENSITY(INCH/HR) =   2.42
 AREA-AVERAGED Fm(INCH/HR) =  0.59
 AREA-AVERAGED Fp(INCH/HR) =  0.98
 AREA-AVERAGED Ap =  0.60
 EFFECTIVE STREAM AREA(ACRES) =       4.70
 TOTAL STREAM AREA(ACRES) =       6.16
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       8.39

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =    843.50  DOWNSTREAM(FEET) =    840.50

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.133
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.616
 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
 "3-4 DWELLINGS/ACRE"       A        1.14      0.98     0.600    32   10.13
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
```

```
  SUBAREA RUNOFF(CFS) =      2.08
  TOTAL AREA(ACRES) =      1.14   PEAK FLOW RATE(CFS) =      2.08

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   835.00  DOWNSTREAM(FEET) =   833.10
  FLOW LENGTH(FEET) =    82.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.13
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.08
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   10.36
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     15.00 =     382.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 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.) =   10.36
  RAINFALL INTENSITY(INCH/HR) =   2.58
  AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =       1.14
  TOTAL STREAM AREA(ACRES) =       1.14
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.08

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        8.39   11.51    2.424  0.98( 0.59) 0.60       4.7       5.00
      1        8.10   16.51    1.952  0.97( 0.58) 0.60       6.2       1.00
      2        2.08   10.36    2.582  0.98( 0.59) 0.60       1.1       8.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       10.29   10.36    2.582  0.98( 0.59) 0.60       5.4       8.00
      2       10.31   11.51    2.424  0.98( 0.59) 0.60       5.8       5.00
      3        9.53   16.51    1.952  0.98( 0.59) 0.60       7.3       1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
```

```
  PEAK FLOW RATE(CFS) =      10.31    Tc(MIN.) =    11.51
  EFFECTIVE AREA(ACRES) =       5.84   AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        7.3
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    1103.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     17.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   833.10  DOWNSTREAM(FEET) =   832.50
  FLOW LENGTH(FEET) =   150.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.86
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.31
  PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =   12.02
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.00 =    1253.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 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.) =   12.02
  RAINFALL INTENSITY(INCH/HR) =   2.36
  AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =       5.84
  TOTAL STREAM AREA(ACRES) =       7.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      10.31

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   247.00
  ELEVATION DATA: UPSTREAM(FEET) =    843.60  DOWNSTREAM(FEET) =    840.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.959
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.817
  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
  "3-4 DWELLINGS/ACRE"       A        1.79      0.98     0.600    32    8.96
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      3.60
  TOTAL AREA(ACRES) =      1.79   PEAK FLOW RATE(CFS) =      3.60

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 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.) =    8.96
  RAINFALL INTENSITY(INCH/HR) =   2.82
  AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =       1.79
  TOTAL STREAM AREA(ACRES) =       1.79
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.60

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       10.29   10.87    2.508  0.98( 0.59) 0.60       5.4       8.00
      1       10.31   12.02    2.361  0.98( 0.59) 0.60       5.8       5.00
      1        9.53   17.05    1.915  0.98( 0.59) 0.60       7.3       1.00
      2        3.60    8.96    2.817  0.98( 0.59) 0.60       1.8      16.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       13.43    8.96    2.817  0.98( 0.59) 0.60       6.2      16.00
      2       13.38   10.87    2.508  0.98( 0.59) 0.60       7.2       8.00
      3       13.17   12.02    2.361  0.98( 0.59) 0.60       7.6       5.00
      4       11.67   17.05    1.915  0.98( 0.58) 0.60       9.1       1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      13.43    Tc(MIN.) =     8.96
  EFFECTIVE AREA(ACRES) =       6.22   AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        9.1
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.00 =    1253.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     25.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
 ELEVATION DATA: UPSTREAM(FEET) =   832.50  DOWNSTREAM(FEET) =   831.60
 FLOW LENGTH(FEET) =   260.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.91
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      13.43
 PIPE TRAVEL TIME(MIN.) =   0.88    Tc(MIN.) =    9.84
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     25.00 =    1513.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 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.) =    9.84
 RAINFALL INTENSITY(INCH/HR) =   2.66
 AREA-AVERAGED Fm(INCH/HR) =  0.59
 AREA-AVERAGED Fp(INCH/HR) =  0.98
 AREA-AVERAGED Ap =  0.60
 EFFECTIVE STREAM AREA(ACRES) =       6.22
 TOTAL STREAM AREA(ACRES) =       9.09
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      13.43

****************************************************************************
 FLOW PROCESS FROM NODE     24.00 TO NODE     25.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   255.00
 ELEVATION DATA: UPSTREAM(FEET) =    843.50  DOWNSTREAM(FEET) =    840.60

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.254
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.763
 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
 "3-4 DWELLINGS/ACRE"       A        1.47      0.98     0.600    32    9.25
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
 SUBAREA RUNOFF(CFS) =      2.88
 TOTAL AREA(ACRES) =      1.47   PEAK FLOW RATE(CFS) =      2.88

****************************************************************************
 FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 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.) =    9.25
 RAINFALL INTENSITY(INCH/HR) =   2.76
 AREA-AVERAGED Fm(INCH/HR) =  0.59
 AREA-AVERAGED Fp(INCH/HR) =  0.98
 AREA-AVERAGED Ap =  0.60
 EFFECTIVE STREAM AREA(ACRES) =       1.47
 TOTAL STREAM AREA(ACRES) =       1.47
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.88

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       13.43    9.84    2.663  0.98( 0.59) 0.60       6.2      16.00
     1       13.38   11.75    2.393  0.98( 0.59) 0.60       7.2       8.00
     1       13.17   12.91    2.263  0.98( 0.59) 0.60       7.6       5.00
     1       11.67   17.98    1.855  0.98( 0.58) 0.60       9.1       1.00
     2        2.88    9.25    2.763  0.98( 0.59) 0.60       1.5      24.00

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       16.12    9.25    2.763  0.98( 0.59) 0.60       7.3      24.00
     2       16.18    9.84    2.663  0.98( 0.59) 0.60       7.7      16.00
     3       15.78   11.75    2.393  0.98( 0.59) 0.60       8.6       8.00
     4       15.39   12.91    2.263  0.98( 0.59) 0.60       9.1       5.00
     5       13.35   17.98    1.855  0.98( 0.58) 0.60      10.6       1.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      16.18    Tc(MIN.) =     9.84
 EFFECTIVE AREA(ACRES) =       7.69   AREA-AVERAGED Fm(INCH/HR) =  0.59
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.60
 TOTAL AREA(ACRES) =       10.6
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     25.00 =    1513.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     25.00 TO NODE     28.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   831.60  DOWNSTREAM(FEET) =   831.20
 FLOW LENGTH(FEET) =    98.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.43
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      16.18
 PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   10.14
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     28.00 =    1611.00 FEET.

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

```
  FLOW PROCESS FROM NODE     28.00 TO NODE     28.00 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.) =   10.14
  RAINFALL INTENSITY(INCH/HR) =   2.61
  AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =       7.69
  TOTAL STREAM AREA(ACRES) =      10.56
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      16.18

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     27.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   298.00
  ELEVATION DATA: UPSTREAM(FEET) =    843.60  DOWNSTREAM(FEET) =    840.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.027
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.633
  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
  "3-4 DWELLINGS/ACRE"       A        0.80      0.98     0.600    32   10.03
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      1.47
  TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      1.47

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     28.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   834.50  DOWNSTREAM(FEET) =   831.20
  FLOW LENGTH(FEET) =   150.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.45
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.47
  PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =   10.49
  LONGEST FLOWPATH FROM NODE     26.00 TO NODE     28.00 =     448.00 FEET.

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

```
 FLOW PROCESS FROM NODE     28.00 TO NODE     28.00 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.) =   10.49
 RAINFALL INTENSITY(INCH/HR) =   2.56
 AREA-AVERAGED Fm(INCH/HR) =  0.59
 AREA-AVERAGED Fp(INCH/HR) =  0.98
 AREA-AVERAGED Ap =  0.60
 EFFECTIVE STREAM AREA(ACRES) =       0.80
 TOTAL STREAM AREA(ACRES) =       0.80
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.47

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       16.12    9.56    2.710  0.98( 0.59) 0.60       7.3      24.00
     1       16.18   10.14    2.615  0.98( 0.59) 0.60       7.7      16.00
     1       15.78   12.06    2.357  0.98( 0.59) 0.60       8.6       8.00
     1       15.39   13.21    2.232  0.98( 0.59) 0.60       9.1       5.00
     1       13.35   18.30    1.835  0.98( 0.58) 0.60      10.6       1.00
     2        1.47   10.49    2.563  0.98( 0.59) 0.60       0.8      26.00

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       17.57    9.56    2.710  0.98( 0.59) 0.60       8.0      24.00
     2       17.65   10.14    2.615  0.98( 0.59) 0.60       8.5      16.00
     3       17.58   10.49    2.563  0.98( 0.59) 0.60       8.7      26.00
     4       17.10   12.06    2.357  0.98( 0.59) 0.60       9.4       8.00
     5       16.62   13.21    2.232  0.98( 0.59) 0.60       9.9       5.00
     6       14.28   18.30    1.835  0.98( 0.58) 0.60      11.4       1.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      17.65    Tc(MIN.) =    10.14
 EFFECTIVE AREA(ACRES) =       8.46   AREA-AVERAGED Fm(INCH/HR) =  0.59
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.60
 TOTAL AREA(ACRES) =       11.4
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     28.00 =    1611.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     28.00 TO NODE     29.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   831.20  DOWNSTREAM(FEET) =   831.00
 FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
```

```
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.53
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      17.65
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   10.22
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     29.00 =    1641.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     29.00 TO NODE     29.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.22
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.603
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                A        0.50      0.98     0.850    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    0.80
 EFFECTIVE AREA(ACRES) =      8.96   AREA-AVERAGED Fm(INCH/HR) =  0.60
 AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.61
 TOTAL AREA(ACRES) =       11.9       PEAK FLOW RATE(CFS) =      17.65
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

+--------------------------------------------------------------------------+
| Offsite area                                                             |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE     50.00 TO NODE     51.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   525.00
 ELEVATION DATA: UPSTREAM(FEET) =    866.70  DOWNSTREAM(FEET) =    860.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.742
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.179
 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
 "1 DWELLING/ACRE"          A        1.80      0.98     0.800    32   13.74
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
 SUBAREA RUNOFF(CFS) =      2.27
 TOTAL AREA(ACRES) =      1.80   PEAK FLOW RATE(CFS) =      2.27
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     51.00 TO NODE     52.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    860.00  DOWNSTREAM(FEET) =    847.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   994.00   CHANNEL SLOPE =  0.0131
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.27
  FLOW VELOCITY(FEET/SEC) =   2.02 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   8.20   Tc(MIN.) =   21.94
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     52.00 =    1519.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     52.00 TO NODE     52.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.94
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.646
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "1 DWELLING/ACRE"          A        5.90      0.98     0.800    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  SUBAREA AREA(ACRES) =    5.90      SUBAREA RUNOFF(CFS) =    4.60
  EFFECTIVE AREA(ACRES) =      7.70   AREA-AVERAGED Fm(INCH/HR) =  0.78
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.80
  TOTAL AREA(ACRES) =        7.7       PEAK FLOW RATE(CFS) =       6.00

****************************************************************************
  FLOW PROCESS FROM NODE     52.00 TO NODE     62.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    845.00  DOWNSTREAM(FEET) =    843.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   500.00   CHANNEL SLOPE =  0.0030
  CHANNEL FLOW THRU SUBAREA(CFS) =       6.00
  FLOW VELOCITY(FEET/SEC) =   1.21 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.91   Tc(MIN.) =   28.85
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     62.00 =    2019.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     62.00 TO NODE     62.00 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.) =   28.85
  RAINFALL INTENSITY(INCH/HR) =   1.40
```

```
 AREA-AVERAGED Fm(INCH/HR) =  0.78
 AREA-AVERAGED Fp(INCH/HR) =  0.98
 AREA-AVERAGED Ap =  0.80
 EFFECTIVE STREAM AREA(ACRES) =       7.70
 TOTAL STREAM AREA(ACRES) =       7.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.00

****************************************************************************
 FLOW PROCESS FROM NODE     60.00 TO NODE     61.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   730.00
 ELEVATION DATA: UPSTREAM(FEET) =    866.70  DOWNSTREAM(FEET) =    857.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.553
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.023
 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
 "1 DWELLING/ACRE"          A        6.70      0.98     0.800    32   15.55
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
 SUBAREA RUNOFF(CFS) =      7.50
 TOTAL AREA(ACRES) =      6.70   PEAK FLOW RATE(CFS) =      7.50

****************************************************************************
 FLOW PROCESS FROM NODE     61.00 TO NODE     62.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    857.00  DOWNSTREAM(FEET) =    846.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1070.00   CHANNEL SLOPE =  0.0103
 CHANNEL FLOW THRU SUBAREA(CFS) =       7.50
 FLOW VELOCITY(FEET/SEC) =   2.36 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   7.56   Tc(MIN.) =   23.12
 LONGEST FLOWPATH FROM NODE     60.00 TO NODE     62.00 =    1800.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     62.00 TO NODE     62.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   23.12
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.595
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "1 DWELLING/ACRE"          A       11.20      0.98     0.800    32
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  SUBAREA AREA(ACRES) =   11.20      SUBAREA RUNOFF(CFS) =    8.22
  EFFECTIVE AREA(ACRES) =     17.90   AREA-AVERAGED Fm(INCH/HR) =  0.78
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.80
  TOTAL AREA(ACRES) =       17.9       PEAK FLOW RATE(CFS) =      13.13

****************************************************************************
  FLOW PROCESS FROM NODE     62.00 TO NODE     62.00 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.) =   23.12
  RAINFALL INTENSITY(INCH/HR) =   1.60
  AREA-AVERAGED Fm(INCH/HR) =  0.78
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.80
  EFFECTIVE STREAM AREA(ACRES) =      17.90
  TOTAL STREAM AREA(ACRES) =      17.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      13.13

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        6.00   28.85    1.397  0.98( 0.78) 0.80       7.7      50.00
      2       13.13   23.12    1.595  0.98( 0.78) 0.80      17.9      60.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       19.13   23.12    1.595  0.98( 0.78) 0.80      24.1      60.00
      2       15.93   28.85    1.397  0.98( 0.78) 0.80      25.6      50.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      19.13    Tc(MIN.) =    23.12
  EFFECTIVE AREA(ACRES) =      24.07   AREA-AVERAGED Fm(INCH/HR) =  0.78
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.80
  TOTAL AREA(ACRES) =       25.6
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     62.00 =    2019.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     62.00 TO NODE     64.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    843.50  DOWNSTREAM(FEET) =    842.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   340.00   CHANNEL SLOPE =  0.0044
```

```
 CHANNEL FLOW THRU SUBAREA(CFS) =      19.13
 FLOW VELOCITY(FEET/SEC) =   1.97 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.88   Tc(MIN.) =   26.00
 LONGEST FLOWPATH FROM NODE     50.00 TO NODE     64.00 =    2359.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     64.00 TO NODE     69.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   837.00  DOWNSTREAM(FEET) =   835.30
 FLOW LENGTH(FEET) =   596.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.92
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      19.13
 PIPE TRAVEL TIME(MIN.) =   2.02    Tc(MIN.) =   28.02
 LONGEST FLOWPATH FROM NODE     50.00 TO NODE     69.00 =    2955.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     69.00 TO NODE     69.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   28.02
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.421
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        0.20      0.98     0.100    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.24
 EFFECTIVE AREA(ACRES) =     24.27   AREA-AVERAGED Fm(INCH/HR) =  0.77
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.79
 TOTAL AREA(ACRES) =       25.8       PEAK FLOW RATE(CFS) =      19.13
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =       25.8  TC(MIN.) =     28.02
 EFFECTIVE AREA(ACRES) =     24.27  AREA-AVERAGED Fm(INCH/HR)=  0.77
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap = 0.794
 PEAK FLOW RATE(CFS)   =      19.13

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       19.13   28.02    1.421  0.98( 0.77) 0.79      24.3      60.00
     2       15.93   34.02    1.265  0.98( 0.77) 0.79      25.8      50.00
============================================================================
============================================================================
 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 1269

                          Analysis prepared by:

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 ************************* DESCRIPTION OF STUDY *************************
* TENTATIVE TRACT 20394                                                 *
* PROPOSED HYDROLOGY                                                    *
* 100-YEAR STORM                                                        *
 ************************************************************************

  FILE NAME: C:\AES2016\HYDROSFT\RATSCX\89704\89704.DAT
  TIME/DATE OF STUDY: 11:54 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) = 1.3000

  *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      3.00 IS CODE =  21
```

```
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   703.00
  ELEVATION DATA: UPSTREAM(FEET) =    847.30  DOWNSTREAM(FEET) =    842.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.074
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.978
  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
  "3-4 DWELLINGS/ACRE"       A        4.62      0.74     0.600    52   15.07
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =     10.53
  TOTAL AREA(ACRES) =      4.62   PEAK FLOW RATE(CFS) =     10.53

************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      6.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   835.00  DOWNSTREAM(FEET) =   833.80
  FLOW LENGTH(FEET) =   218.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.40
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.53
  PIPE TRAVEL TIME(MIN.) =   0.67    Tc(MIN.) =   15.75
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =     921.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 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.) =   15.75
  RAINFALL INTENSITY(INCH/HR) =   2.90
  AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =       4.62
  TOTAL STREAM AREA(ACRES) =       4.62
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      10.53

************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  21
------------------------------------------------------------------------
```

```
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   346.00
  ELEVATION DATA: UPSTREAM(FEET) =    844.10  DOWNSTREAM(FEET) =    840.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.830
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.631
  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
  "3-4 DWELLINGS/ACRE"       A        1.54      0.74     0.600    52   10.83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      4.42
  TOTAL AREA(ACRES) =      1.54   PEAK FLOW RATE(CFS) =      4.42

********************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 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.) =   10.83
  RAINFALL INTENSITY(INCH/HR) =   3.63
  AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =       1.54
  TOTAL STREAM AREA(ACRES) =       1.54
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.42

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       10.53   15.75    2.901  0.74( 0.45) 0.60       4.6       1.00
      2        4.42   10.83    3.631  0.74( 0.45) 0.60       1.5       5.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       13.81   10.83    3.631  0.74( 0.45) 0.60       4.7       5.00
      2       13.93   15.75    2.901  0.74( 0.45) 0.60       6.2       1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      13.93    Tc(MIN.) =    15.75
  EFFECTIVE AREA(ACRES) =       6.16   AREA-AVERAGED Fm(INCH/HR) =  0.45
```

```
 AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.60
 TOTAL AREA(ACRES) =        6.2
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =     921.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   833.80  DOWNSTREAM(FEET) =   833.10
 FLOW LENGTH(FEET) =   182.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.16
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      13.93
 PIPE TRAVEL TIME(MIN.) =   0.59    Tc(MIN.) =   16.33
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =    1103.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 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.) =   16.33
 RAINFALL INTENSITY(INCH/HR) =   2.84
 AREA-AVERAGED Fm(INCH/HR) =  0.45
 AREA-AVERAGED Fp(INCH/HR) =  0.74
 AREA-AVERAGED Ap =  0.60
 EFFECTIVE STREAM AREA(ACRES) =       6.16
 TOTAL STREAM AREA(ACRES) =       6.16
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      13.93

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =    843.50  DOWNSTREAM(FEET) =    840.50

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.133
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.779
 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
 "3-4 DWELLINGS/ACRE"       A        1.14      0.74     0.600    52   10.13
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
```

```
  SUBAREA RUNOFF(CFS) =      3.42
  TOTAL AREA(ACRES) =      1.14   PEAK FLOW RATE(CFS) =      3.42

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   835.00  DOWNSTREAM(FEET) =   833.10
  FLOW LENGTH(FEET) =    82.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.07
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.42
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   10.33
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     15.00 =     382.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 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.) =   10.33
  RAINFALL INTENSITY(INCH/HR) =   3.74
  AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =       1.14
  TOTAL STREAM AREA(ACRES) =       1.14
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.42

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       13.81   11.42    3.518  0.74( 0.45) 0.60       4.7       5.00
      1       13.93   16.33    2.838  0.74( 0.45) 0.60       6.2       1.00
      2        3.42   10.33    3.737  0.74( 0.45) 0.60       1.1       8.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       16.80   10.33    3.737  0.74( 0.45) 0.60       5.4       8.00
      2       17.01   11.42    3.518  0.74( 0.45) 0.60       5.9       5.00
      3       16.42   16.33    2.838  0.74( 0.45) 0.60       7.3       1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
```

PEAK FLOW RATE(CFS) = 17.01 Tc(MIN.) = 11.42
EFFECTIVE AREA(ACRES) = 5.86 AREA-AVERAGED Fm(INCH/HR) = 0.45
AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED Ap = 0.60
TOTAL AREA(ACRES) = 7.3
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 15.00 = 1103.00 FEET.

****
FLOW PROCESS FROM NODE 15.00 TO NODE 17.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==
ELEVATION DATA: UPSTREAM(FEET) = 833.10 DOWNSTREAM(FEET) = 832.50
FLOW LENGTH(FEET) = 150.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 19.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.43
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 17.01
PIPE TRAVEL TIME(MIN.) = 0.46 Tc(MIN.) = 11.88
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 17.00 = 1253.00 FEET.

****
FLOW PROCESS FROM NODE 17.00 TO NODE 17.00 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.) = 11.88
RAINFALL INTENSITY(INCH/HR) = 3.44
AREA-AVERAGED Fm(INCH/HR) = 0.45
AREA-AVERAGED Fp(INCH/HR) = 0.74
AREA-AVERAGED Ap = 0.60
EFFECTIVE STREAM AREA(ACRES) = 5.86
TOTAL STREAM AREA(ACRES) = 7.30
PEAK FLOW RATE(CFS) AT CONFLUENCE = 17.01

****
FLOW PROCESS FROM NODE 16.00 TO NODE 17.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==
INITIAL SUBAREA FLOW-LENGTH(FEET) = 247.00
ELEVATION DATA: UPSTREAM(FEET) = 843.60 DOWNSTREAM(FEET) = 840.50

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.959
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.069
SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL "3-4 DWELLINGS/ACRE"	A	1.79	0.74	0.600	52	8.96

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      5.84
  TOTAL AREA(ACRES) =      1.79   PEAK FLOW RATE(CFS) =      5.84

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 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.) =    8.96
  RAINFALL INTENSITY(INCH/HR) =   4.07
  AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =       1.79
  TOTAL STREAM AREA(ACRES) =       1.79
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.84

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       16.80   10.79    3.640  0.74( 0.45) 0.60       5.4       8.00
      1       17.01   11.88    3.435  0.74( 0.45) 0.60       5.9       5.00
      1       16.42   16.80    2.791  0.74( 0.45) 0.60       7.3       1.00
      2        5.84    8.96    4.069  0.74( 0.45) 0.60       1.8      16.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       21.67    8.96    4.069  0.74( 0.45) 0.60       6.3      16.00
      2       21.95   10.79    3.640  0.74( 0.45) 0.60       7.2       8.00
      3       21.82   11.88    3.435  0.74( 0.45) 0.60       7.6       5.00
      4       20.20   16.80    2.791  0.74( 0.45) 0.60       9.1       1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      21.95    Tc(MIN.) =    10.79
  EFFECTIVE AREA(ACRES) =       7.20   AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        9.1
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     17.00 =    1253.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     25.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
 ELEVATION DATA: UPSTREAM(FEET) =   832.50  DOWNSTREAM(FEET) =   831.60
 FLOW LENGTH(FEET) =   260.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.44
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      21.95
 PIPE TRAVEL TIME(MIN.) =   0.80    Tc(MIN.) =   11.58
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     25.00 =    1513.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 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.) =   11.58
 RAINFALL INTENSITY(INCH/HR) =   3.49
 AREA-AVERAGED Fm(INCH/HR) =  0.45
 AREA-AVERAGED Fp(INCH/HR) =  0.74
 AREA-AVERAGED Ap =  0.60
 EFFECTIVE STREAM AREA(ACRES) =       7.20
 TOTAL STREAM AREA(ACRES) =       9.09
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      21.95

****************************************************************************
 FLOW PROCESS FROM NODE     24.00 TO NODE     25.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   255.00
 ELEVATION DATA: UPSTREAM(FEET) =    843.50  DOWNSTREAM(FEET) =    840.60

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.254
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.991
 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
 "3-4 DWELLINGS/ACRE"       A        1.47      0.74     0.600    52    9.25
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
 SUBAREA RUNOFF(CFS) =      4.69
 TOTAL AREA(ACRES) =      1.47   PEAK FLOW RATE(CFS) =      4.69

****************************************************************************
 FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 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.) =    9.25
 RAINFALL INTENSITY(INCH/HR) =   3.99
 AREA-AVERAGED Fm(INCH/HR) =  0.45
 AREA-AVERAGED Fp(INCH/HR) =  0.74
 AREA-AVERAGED Ap =  0.60
 EFFECTIVE STREAM AREA(ACRES) =       1.47
 TOTAL STREAM AREA(ACRES) =       1.47
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.69

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       21.67    9.76    3.866  0.74( 0.45) 0.60       6.3      16.00
     1       21.95   11.58    3.488  0.74( 0.45) 0.60       7.2       8.00
     1       21.82   12.68    3.304  0.74( 0.45) 0.60       7.6       5.00
     1       20.20   17.60    2.713  0.74( 0.45) 0.60       9.1       1.00
     2        4.69    9.25    3.991  0.74( 0.45) 0.60       1.5      24.00

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       25.99    9.25    3.991  0.74( 0.45) 0.60       7.4      24.00
     2       26.19    9.76    3.866  0.74( 0.45) 0.60       7.7      16.00
     3       25.97   11.58    3.488  0.74( 0.45) 0.60       8.7       8.00
     4       25.61   12.68    3.304  0.74( 0.45) 0.60       9.1       5.00
     5       23.20   17.60    2.713  0.74( 0.45) 0.60      10.6       1.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      26.19    Tc(MIN.) =     9.76
 EFFECTIVE AREA(ACRES) =       7.75   AREA-AVERAGED Fm(INCH/HR) =  0.45
 AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.60
 TOTAL AREA(ACRES) =       10.6
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     25.00 =    1513.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     25.00 TO NODE     28.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   831.60  DOWNSTREAM(FEET) =   831.20
 FLOW LENGTH(FEET) =    98.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.15
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      26.19
 PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =   10.02
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     28.00 =    1611.00 FEET.

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

```
 FLOW PROCESS FROM NODE     28.00 TO NODE     28.00 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.) =   10.02
 RAINFALL INTENSITY(INCH/HR) =   3.80
 AREA-AVERAGED Fm(INCH/HR) =  0.45
 AREA-AVERAGED Fp(INCH/HR) =  0.74
 AREA-AVERAGED Ap =  0.60
 EFFECTIVE STREAM AREA(ACRES) =       7.75
 TOTAL STREAM AREA(ACRES) =      10.56
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      26.19

****************************************************************************
 FLOW PROCESS FROM NODE     26.00 TO NODE     27.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   298.00
 ELEVATION DATA: UPSTREAM(FEET) =    843.60  DOWNSTREAM(FEET) =    840.50

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.027
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.803
 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
 "3-4 DWELLINGS/ACRE"       A        0.80      0.74     0.600    52   10.03
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
 SUBAREA RUNOFF(CFS) =      2.42
 TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      2.42

****************************************************************************
 FLOW PROCESS FROM NODE     27.00 TO NODE     28.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   834.50  DOWNSTREAM(FEET) =   831.20
 FLOW LENGTH(FEET) =   150.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.29
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.42
 PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =   10.42
 LONGEST FLOWPATH FROM NODE     26.00 TO NODE     28.00 =     448.00 FEET.

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

FLOW PROCESS FROM NODE 28.00 TO NODE 28.00 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.) = 10.42
RAINFALL INTENSITY(INCH/HR) = 3.72
AREA-AVERAGED Fm(INCH/HR) = 0.45
AREA-AVERAGED Fp(INCH/HR) = 0.74
AREA-AVERAGED Ap = 0.60
EFFECTIVE STREAM AREA(ACRES) = 0.80
TOTAL STREAM AREA(ACRES) = 0.80
PEAK FLOW RATE(CFS) AT CONFLUENCE = 2.42

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	25.99	9.52	3.923	0.74(0.45)	0.60	7.4	24.00
1	26.19	10.02	3.804	0.74(0.45)	0.60	7.7	16.00
1	25.97	11.85	3.440	0.74(0.45)	0.60	8.7	8.00
1	25.61	12.94	3.263	0.74(0.45)	0.60	9.1	5.00
1	23.20	17.88	2.688	0.74(0.45)	0.60	10.6	1.00
2	2.42	10.42	3.715	0.74(0.45)	0.60	0.8	26.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	28.34	9.52	3.923	0.74(0.45)	0.60	8.2	24.00
2	28.58	10.02	3.804	0.74(0.45)	0.60	8.5	16.00
3	28.56	10.42	3.715	0.74(0.45)	0.60	8.8	26.00
4	28.19	11.85	3.440	0.74(0.45)	0.60	9.5	8.00
5	27.69	12.94	3.263	0.74(0.45)	0.60	9.9	5.00
6	24.86	17.88	2.688	0.74(0.45)	0.60	11.4	1.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 28.58 Tc(MIN.) = 10.02
EFFECTIVE AREA(ACRES) = 8.52 AREA-AVERAGED Fm(INCH/HR) = 0.45
AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED Ap = 0.60
TOTAL AREA(ACRES) = 11.4
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 28.00 = 1611.00 FEET.

****

FLOW PROCESS FROM NODE 28.00 TO NODE 29.00 IS CODE = 31

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

==========

ELEVATION DATA: UPSTREAM(FEET) = 831.20 DOWNSTREAM(FEET) = 831.00
FLOW LENGTH(FEET) = 30.00 MANNING'S N = 0.013

```
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.50
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      28.58
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   10.09
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     29.00 =    1641.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     29.00 TO NODE     29.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.09
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.789
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                A        0.50      0.74     0.850    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    1.42
  EFFECTIVE AREA(ACRES) =      9.02   AREA-AVERAGED Fm(INCH/HR) =  0.46
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.61
  TOTAL AREA(ACRES) =       11.9       PEAK FLOW RATE(CFS) =      28.58
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

+--------------------------------------------------------------------------+
| Offsite area                                                             |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     51.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   525.00
  ELEVATION DATA: UPSTREAM(FEET) =    866.70  DOWNSTREAM(FEET) =    860.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.742
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.148
  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
  "1 DWELLING/ACRE"          A        1.80      0.74     0.800    52   13.74
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  SUBAREA RUNOFF(CFS) =      4.14
  TOTAL AREA(ACRES) =      1.80   PEAK FLOW RATE(CFS) =      4.14
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     51.00 TO NODE     52.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    860.00  DOWNSTREAM(FEET) =    847.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   994.00   CHANNEL SLOPE =  0.0131
  CHANNEL FLOW THRU SUBAREA(CFS) =       4.14
  FLOW VELOCITY(FEET/SEC) =   2.31 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.18   Tc(MIN.) =   20.92
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     52.00 =    1519.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     52.00 TO NODE     52.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   20.92
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.446
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "1 DWELLING/ACRE"          A        5.90      0.74     0.800    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  SUBAREA AREA(ACRES) =    5.90      SUBAREA RUNOFF(CFS) =    9.84
  EFFECTIVE AREA(ACRES) =      7.70   AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.80
  TOTAL AREA(ACRES) =        7.7       PEAK FLOW RATE(CFS) =      12.84

****************************************************************************
  FLOW PROCESS FROM NODE     52.00 TO NODE     62.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    845.00  DOWNSTREAM(FEET) =    843.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   500.00   CHANNEL SLOPE =  0.0030
  CHANNEL FLOW THRU SUBAREA(CFS) =      12.84
  FLOW VELOCITY(FEET/SEC) =   1.46 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.71   Tc(MIN.) =   26.63
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     62.00 =    2019.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     62.00 TO NODE     62.00 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.) =   26.63
  RAINFALL INTENSITY(INCH/HR) =   2.12
```

```
 AREA-AVERAGED Fm(INCH/HR) =  0.59
 AREA-AVERAGED Fp(INCH/HR) =  0.74
 AREA-AVERAGED Ap =  0.80
 EFFECTIVE STREAM AREA(ACRES) =       7.70
 TOTAL STREAM AREA(ACRES) =       7.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      12.84

****************************************************************************
 FLOW PROCESS FROM NODE     60.00 TO NODE     61.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   730.00
 ELEVATION DATA: UPSTREAM(FEET) =    866.70  DOWNSTREAM(FEET) =    857.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.553
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.922
 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
 "1 DWELLING/ACRE"          A        6.70      0.74     0.800    52   15.55
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
 SUBAREA RUNOFF(CFS) =     14.04
 TOTAL AREA(ACRES) =      6.70   PEAK FLOW RATE(CFS) =     14.04

****************************************************************************
 FLOW PROCESS FROM NODE     61.00 TO NODE     62.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    857.00  DOWNSTREAM(FEET) =    846.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1070.00   CHANNEL SLOPE =  0.0103
 CHANNEL FLOW THRU SUBAREA(CFS) =      14.04
 FLOW VELOCITY(FEET/SEC) =   2.77 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   6.45   Tc(MIN.) =   22.00
 LONGEST FLOWPATH FROM NODE     60.00 TO NODE     62.00 =    1800.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     62.00 TO NODE     62.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   22.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.373
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "1 DWELLING/ACRE"          A       11.20      0.74     0.800    52
```

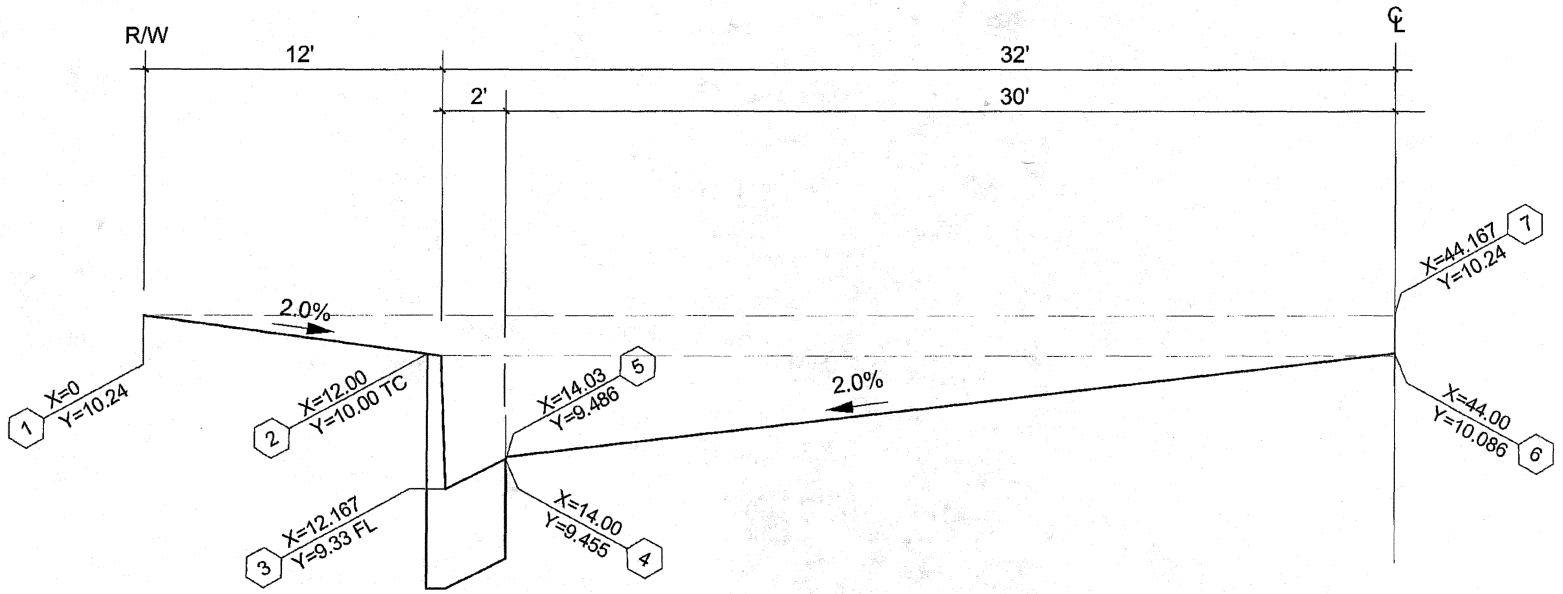
```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  SUBAREA AREA(ACRES) =   11.20      SUBAREA RUNOFF(CFS) =   17.94
  EFFECTIVE AREA(ACRES) =     17.90   AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.80
  TOTAL AREA(ACRES) =       17.9       PEAK FLOW RATE(CFS) =      28.67

****************************************************************************
  FLOW PROCESS FROM NODE     62.00 TO NODE     62.00 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.) =   22.00
  RAINFALL INTENSITY(INCH/HR) =   2.37
  AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.80
  EFFECTIVE STREAM AREA(ACRES) =      17.90
  TOTAL STREAM AREA(ACRES) =      17.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      28.67

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       12.84   26.63    2.117  0.74( 0.59) 0.80       7.7      50.00
      2       28.67   22.00    2.373  0.74( 0.59) 0.80      17.9      60.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       41.07   22.00    2.373  0.74( 0.59) 0.80      24.3      60.00
      2       37.38   26.63    2.117  0.74( 0.59) 0.80      25.6      50.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      41.07    Tc(MIN.) =    22.00
  EFFECTIVE AREA(ACRES) =      24.26   AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.80
  TOTAL AREA(ACRES) =       25.6
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     62.00 =    2019.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     62.00 TO NODE     64.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    843.50  DOWNSTREAM(FEET) =    842.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   340.00   CHANNEL SLOPE =  0.0044
```

```
 CHANNEL FLOW THRU SUBAREA(CFS) =      41.07
 FLOW VELOCITY(FEET/SEC) =   2.43 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.33   Tc(MIN.) =   24.33
 LONGEST FLOWPATH FROM NODE     50.00 TO NODE     64.00 =    2359.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     64.00 TO NODE     69.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   837.00  DOWNSTREAM(FEET) =   835.30
 FLOW LENGTH(FEET) =   596.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  30.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.90
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      41.07
 PIPE TRAVEL TIME(MIN.) =   1.68    Tc(MIN.) =   26.02
 LONGEST FLOWPATH FROM NODE     50.00 TO NODE     69.00 =    2955.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     69.00 TO NODE     69.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   26.02
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.146
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        0.20      0.74     0.100    52
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.37
 EFFECTIVE AREA(ACRES) =     24.46   AREA-AVERAGED Fm(INCH/HR) =  0.59
 AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.79
 TOTAL AREA(ACRES) =       25.8       PEAK FLOW RATE(CFS) =      41.07
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =       25.8  TC(MIN.) =     26.02
 EFFECTIVE AREA(ACRES) =     24.46  AREA-AVERAGED Fm(INCH/HR)=  0.59
 AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap = 0.794
 PEAK FLOW RATE(CFS)   =      41.07

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       41.07   26.02    2.146  0.74( 0.59) 0.79      24.5      60.00
     2       37.38   30.72    1.942  0.74( 0.59) 0.79      25.8      50.00
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

C

C. Hydraulics Calculations

- Francis Avenue Street Capacity
- Yorba Avenue Street Capacity



LOCATION: FRANCIS AVENUE (TT 20056)

SLOPE = 0.004

HALF STREET CAPACITY: 54 CFS FLOW WITHIN R/W

20.7 CFS FLOW BELOW TC

JN: 89700

```
==========================================================================
              ** RESULTS OF IRREGULAR CHANNEL ANALYSIS **
                CALCULATIONS BASED ON MANNINGS EQUATION
             WITH ALL DIMENSIONS IN FEET OR FEET AND SECONDS

==========================================================================
```


Ver. 23.0 Release Date: 07/01/2016 License ID 1269

Analysis prepared by:

```
 ************************** DESCRIPTION OF STUDY **************************
* Half Street capacity                                                   *
* Flow Below Top of Curb                                                 *
* Q=20 CFS                                                               *
 ************************************************************************

  TIME/DATE OF STUDY: 12:21 08/13/2019
--------------------------------------------------------------------------
          * ENTERED INFORMATION FOR SUBCHANNEL NUMBER  1 :
          NODE NUMBER      "X" COORDINATE     "Y" COORDINATE

              1                 0.00              10.24
              2                12.00              10.00
              3                12.17               9.33
              4                14.00               9.44
              5                14.03               9.49
              6                44.00              10.09
              7                44.17              10.24
          SUBCHANNEL SLOPE(FEET/FEET) = 0.004000
          SUBCHANNEL MANNINGS FRICTION FACTOR = 0.015000

..........................................................................
          SUBCHANNEL FLOW(CFS) =       20.7
          SUBCHANNEL FLOW AREA(SQUARE FEET) =       7.79
          SUBCHANNEL FLOW VELOCITY(FEET/SEC.) =     2.655
          SUBCHANNEL FROUDE NUMBER =  0.882
          SUBCHANNEL FLOW TOP-WIDTH(FEET) =       27.71
          SUBCHANNEL HYDRAULIC DEPTH(FEET) =     0.28

--------------------------------------------------------------------------
--------------------------------------------------------------------------
          TOTAL IRREGULAR CHANNEL FLOW(CFS) WANTED =       20.00
          COMPUTED IRREGULAR CHANNEL FLOW(CFS) =       20.69

          ESTIMATED IRREGULAR CHANNEL NORMAL DEPTH WATER SURFACE
          ELEVATION.............................      10.00


              NOTE: WATER SURFACE IS BELOW EXTREME
                    LEFT AND RIGHT BANK ELEVATIONS.
```

```
================================================================================
                ** RESULTS OF IRREGULAR CHANNEL ANALYSIS **
                  CALCULATIONS BASED ON MANNINGS EQUATION
               WITH ALL DIMENSIONS IN FEET OR FEET AND SECONDS

================================================================================
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                          Analysis prepared by:



 ************************** DESCRIPTION OF STUDY **************************
* Half Street Capacity                                                       *
* Flow Below ROW                                                             *
* Q=54 CFS                                                                   *
 ****************************************************************************

    TIME/DATE OF STUDY: 12:33 08/13/2019
--------------------------------------------------------------------------------
           * ENTERED INFORMATION FOR SUBCHANNEL NUMBER  1 :
           NODE NUMBER      "X" COORDINATE     "Y" COORDINATE

                1                 0.00              10.24
                2                12.00              10.00
                3                12.17               9.33
                4                14.00               9.45
                5                14.03               9.49
                6                44.00              10.09
                7                44.17              10.24
           SUBCHANNEL SLOPE(FEET/FEET) = 0.004000
           SUBCHANNEL MANNINGS FRICTION FACTOR = 0.015000

................................................................................
         SUBCHANNEL FLOW(CFS) =       54.4
         SUBCHANNEL FLOW AREA(SQUARE FEET) =      16.73
         SUBCHANNEL FLOW VELOCITY(FEET/SEC.) =     3.251
         SUBCHANNEL FROUDE NUMBER =  0.931
         SUBCHANNEL FLOW TOP-WIDTH(FEET) =      44.17
         SUBCHANNEL HYDRAULIC DEPTH(FEET) =    0.38

--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
         TOTAL IRREGULAR CHANNEL FLOW(CFS) WANTED =      54.00
         COMPUTED IRREGULAR CHANNEL FLOW(CFS) =      54.39

         ESTIMATED IRREGULAR CHANNEL NORMAL DEPTH WATER SURFACE
         ELEVATION.....................     10.24


              NOTE: WATER SURFACE IS ABOVE LEFT OR RIGHT
                    BANK ELEVATIONS.

--------------------------------------------------------------------------------
```
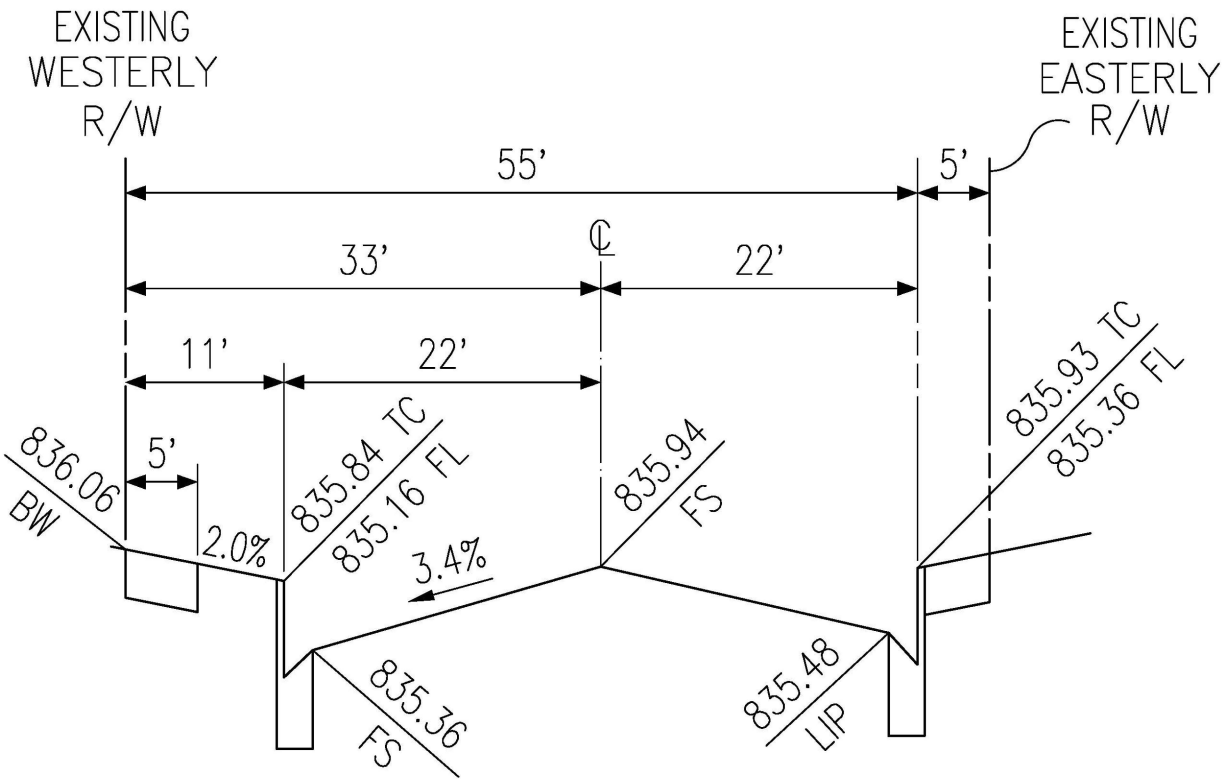

TYPICAL STREET SECTION



25+27.00

YORBA AVENUE

MDS CONSULTING
MORSE SCHULTZ
17320 Redhill Ave.
Suite 350
Irvine, CA 92614
Voice: 949-251-8821
FAX: 949-251-0516
PLANNERS ENGINEERS SURVEYORS

```
==========================================================================
               ** RESULTS OF IRREGULAR CHANNEL ANALYSIS **
                 CALCULATIONS BASED ON MANNINGS EQUATION
              WITH ALL DIMENSIONS IN FEET OR FEET AND SECONDS

==========================================================================
```



```
        Ver. 23.0  Release Date: 07/01/2016  License ID 1269

                          Analysis prepared by:

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                          Phone: (949) 251-8821
                    Email: mdsirvine@mdsconsulting.net



 ************************* DESCRIPTION OF STUDY *************************
* TRACT NO. 20394                                                       *
* HALF STREET CAPACITY, YORBA AVENUE AT STA. 25+27                      *
* Q100 = 22.7 CFS, WITH S=0.0076                                        *
 ************************************************************************

    TIME/DATE OF STUDY: 08:36 11/08/2021
--------------------------------------------------------------------------
           * ENTERED INFORMATION FOR SUBCHANNEL NUMBER  1 :
           NODE NUMBER      "X" COORDINATE     "Y" COORDINATE

                1                 0.00            836.06
                2                11.00            835.84
                3                11.13            835.16
                4                13.00            835.36
                5                33.00            835.94
           SUBCHANNEL SLOPE(FEET/FEET) = 0.007600
           SUBCHANNEL MANNINGS FRICTION FACTOR = 0.015000

..........................................................................
         SUBCHANNEL FLOW(CFS) =      23.5
         SUBCHANNEL FLOW AREA(SQUARE FEET) =       6.62
         SUBCHANNEL FLOW VELOCITY(FEET/SEC.) =    3.553
         SUBCHANNEL FROUDE NUMBER =  1.205
         SUBCHANNEL FLOW TOP-WIDTH(FEET) =      24.52
         SUBCHANNEL HYDRAULIC DEPTH(FEET) =    0.27

--------------------------------------------------------------------------
--------------------------------------------------------------------------
         TOTAL IRREGULAR CHANNEL FLOW(CFS) WANTED =      22.70
         COMPUTED IRREGULAR CHANNEL FLOW(CFS) =      23.53

         ESTIMATED IRREGULAR CHANNEL NORMAL DEPTH WATER SURFACE
         ELEVATION.............................    835.91
```
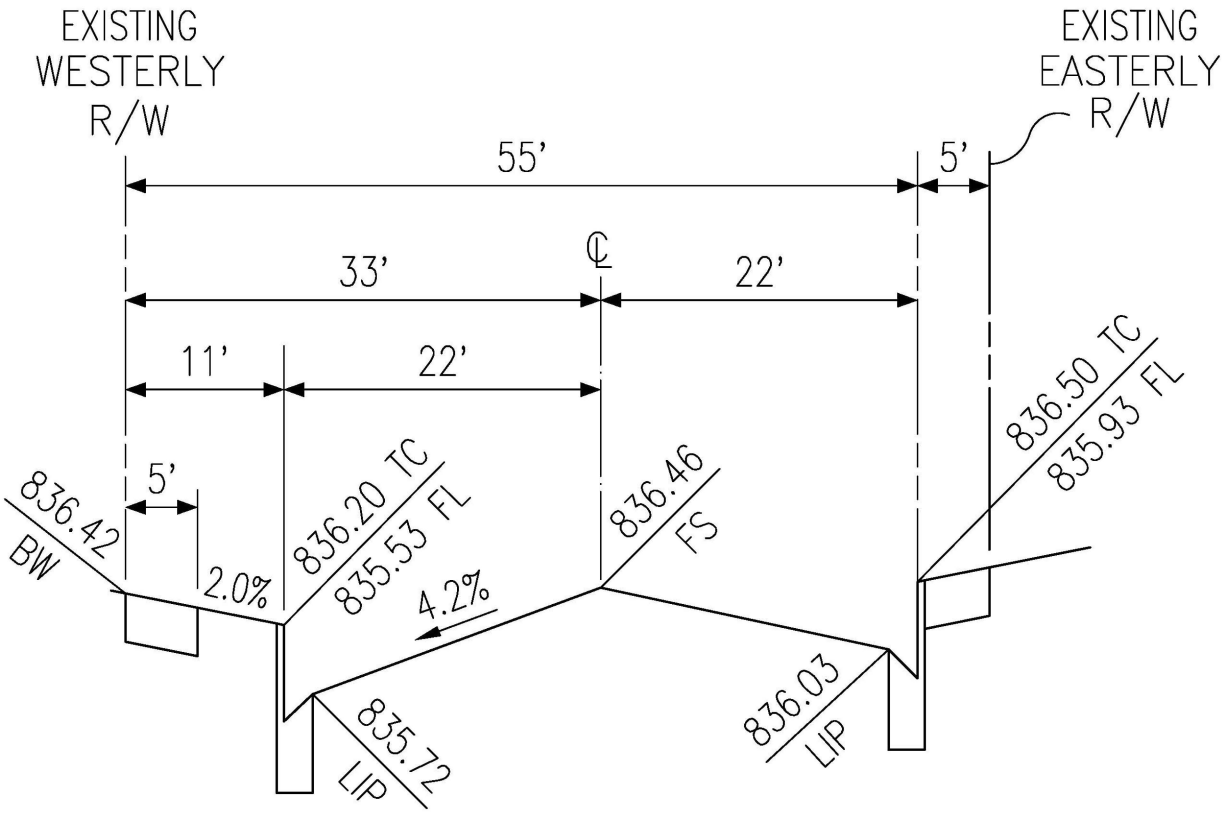

NOTE: WATER SURFACE IS BELOW EXTREME
LEFT AND RIGHT BANK ELEVATIONS.

TYPICAL STREET SECTION



25+71.00
YORBA AVENUE

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PLANNERS ENGINEERS SURVEYORS

```
==============================================================================
               ** RESULTS OF IRREGULAR CHANNEL ANALYSIS **
                 CALCULATIONS BASED ON MANNINGS EQUATION
              WITH ALL DIMENSIONS IN FEET OR FEET AND SECONDS

==============================================================================
```



```
        Ver. 23.0  Release Date: 07/01/2016  License ID 1269

                          Analysis prepared by:

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                          Phone: (949) 251-8821
                    Email: mdsirvine@mdsconsulting.net



 ************************* DESCRIPTION OF STUDY *************************
* TRACT NO. 20394                                                      *
* HALF STREET CAPACITY, YORBA AVENUE AT STA. 25+71                     *
* Q100 = 22.7 CFS, WITH S=0.0125                                       *
 ************************************************************************

    TIME/DATE OF STUDY: 13:21 11/08/2021
------------------------------------------------------------------------------
            * ENTERED INFORMATION FOR SUBCHANNEL NUMBER  1 :
            NODE NUMBER      "X" COORDINATE     "Y" COORDINATE

                 1                 0.00            836.42
                 2                11.00            836.20
                 3                11.13            835.53
                 4                13.00            835.72
                 5                33.00            836.46
            SUBCHANNEL SLOPE(FEET/FEET) = 0.012500
            SUBCHANNEL MANNINGS FRICTION FACTOR = 0.015000

..............................................................................
         SUBCHANNEL FLOW(CFS) =      23.1
         SUBCHANNEL FLOW AREA(SQUARE FEET) =       5.09
         SUBCHANNEL FLOW VELOCITY(FEET/SEC.) =    4.532
         SUBCHANNEL FROUDE NUMBER =  1.538
         SUBCHANNEL FLOW TOP-WIDTH(FEET) =      18.88
         SUBCHANNEL HYDRAULIC DEPTH(FEET) =    0.27

------------------------------------------------------------------------------
------------------------------------------------------------------------------
         TOTAL IRREGULAR CHANNEL FLOW(CFS) WANTED =      22.70
         COMPUTED IRREGULAR CHANNEL FLOW(CFS) =      23.07

         ESTIMATED IRREGULAR CHANNEL NORMAL DEPTH WATER SURFACE
         ELEVATION.............................    836.25
```

NOTE: WATER SURFACE IS BELOW EXTREME
LEFT AND RIGHT BANK ELEVATIONS.

D

D. Synthetic Unit Hydrograph and Storm Routing

- 2-Year / 24-Hour
- 100-Year / 24-Hour

U n i t H y d r o g r a p h A n a l y s i s

Study date 11/05/21

++

San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 4027

Unit Hydrograph
Post Development
2-year / 24-hour

Storm Event Year = 2

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 2		
11.90	1	0.60
Rainfall data for year 2		
11.90	6	1.45
Rainfall data for year 2		
11.90	24	2.50

++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	SCS curve NO.(AMC 2)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
32.0	32.0	0.50	0.042	0.978	0.850	0.831
33.0	33.0	11.40	0.958	0.972	0.550	0.534

Area-averaged adjusted loss rate Fm (In/Hr) = 0.547

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC2)	S	Pervious Yield Fr
0.42	0.036	32.0	32.0	12.50	0.000
0.08	0.006	98.0	98.0	0.20	0.908
6.27	0.527	33.0	33.0	12.50	0.000
5.13	0.431	98.0	98.0	0.20	0.908

Area-averaged catchment yield fraction, Y = 0.397
Area-averaged low loss fraction, Yb = 0.603
Direct entry of lag time by user
++
Watershed area = 11.90(Ac.)
Catchment Lag time = 0.157 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 53.0786
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.547(In/Hr)
Average low loss rate fraction (Yb) = 0.603 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.222(In)
Computed peak 30-minute rainfall = 0.455(In)
Specified peak 1-hour rainfall = 0.600(In)
Computed peak 3-hour rainfall = 1.031(In)
Specified peak 6-hour rainfall = 1.450(In)
Specified peak 24-hour rainfall = 2.500(In)

Rainfall depth area reduction factors:
Using a total area of 11.90(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999 Adjusted rainfall = 0.222(In)
30-minute factor = 0.999 Adjusted rainfall = 0.454(In)
1-hour factor = 0.999 Adjusted rainfall = 0.600(In)
3-hour factor = 1.000 Adjusted rainfall = 1.031(In)
6-hour factor = 1.000 Adjusted rainfall = 1.450(In)
24-hour factor = 1.000 Adjusted rainfall = 2.500(In)

U n i t H y d r o g r a p h
++

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))

(K = 143.92 (CFS))

1	5.135	7.391
2	33.307	40.544
3	73.471	57.802
4	92.153	26.887
5	97.775	8.090
6	99.055	1.842
7	100.000	1.360

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.2219	0.2219
2	0.2929	0.0709
3	0.3444	0.0516
4	0.3864	0.0420
5	0.4225	0.0361
6	0.4545	0.0320
7	0.4834	0.0289
8	0.5099	0.0265
9	0.5345	0.0246
10	0.5575	0.0230
11	0.5792	0.0217
12	0.5997	0.0205
13	0.6238	0.0241
14	0.6470	0.0232
15	0.6694	0.0224
16	0.6910	0.0216
17	0.7120	0.0210
18	0.7323	0.0203
19	0.7521	0.0198
20	0.7714	0.0193
21	0.7901	0.0188
22	0.8085	0.0183
23	0.8264	0.0179
24	0.8439	0.0175
25	0.8611	0.0172
26	0.8779	0.0168
27	0.8943	0.0165
28	0.9105	0.0162
29	0.9264	0.0159
30	0.9420	0.0156
31	0.9574	0.0153
32	0.9725	0.0151
33	0.9873	0.0149
34	1.0020	0.0146
35	1.0164	0.0144
36	1.0306	0.0142
37	1.0446	0.0140
38	1.0584	0.0138
39	1.0720	0.0136
40	1.0855	0.0135
41	1.0988	0.0133
42	1.1119	0.0131
43	1.1248	0.0130

44	1.1377	0.0128
45	1.1503	0.0127
46	1.1628	0.0125
47	1.1752	0.0124
48	1.1875	0.0122
49	1.1996	0.0121
50	1.2116	0.0120
51	1.2235	0.0119
52	1.2352	0.0118
53	1.2469	0.0116
54	1.2584	0.0115
55	1.2698	0.0114
56	1.2811	0.0113
57	1.2924	0.0112
58	1.3035	0.0111
59	1.3145	0.0110
60	1.3254	0.0109
61	1.3363	0.0108
62	1.3470	0.0107
63	1.3577	0.0107
64	1.3682	0.0106
65	1.3787	0.0105
66	1.3891	0.0104
67	1.3994	0.0103
68	1.4097	0.0102
69	1.4199	0.0102
70	1.4300	0.0101
71	1.4400	0.0100
72	1.4499	0.0100
73	1.4578	0.0079
74	1.4656	0.0078
75	1.4734	0.0078
76	1.4811	0.0077
77	1.4887	0.0076
78	1.4963	0.0076
79	1.5038	0.0075
80	1.5112	0.0075
81	1.5186	0.0074
82	1.5260	0.0073
83	1.5333	0.0073
84	1.5405	0.0072
85	1.5477	0.0072
86	1.5548	0.0071
87	1.5619	0.0071
88	1.5689	0.0070
89	1.5759	0.0070
90	1.5828	0.0069
91	1.5897	0.0069
92	1.5966	0.0068
93	1.6034	0.0068
94	1.6101	0.0068
95	1.6168	0.0067
96	1.6235	0.0067
97	1.6301	0.0066

98	1.6367	0.0066
99	1.6432	0.0065
100	1.6497	0.0065
101	1.6562	0.0065
102	1.6626	0.0064
103	1.6690	0.0064
104	1.6754	0.0063
105	1.6817	0.0063
106	1.6879	0.0063
107	1.6942	0.0062
108	1.7004	0.0062
109	1.7066	0.0062
110	1.7127	0.0061
111	1.7188	0.0061
112	1.7249	0.0061
113	1.7309	0.0060
114	1.7369	0.0060
115	1.7429	0.0060
116	1.7488	0.0059
117	1.7547	0.0059
118	1.7606	0.0059
119	1.7664	0.0058
120	1.7723	0.0058
121	1.7781	0.0058
122	1.7838	0.0058
123	1.7895	0.0057
124	1.7952	0.0057
125	1.8009	0.0057
126	1.8066	0.0056
127	1.8122	0.0056
128	1.8178	0.0056
129	1.8234	0.0056
130	1.8289	0.0055
131	1.8344	0.0055
132	1.8399	0.0055
133	1.8454	0.0055
134	1.8508	0.0054
135	1.8562	0.0054
136	1.8616	0.0054
137	1.8670	0.0054
138	1.8723	0.0053
139	1.8776	0.0053
140	1.8829	0.0053
141	1.8882	0.0053
142	1.8935	0.0053
143	1.8987	0.0052
144	1.9039	0.0052
145	1.9091	0.0052
146	1.9142	0.0052
147	1.9194	0.0051
148	1.9245	0.0051
149	1.9296	0.0051
150	1.9347	0.0051
151	1.9397	0.0051

152	1.9448	0.0050
153	1.9498	0.0050
154	1.9548	0.0050
155	1.9598	0.0050
156	1.9647	0.0050
157	1.9697	0.0049
158	1.9746	0.0049
159	1.9795	0.0049
160	1.9844	0.0049
161	1.9892	0.0049
162	1.9941	0.0048
163	1.9989	0.0048
164	2.0037	0.0048
165	2.0085	0.0048
166	2.0133	0.0048
167	2.0180	0.0048
168	2.0228	0.0047
169	2.0275	0.0047
170	2.0322	0.0047
171	2.0369	0.0047
172	2.0416	0.0047
173	2.0462	0.0047
174	2.0509	0.0046
175	2.0555	0.0046
176	2.0601	0.0046
177	2.0647	0.0046
178	2.0693	0.0046
179	2.0738	0.0046
180	2.0784	0.0045
181	2.0829	0.0045
182	2.0874	0.0045
183	2.0919	0.0045
184	2.0964	0.0045
185	2.1009	0.0045
186	2.1053	0.0045
187	2.1098	0.0044
188	2.1142	0.0044
189	2.1186	0.0044
190	2.1230	0.0044
191	2.1274	0.0044
192	2.1318	0.0044
193	2.1361	0.0044
194	2.1405	0.0043
195	2.1448	0.0043
196	2.1491	0.0043
197	2.1534	0.0043
198	2.1577	0.0043
199	2.1620	0.0043
200	2.1662	0.0043
201	2.1705	0.0042
202	2.1747	0.0042
203	2.1789	0.0042
204	2.1832	0.0042
205	2.1874	0.0042

206	2.1915	0.0042
207	2.1957	0.0042
208	2.1999	0.0042
209	2.2040	0.0041
210	2.2082	0.0041
211	2.2123	0.0041
212	2.2164	0.0041
213	2.2205	0.0041
214	2.2246	0.0041
215	2.2287	0.0041
216	2.2327	0.0041
217	2.2368	0.0041
218	2.2408	0.0040
219	2.2449	0.0040
220	2.2489	0.0040
221	2.2529	0.0040
222	2.2569	0.0040
223	2.2609	0.0040
224	2.2649	0.0040
225	2.2688	0.0040
226	2.2728	0.0040
227	2.2767	0.0039
228	2.2807	0.0039
229	2.2846	0.0039
230	2.2885	0.0039
231	2.2924	0.0039
232	2.2963	0.0039
233	2.3002	0.0039
234	2.3041	0.0039
235	2.3079	0.0039
236	2.3118	0.0039
237	2.3156	0.0038
238	2.3195	0.0038
239	2.3233	0.0038
240	2.3271	0.0038
241	2.3309	0.0038
242	2.3347	0.0038
243	2.3385	0.0038
244	2.3423	0.0038
245	2.3461	0.0038
246	2.3498	0.0038
247	2.3536	0.0037
248	2.3573	0.0037
249	2.3610	0.0037
250	2.3648	0.0037
251	2.3685	0.0037
252	2.3722	0.0037
253	2.3759	0.0037
254	2.3795	0.0037
255	2.3832	0.0037
256	2.3869	0.0037
257	2.3906	0.0037
258	2.3942	0.0037
259	2.3978	0.0036

260	2.4015	0.0036
261	2.4051	0.0036
262	2.4087	0.0036
263	2.4123	0.0036
264	2.4159	0.0036
265	2.4195	0.0036
266	2.4231	0.0036
267	2.4267	0.0036
268	2.4302	0.0036
269	2.4338	0.0036
270	2.4374	0.0036
271	2.4409	0.0035
272	2.4444	0.0035
273	2.4480	0.0035
274	2.4515	0.0035
275	2.4550	0.0035
276	2.4585	0.0035
277	2.4620	0.0035
278	2.4655	0.0035
279	2.4690	0.0035
280	2.4724	0.0035
281	2.4759	0.0035
282	2.4794	0.0035
283	2.4828	0.0035
284	2.4863	0.0034
285	2.4897	0.0034
286	2.4931	0.0034
287	2.4965	0.0034
288	2.5000	0.0034

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0034	0.0021	0.0014
2	0.0034	0.0021	0.0014
3	0.0034	0.0021	0.0014
4	0.0034	0.0021	0.0014
5	0.0035	0.0021	0.0014
6	0.0035	0.0021	0.0014
7	0.0035	0.0021	0.0014
8	0.0035	0.0021	0.0014
9	0.0035	0.0021	0.0014
10	0.0035	0.0021	0.0014
11	0.0035	0.0021	0.0014
12	0.0035	0.0021	0.0014
13	0.0036	0.0021	0.0014
14	0.0036	0.0021	0.0014
15	0.0036	0.0022	0.0014
16	0.0036	0.0022	0.0014
17	0.0036	0.0022	0.0014
18	0.0036	0.0022	0.0014
19	0.0036	0.0022	0.0014
20	0.0036	0.0022	0.0014

21	0.0037	0.0022	0.0015
22	0.0037	0.0022	0.0015
23	0.0037	0.0022	0.0015
24	0.0037	0.0022	0.0015
25	0.0037	0.0022	0.0015
26	0.0037	0.0022	0.0015
27	0.0037	0.0022	0.0015
28	0.0037	0.0023	0.0015
29	0.0038	0.0023	0.0015
30	0.0038	0.0023	0.0015
31	0.0038	0.0023	0.0015
32	0.0038	0.0023	0.0015
33	0.0038	0.0023	0.0015
34	0.0038	0.0023	0.0015
35	0.0038	0.0023	0.0015
36	0.0039	0.0023	0.0015
37	0.0039	0.0023	0.0015
38	0.0039	0.0023	0.0015
39	0.0039	0.0024	0.0016
40	0.0039	0.0024	0.0016
41	0.0039	0.0024	0.0016
42	0.0039	0.0024	0.0016
43	0.0040	0.0024	0.0016
44	0.0040	0.0024	0.0016
45	0.0040	0.0024	0.0016
46	0.0040	0.0024	0.0016
47	0.0040	0.0024	0.0016
48	0.0040	0.0024	0.0016
49	0.0041	0.0025	0.0016
50	0.0041	0.0025	0.0016
51	0.0041	0.0025	0.0016
52	0.0041	0.0025	0.0016
53	0.0041	0.0025	0.0016
54	0.0041	0.0025	0.0016
55	0.0042	0.0025	0.0017
56	0.0042	0.0025	0.0017
57	0.0042	0.0025	0.0017
58	0.0042	0.0025	0.0017
59	0.0042	0.0026	0.0017
60	0.0043	0.0026	0.0017
61	0.0043	0.0026	0.0017
62	0.0043	0.0026	0.0017
63	0.0043	0.0026	0.0017
64	0.0043	0.0026	0.0017
65	0.0044	0.0026	0.0017
66	0.0044	0.0026	0.0017
67	0.0044	0.0027	0.0018
68	0.0044	0.0027	0.0018
69	0.0045	0.0027	0.0018
70	0.0045	0.0027	0.0018
71	0.0045	0.0027	0.0018
72	0.0045	0.0027	0.0018
73	0.0045	0.0027	0.0018
74	0.0046	0.0027	0.0018

75	0.0046	0.0028	0.0018
76	0.0046	0.0028	0.0018
77	0.0046	0.0028	0.0018
78	0.0047	0.0028	0.0018
79	0.0047	0.0028	0.0019
80	0.0047	0.0028	0.0019
81	0.0047	0.0029	0.0019
82	0.0048	0.0029	0.0019
83	0.0048	0.0029	0.0019
84	0.0048	0.0029	0.0019
85	0.0048	0.0029	0.0019
86	0.0049	0.0029	0.0019
87	0.0049	0.0030	0.0019
88	0.0049	0.0030	0.0020
89	0.0050	0.0030	0.0020
90	0.0050	0.0030	0.0020
91	0.0050	0.0030	0.0020
92	0.0050	0.0030	0.0020
93	0.0051	0.0031	0.0020
94	0.0051	0.0031	0.0020
95	0.0051	0.0031	0.0020
96	0.0052	0.0031	0.0021
97	0.0052	0.0031	0.0021
98	0.0052	0.0032	0.0021
99	0.0053	0.0032	0.0021
100	0.0053	0.0032	0.0021
101	0.0053	0.0032	0.0021
102	0.0054	0.0032	0.0021
103	0.0054	0.0033	0.0022
104	0.0054	0.0033	0.0022
105	0.0055	0.0033	0.0022
106	0.0055	0.0033	0.0022
107	0.0056	0.0034	0.0022
108	0.0056	0.0034	0.0022
109	0.0056	0.0034	0.0022
110	0.0057	0.0034	0.0023
111	0.0057	0.0035	0.0023
112	0.0058	0.0035	0.0023
113	0.0058	0.0035	0.0023
114	0.0058	0.0035	0.0023
115	0.0059	0.0036	0.0023
116	0.0059	0.0036	0.0024
117	0.0060	0.0036	0.0024
118	0.0060	0.0036	0.0024
119	0.0061	0.0037	0.0024
120	0.0061	0.0037	0.0024
121	0.0062	0.0037	0.0025
122	0.0062	0.0038	0.0025
123	0.0063	0.0038	0.0025
124	0.0063	0.0038	0.0025
125	0.0064	0.0039	0.0026
126	0.0065	0.0039	0.0026
127	0.0065	0.0039	0.0026
128	0.0066	0.0040	0.0026

129	0.0067	0.0040	0.0026
130	0.0067	0.0040	0.0027
131	0.0068	0.0041	0.0027
132	0.0068	0.0041	0.0027
133	0.0069	0.0042	0.0028
134	0.0070	0.0042	0.0028
135	0.0071	0.0043	0.0028
136	0.0071	0.0043	0.0028
137	0.0072	0.0044	0.0029
138	0.0073	0.0044	0.0029
139	0.0074	0.0045	0.0029
140	0.0075	0.0045	0.0030
141	0.0076	0.0046	0.0030
142	0.0076	0.0046	0.0030
143	0.0078	0.0047	0.0031
144	0.0078	0.0047	0.0031
145	0.0100	0.0060	0.0040
146	0.0100	0.0060	0.0040
147	0.0102	0.0061	0.0040
148	0.0102	0.0062	0.0041
149	0.0104	0.0063	0.0041
150	0.0105	0.0063	0.0042
151	0.0107	0.0064	0.0042
152	0.0107	0.0065	0.0043
153	0.0109	0.0066	0.0043
154	0.0110	0.0066	0.0044
155	0.0112	0.0068	0.0045
156	0.0113	0.0068	0.0045
157	0.0115	0.0070	0.0046
158	0.0116	0.0070	0.0046
159	0.0119	0.0072	0.0047
160	0.0120	0.0072	0.0048
161	0.0122	0.0074	0.0049
162	0.0124	0.0075	0.0049
163	0.0127	0.0076	0.0050
164	0.0128	0.0077	0.0051
165	0.0131	0.0079	0.0052
166	0.0133	0.0080	0.0053
167	0.0136	0.0082	0.0054
168	0.0138	0.0083	0.0055
169	0.0142	0.0086	0.0056
170	0.0144	0.0087	0.0057
171	0.0149	0.0090	0.0059
172	0.0151	0.0091	0.0060
173	0.0156	0.0094	0.0062
174	0.0159	0.0096	0.0063
175	0.0165	0.0099	0.0065
176	0.0168	0.0101	0.0067
177	0.0175	0.0106	0.0070
178	0.0179	0.0108	0.0071
179	0.0188	0.0113	0.0075
180	0.0193	0.0116	0.0077
181	0.0203	0.0123	0.0081
182	0.0210	0.0126	0.0083

183	0.0224	0.0135	0.0089
184	0.0232	0.0140	0.0092
185	0.0205	0.0124	0.0081
186	0.0217	0.0131	0.0086
187	0.0246	0.0148	0.0098
188	0.0265	0.0160	0.0105
189	0.0320	0.0193	0.0127
190	0.0361	0.0217	0.0143
191	0.0516	0.0311	0.0205
192	0.0709	0.0427	0.0282
193	0.2219	0.0456	0.1764
194	0.0420	0.0253	0.0167
195	0.0289	0.0174	0.0115
196	0.0230	0.0139	0.0091
197	0.0241	0.0145	0.0096
198	0.0216	0.0130	0.0086
199	0.0198	0.0119	0.0079
200	0.0183	0.0110	0.0073
201	0.0172	0.0103	0.0068
202	0.0162	0.0097	0.0064
203	0.0153	0.0093	0.0061
204	0.0146	0.0088	0.0058
205	0.0140	0.0084	0.0056
206	0.0135	0.0081	0.0053
207	0.0130	0.0078	0.0051
208	0.0125	0.0075	0.0050
209	0.0121	0.0073	0.0048
210	0.0118	0.0071	0.0047
211	0.0114	0.0069	0.0045
212	0.0111	0.0067	0.0044
213	0.0108	0.0065	0.0043
214	0.0106	0.0064	0.0042
215	0.0103	0.0062	0.0041
216	0.0101	0.0061	0.0040
217	0.0079	0.0047	0.0031
218	0.0077	0.0046	0.0031
219	0.0075	0.0045	0.0030
220	0.0073	0.0044	0.0029
221	0.0072	0.0043	0.0029
222	0.0070	0.0042	0.0028
223	0.0069	0.0042	0.0027
224	0.0068	0.0041	0.0027
225	0.0066	0.0040	0.0026
226	0.0065	0.0039	0.0026
227	0.0064	0.0038	0.0025
228	0.0063	0.0038	0.0025
229	0.0062	0.0037	0.0025
230	0.0061	0.0037	0.0024
231	0.0060	0.0036	0.0024
232	0.0059	0.0035	0.0023
233	0.0058	0.0035	0.0023
234	0.0057	0.0034	0.0023
235	0.0056	0.0034	0.0022
236	0.0055	0.0033	0.0022

237	0.0055	0.0033	0.0022
238	0.0054	0.0032	0.0021
239	0.0053	0.0032	0.0021
240	0.0053	0.0032	0.0021
241	0.0052	0.0031	0.0021
242	0.0051	0.0031	0.0020
243	0.0051	0.0030	0.0020
244	0.0050	0.0030	0.0020
245	0.0049	0.0030	0.0020
246	0.0049	0.0029	0.0019
247	0.0048	0.0029	0.0019
248	0.0048	0.0029	0.0019
249	0.0047	0.0028	0.0019
250	0.0047	0.0028	0.0019
251	0.0046	0.0028	0.0018
252	0.0046	0.0028	0.0018
253	0.0045	0.0027	0.0018
254	0.0045	0.0027	0.0018
255	0.0044	0.0027	0.0018
256	0.0044	0.0027	0.0017
257	0.0044	0.0026	0.0017
258	0.0043	0.0026	0.0017
259	0.0043	0.0026	0.0017
260	0.0042	0.0026	0.0017
261	0.0042	0.0025	0.0017
262	0.0042	0.0025	0.0017
263	0.0041	0.0025	0.0016
264	0.0041	0.0025	0.0016
265	0.0041	0.0024	0.0016
266	0.0040	0.0024	0.0016
267	0.0040	0.0024	0.0016
268	0.0040	0.0024	0.0016
269	0.0039	0.0024	0.0016
270	0.0039	0.0023	0.0015
271	0.0039	0.0023	0.0015
272	0.0038	0.0023	0.0015
273	0.0038	0.0023	0.0015
274	0.0038	0.0023	0.0015
275	0.0037	0.0023	0.0015
276	0.0037	0.0022	0.0015
277	0.0037	0.0022	0.0015
278	0.0037	0.0022	0.0015
279	0.0036	0.0022	0.0014
280	0.0036	0.0022	0.0014
281	0.0036	0.0022	0.0014
282	0.0036	0.0022	0.0014
283	0.0035	0.0021	0.0014
284	0.0035	0.0021	0.0014
285	0.0035	0.0021	0.0014
286	0.0035	0.0021	0.0014
287	0.0035	0.0021	0.0014
288	0.0034	0.0021	0.0014

Total soil rain loss = 1.42(In)
Total effective rainfall = 1.08(In)
Peak flow rate in flood hydrograph = 11.92(CFS)

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24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	5.0	10.0	15.0	20.0
0+ 5	0.0001	0.01	Q				
0+10	0.0005	0.07	Q				
0+15	0.0015	0.14	Q				
0+20	0.0027	0.18	Q				
0+25	0.0041	0.19	Q				
0+30	0.0054	0.20	Q				
0+35	0.0068	0.20	Q				
0+40	0.0081	0.20	Q				
0+45	0.0095	0.20	Q				
0+50	0.0109	0.20	Q				
0+55	0.0123	0.20	Q				
1+ 0	0.0137	0.20	Q				
1+ 5	0.0150	0.20	Q				
1+10	0.0164	0.20	Q				
1+15	0.0178	0.20	Q				
1+20	0.0192	0.20	Q				
1+25	0.0206	0.20	Q				
1+30	0.0221	0.21	Q				
1+35	0.0235	0.21	Q				
1+40	0.0249	0.21	Q				
1+45	0.0263	0.21	Q				
1+50	0.0277	0.21	QV				
1+55	0.0292	0.21	QV				
2+ 0	0.0306	0.21	QV				
2+ 5	0.0321	0.21	QV				
2+10	0.0335	0.21	QV				
2+15	0.0350	0.21	QV				
2+20	0.0364	0.21	QV				
2+25	0.0379	0.21	QV				
2+30	0.0394	0.21	QV				
2+35	0.0409	0.21	QV				
2+40	0.0424	0.22	QV				
2+45	0.0438	0.22	QV				
2+50	0.0453	0.22	QV				
2+55	0.0468	0.22	QV				
3+ 0	0.0483	0.22	QV				
3+ 5	0.0499	0.22	QV				
3+10	0.0514	0.22	QV				
3+15	0.0529	0.22	QV				
3+20	0.0544	0.22	Q V				
3+25	0.0560	0.22	Q V				

3+30	0.0575	0.22	Q	V	|	|	|	|
3+35	0.0591	0.22	Q	V	|	|	|	|
3+40	0.0606	0.23	Q	V	|	|	|	|
3+45	0.0622	0.23	Q	V	|	|	|	|
3+50	0.0637	0.23	Q	V	|	|	|	|
3+55	0.0653	0.23	Q	V	|	|	|	|
4+ 0	0.0669	0.23	Q	V	|	|	|	|
4+ 5	0.0685	0.23	Q	V	|	|	|	|
4+10	0.0701	0.23	Q	V	|	|	|	|
4+15	0.0717	0.23	Q	V	|	|	|	|
4+20	0.0733	0.23	Q	V	|	|	|	|
4+25	0.0749	0.23	Q	V	|	|	|	|
4+30	0.0765	0.24	Q	V	|	|	|	|
4+35	0.0782	0.24	Q	V	|	|	|	|
4+40	0.0798	0.24	Q	V	|	|	|	|
4+45	0.0814	0.24	Q	V	|	|	|	|
4+50	0.0831	0.24	Q	V	|	|	|	|
4+55	0.0847	0.24	Q	V	|	|	|	|
5+ 0	0.0864	0.24	Q	V	|	|	|	|
5+ 5	0.0881	0.24	Q	V	|	|	|	|
5+10	0.0898	0.24	Q	V	|	|	|	|
5+15	0.0914	0.25	Q	V	|	|	|	|
5+20	0.0931	0.25	Q	V	|	|	|	|
5+25	0.0948	0.25	Q	V	|	|	|	|
5+30	0.0966	0.25	Q	V	|	|	|	|
5+35	0.0983	0.25	Q	V	|	|	|	|
5+40	0.1000	0.25	Q	V	|	|	|	|
5+45	0.1017	0.25	Q	V	|	|	|	|
5+50	0.1035	0.25	Q	V	|	|	|	|
5+55	0.1052	0.25	Q	V	|	|	|	|
6+ 0	0.1070	0.26	Q	V	|	|	|	|
6+ 5	0.1088	0.26	Q	V	|	|	|	|
6+10	0.1105	0.26	Q	V	|	|	|	|
6+15	0.1123	0.26	Q	V	|	|	|	|
6+20	0.1141	0.26	Q	V	|	|	|	|
6+25	0.1159	0.26	Q	V	|	|	|	|
6+30	0.1178	0.26	Q	V	|	|	|	|
6+35	0.1196	0.27	Q	V	|	|	|	|
6+40	0.1214	0.27	Q	V	|	|	|	|
6+45	0.1233	0.27	Q	V	|	|	|	|
6+50	0.1251	0.27	Q	V	|	|	|	|
6+55	0.1270	0.27	Q	V	|	|	|	|
7+ 0	0.1289	0.27	Q	V	|	|	|	|
7+ 5	0.1307	0.27	Q	V	|	|	|	|
7+10	0.1326	0.28	Q	V	|	|	|	|
7+15	0.1345	0.28	Q	V	|	|	|	|
7+20	0.1365	0.28	Q	V	|	|	|	|
7+25	0.1384	0.28	Q	V	|	|	|	|
7+30	0.1403	0.28	Q	V	|	|	|	|
7+35	0.1423	0.28	Q	V	|	|	|	|
7+40	0.1442	0.28	Q	V	|	|	|	|
7+45	0.1462	0.29	Q	V	|	|	|	|
7+50	0.1482	0.29	Q	V	|	|	|	|
7+55	0.1502	0.29	Q	V	|	|	|	|

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 8+ 0       0.1522      0.29  Q    V    |          |          |          |
 8+ 5       0.1542      0.29  Q    V    |          |          |          |
 8+10       0.1563      0.30  Q    V    |          |          |          |
 8+15       0.1583      0.30  Q    V    |          |          |          |
 8+20       0.1604      0.30  Q    V    |          |          |          |
 8+25       0.1625      0.30  Q     V   |          |          |          |
 8+30       0.1645      0.30  Q     V   |          |          |          |
 8+35       0.1666      0.31  Q     V   |          |          |          |
 8+40       0.1688      0.31  Q     V   |          |          |          |
 8+45       0.1709      0.31  Q     V   |          |          |          |
 8+50       0.1730      0.31  Q     V   |          |          |          |
 8+55       0.1752      0.31  Q     V   |          |          |          |
 9+ 0       0.1774      0.32  Q     V   |          |          |          |
 9+ 5       0.1796      0.32  Q     V   |          |          |          |
 9+10       0.1818      0.32  Q     V   |          |          |          |
 9+15       0.1840      0.32  Q     V   |          |          |          |
 9+20       0.1862      0.32  Q     V   |          |          |          |
 9+25       0.1885      0.33  Q      V  |          |          |          |
 9+30       0.1907      0.33  Q      V  |          |          |          |
 9+35       0.1930      0.33  Q      V  |          |          |          |
 9+40       0.1953      0.33  Q      V  |          |          |          |
 9+45       0.1977      0.34  Q      V  |          |          |          |
 9+50       0.2000      0.34  Q      V  |          |          |          |
 9+55       0.2024      0.34  Q      V  |          |          |          |
10+ 0       0.2048      0.35  Q      V  |          |          |          |
10+ 5       0.2072      0.35  Q      V  |          |          |          |
10+10       0.2096      0.35  Q      V  |          |          |          |
10+15       0.2120      0.35  Q      V  |          |          |          |
10+20       0.2145      0.36  Q       V |          |          |          |
10+25       0.2170      0.36  Q       V |          |          |          |
10+30       0.2195      0.36  Q       V |          |          |          |
10+35       0.2220      0.37  Q       V |          |          |          |
10+40       0.2245      0.37  Q       V |          |          |          |
10+45       0.2271      0.37  Q       V |          |          |          |
10+50       0.2297      0.38  Q       V |          |          |          |
10+55       0.2323      0.38  Q       V |          |          |          |
11+ 0       0.2350      0.38  Q       V |          |          |          |
11+ 5       0.2376      0.39  Q       V |          |          |          |
11+10       0.2403      0.39  Q       V |          |          |          |
11+15       0.2431      0.40  Q        V|          |          |          |
11+20       0.2458      0.40  Q        V|          |          |          |
11+25       0.2486      0.40  Q        V|          |          |          |
11+30       0.2514      0.41  Q        V|          |          |          |
11+35       0.2543      0.41  Q        V|          |          |          |
11+40       0.2571      0.42  Q        V|          |          |          |
11+45       0.2600      0.42  Q        V|          |          |          |
11+50       0.2630      0.43  Q        V|          |          |          |
11+55       0.2660      0.43  Q        V|          |          |          |
12+ 0       0.2690      0.44  Q         V          |          |          |
12+ 5       0.2721      0.45  Q         V          |          |          |
12+10       0.2754      0.49  Q         V          |          |          |
12+15       0.2791      0.54  |Q        V          |          |          |
12+20       0.2830      0.57  |Q        V          |          |          |
12+25       0.2870      0.58  |Q        V          |          |          |
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12+30	0.2910	0.59	Q	V			
12+35	0.2951	0.59	Q	V			
12+40	0.2993	0.60	Q	V			
12+45	0.3034	0.61	Q	V			
12+50	0.3077	0.62	Q	V			
12+55	0.3120	0.62	Q	V			
13+ 0	0.3163	0.63	Q	V			
13+ 5	0.3207	0.64	Q	V			
13+10	0.3252	0.65	Q	V			
13+15	0.3297	0.66	Q	V			
13+20	0.3343	0.67	Q	V			
13+25	0.3390	0.68	Q	V			
13+30	0.3437	0.69	Q	V			
13+35	0.3486	0.70	Q	V			
13+40	0.3535	0.71	Q	V			
13+45	0.3584	0.72	Q	V			
13+50	0.3635	0.73	Q	V			
13+55	0.3686	0.75	Q	V			
14+ 0	0.3739	0.76	Q	V			
14+ 5	0.3792	0.78	Q	V			
14+10	0.3847	0.79	Q	V			
14+15	0.3903	0.81	Q	V			
14+20	0.3960	0.83	Q	V			
14+25	0.4018	0.85	Q	V			
14+30	0.4078	0.87	Q	V			
14+35	0.4139	0.89	Q	V			
14+40	0.4202	0.91	Q	V			
14+45	0.4267	0.94	Q	V			
14+50	0.4334	0.97	Q	V			
14+55	0.4402	1.00	Q	V			
15+ 0	0.4474	1.03	Q	V			
15+ 5	0.4547	1.07	Q	V			
15+10	0.4624	1.11	Q	V			
15+15	0.4704	1.16	Q	V			
15+20	0.4787	1.21	Q	V			
15+25	0.4874	1.26	Q	V			
15+30	0.4961	1.26	Q	V			
15+35	0.5046	1.24	Q	V			
15+40	0.5135	1.29	Q	V			
15+45	0.5232	1.41	Q	V			
15+50	0.5342	1.59	Q	V			
15+55	0.5470	1.86	Q	V			
16+ 0	0.5630	2.32	Q	V			
16+ 5	0.5915	4.15	Q	V			
16+10	0.6577	9.61	Q	V			
16+15	0.7398	11.92	Q	V			
16+20	0.7847	6.52	Q	V			
16+25	0.8058	3.06	Q	V			
16+30	0.8181	1.79	Q	V			
16+35	0.8289	1.57	Q	V			
16+40	0.8375	1.24	Q	V			
16+45	0.8454	1.14	Q	V			
16+50	0.8526	1.06	Q	V			
16+55	0.8595	0.99	Q	V			

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17+ 0       0.8659      0.93  |Q         |          |          | V        |
17+ 5       0.8719      0.88  |Q         |          |          | V        |
17+10       0.8777      0.84  |Q         |          |          | V        |
17+15       0.8832      0.80  |Q         |          |          | V        |
17+20       0.8885      0.77  |Q         |          |          |  V       |
17+25       0.8937      0.74  |Q         |          |          |  V       |
17+30       0.8986      0.72  |Q         |          |          |  V       |
17+35       0.9034      0.69  |Q         |          |          |  V       |
17+40       0.9080      0.67  |Q         |          |          |  V       |
17+45       0.9125      0.65  |Q         |          |          |   V      |
17+50       0.9169      0.64  |Q         |          |          |   V      |
17+55       0.9212      0.62  |Q         |          |          |   V      |
18+ 0       0.9253      0.60  |Q         |          |          |   V      |
18+ 5       0.9294      0.58  |Q         |          |          |   V      |
18+10       0.9331      0.54  |Q         |          |          |   V      |
18+15       0.9364      0.48  Q          |          |          |   V      |
18+20       0.9395      0.45  Q          |          |          |    V     |
18+25       0.9425      0.43  Q          |          |          |    V     |
18+30       0.9454      0.42  Q          |          |          |    V     |
18+35       0.9482      0.41  Q          |          |          |    V     |
18+40       0.9510      0.40  Q          |          |          |    V     |
18+45       0.9537      0.39  Q          |          |          |    V     |
18+50       0.9563      0.39  Q          |          |          |    V     |
18+55       0.9590      0.38  Q          |          |          |    V     |
19+ 0       0.9615      0.37  Q          |          |          |    V     |
19+ 5       0.9640      0.37  Q          |          |          |    V     |
19+10       0.9665      0.36  Q          |          |          |     V    |
19+15       0.9689      0.35  Q          |          |          |     V    |
19+20       0.9713      0.35  Q          |          |          |     V    |
19+25       0.9737      0.34  Q          |          |          |     V    |
19+30       0.9760      0.34  Q          |          |          |     V    |
19+35       0.9783      0.33  Q          |          |          |     V    |
19+40       0.9805      0.33  Q          |          |          |     V    |
19+45       0.9827      0.32  Q          |          |          |     V    |
19+50       0.9849      0.32  Q          |          |          |     V    |
19+55       0.9871      0.31  Q          |          |          |     V    |
20+ 0       0.9892      0.31  Q          |          |          |     V    |
20+ 5       0.9913      0.30  Q          |          |          |     V    |
20+10       0.9933      0.30  Q          |          |          |      V   |
20+15       0.9954      0.30  Q          |          |          |      V   |
20+20       0.9974      0.29  Q          |          |          |      V   |
20+25       0.9994      0.29  Q          |          |          |      V   |
20+30       1.0014      0.29  Q          |          |          |      V   |
20+35       1.0033      0.28  Q          |          |          |      V   |
20+40       1.0052      0.28  Q          |          |          |      V   |
20+45       1.0071      0.28  Q          |          |          |      V   |
20+50       1.0090      0.27  Q          |          |          |      V   |
20+55       1.0109      0.27  Q          |          |          |      V   |
21+ 0       1.0127      0.27  Q          |          |          |      V   |
21+ 5       1.0145      0.26  Q          |          |          |      V   |
21+10       1.0163      0.26  Q          |          |          |      V   |
21+15       1.0181      0.26  Q          |          |          |      V   |
21+20       1.0199      0.26  Q          |          |          |       V  |
21+25       1.0216      0.25  Q          |          |          |       V  |
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21+30	1.0234	0.25	Q	|	|	|	V |
21+35	1.0251	0.25	Q	|	|	|	V |
21+40	1.0268	0.25	Q	|	|	|	V |
21+45	1.0285	0.24	Q	|	|	|	V |
21+50	1.0301	0.24	Q	|	|	|	V |
21+55	1.0318	0.24	Q	|	|	|	V |
22+ 0	1.0334	0.24	Q	|	|	|	V |
22+ 5	1.0351	0.24	Q	|	|	|	V |
22+10	1.0367	0.23	Q	|	|	|	V |
22+15	1.0383	0.23	Q	|	|	|	V |
22+20	1.0398	0.23	Q	|	|	|	V |
22+25	1.0414	0.23	Q	|	|	|	V |
22+30	1.0430	0.23	Q	|	|	|	V |
22+35	1.0445	0.22	Q	|	|	|	V |
22+40	1.0461	0.22	Q	|	|	|	V|
22+45	1.0476	0.22	Q	|	|	|	V|
22+50	1.0491	0.22	Q	|	|	|	V|
22+55	1.0506	0.22	Q	|	|	|	V|
23+ 0	1.0521	0.22	Q	|	|	|	V|
23+ 5	1.0535	0.21	Q	|	|	|	V|
23+10	1.0550	0.21	Q	|	|	|	V|
23+15	1.0565	0.21	Q	|	|	|	V|
23+20	1.0579	0.21	Q	|	|	|	V|
23+25	1.0593	0.21	Q	|	|	|	V|
23+30	1.0608	0.21	Q	|	|	|	V|
23+35	1.0622	0.21	Q	|	|	|	V|
23+40	1.0636	0.20	Q	|	|	|	V|
23+45	1.0650	0.20	Q	|	|	|	V|
23+50	1.0664	0.20	Q	|	|	|	V|
23+55	1.0677	0.20	Q	|	|	|	V|
24+ 0	1.0691	0.20	Q	|	|	|	V|
24+ 5	1.0704	0.19	Q	|	|	|	V|
24+10	1.0713	0.13	Q	|	|	|	V|
24+15	1.0717	0.05	Q	|	|	|	V|
24+20	1.0718	0.02	Q	|	|	|	V|
24+25	1.0718	0.00	Q	|	|	|	V|
24+30	1.0718	0.00	Q	|	|	|	V|

U n i t H y d r o g r a p h A n a l y s i s

Study date 11/05/21

++

San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 4027

Unit Hydrograph
Post Development
100-year / 24-hour

Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 100		
11.90	1	1.30
Rainfall data for year 100		
11.90	6	3.40
Rainfall data for year 100		
11.90	24	7.05

++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	SCS curve NO.(AMC 3)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
32.0	52.0	0.50	0.042	0.785	0.850	0.667
33.0	53.0	11.40	0.958	0.773	0.550	0.425

Area-averaged adjusted loss rate Fm (In/Hr) = 0.435

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC3)	S	Pervious Yield Fr
0.42	0.036	32.0	52.0	9.23	0.266
0.08	0.006	98.0	98.0	0.20	0.966
6.27	0.527	33.0	53.0	8.87	0.279
5.13	0.431	98.0	98.0	0.20	0.966

Area-averaged catchment yield fraction, Y = 0.579
Area-averaged low loss fraction, Yb = 0.421
Direct entry of lag time by user
++
Watershed area = 11.90(Ac.)
Catchment Lag time = 0.156 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 53.4188
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.435(In/Hr)
Average low loss rate fraction (Yb) = 0.421 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.481(In)
Computed peak 30-minute rainfall = 0.985(In)
Specified peak 1-hour rainfall = 1.300(In)
Computed peak 3-hour rainfall = 2.344(In)
Specified peak 6-hour rainfall = 3.400(In)
Specified peak 24-hour rainfall = 7.050(In)

Rainfall depth area reduction factors:
Using a total area of 11.90(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999 Adjusted rainfall = 0.481(In)
30-minute factor = 0.999 Adjusted rainfall = 0.985(In)
1-hour factor = 0.999 Adjusted rainfall = 1.299(In)
3-hour factor = 1.000 Adjusted rainfall = 2.344(In)
6-hour factor = 1.000 Adjusted rainfall = 3.400(In)
24-hour factor = 1.000 Adjusted rainfall = 7.050(In)

U n i t H y d r o g r a p h
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Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))

(K = 143.92 (CFS))

1	5.200	7.483
2	33.698	41.014
3	73.967	57.953
4	92.355	26.463
5	97.840	7.894
6	99.088	1.797
7	100.000	1.312

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.4809	0.4809
2	0.6345	0.1536
3	0.7462	0.1117
4	0.8372	0.0910
5	0.9154	0.0782
6	0.9847	0.0693
7	1.0473	0.0626
8	1.1048	0.0575
9	1.1580	0.0533
10	1.2079	0.0498
11	1.2548	0.0469
12	1.2993	0.0444
13	1.3563	0.0571
14	1.4114	0.0551
15	1.4647	0.0533
16	1.5163	0.0517
17	1.5665	0.0502
18	1.6153	0.0488
19	1.6629	0.0476
20	1.7094	0.0464
21	1.7548	0.0454
22	1.7991	0.0444
23	1.8426	0.0435
24	1.8852	0.0426
25	1.9270	0.0418
26	1.9680	0.0410
27	2.0083	0.0403
28	2.0479	0.0396
29	2.0869	0.0390
30	2.1252	0.0383
31	2.1630	0.0378
32	2.2002	0.0372
33	2.2368	0.0367
34	2.2730	0.0361
35	2.3086	0.0357
36	2.3438	0.0352
37	2.3785	0.0347
38	2.4128	0.0343
39	2.4467	0.0339
40	2.4801	0.0335
41	2.5132	0.0331
42	2.5459	0.0327
43	2.5783	0.0324

44	2.6103	0.0320
45	2.6420	0.0317
46	2.6733	0.0313
47	2.7043	0.0310
48	2.7351	0.0307
49	2.7655	0.0304
50	2.7956	0.0301
51	2.8255	0.0299
52	2.8551	0.0296
53	2.8844	0.0293
54	2.9135	0.0291
55	2.9423	0.0288
56	2.9709	0.0286
57	2.9993	0.0284
58	3.0274	0.0281
59	3.0553	0.0279
60	3.0830	0.0277
61	3.1105	0.0275
62	3.1377	0.0273
63	3.1648	0.0271
64	3.1916	0.0269
65	3.2183	0.0267
66	3.2448	0.0265
67	3.2711	0.0263
68	3.2972	0.0261
69	3.3231	0.0259
70	3.3489	0.0258
71	3.3745	0.0256
72	3.3999	0.0254
73	3.4246	0.0248
74	3.4492	0.0246
75	3.4737	0.0244
76	3.4980	0.0243
77	3.5221	0.0241
78	3.5461	0.0240
79	3.5699	0.0238
80	3.5936	0.0237
81	3.6172	0.0236
82	3.6406	0.0234
83	3.6639	0.0233
84	3.6871	0.0232
85	3.7101	0.0230
86	3.7330	0.0229
87	3.7558	0.0228
88	3.7784	0.0226
89	3.8009	0.0225
90	3.8233	0.0224
91	3.8456	0.0223
92	3.8678	0.0222
93	3.8899	0.0221
94	3.9118	0.0219
95	3.9337	0.0218
96	3.9554	0.0217
97	3.9770	0.0216

98	3.9985	0.0215
99	4.0199	0.0214
100	4.0412	0.0213
101	4.0624	0.0212
102	4.0836	0.0211
103	4.1046	0.0210
104	4.1255	0.0209
105	4.1463	0.0208
106	4.1670	0.0207
107	4.1877	0.0206
108	4.2082	0.0205
109	4.2287	0.0205
110	4.2490	0.0204
111	4.2693	0.0203
112	4.2895	0.0202
113	4.3096	0.0201
114	4.3296	0.0200
115	4.3496	0.0199
116	4.3694	0.0199
117	4.3892	0.0198
118	4.4089	0.0197
119	4.4285	0.0196
120	4.4480	0.0195
121	4.4675	0.0195
122	4.4869	0.0194
123	4.5062	0.0193
124	4.5254	0.0192
125	4.5446	0.0192
126	4.5637	0.0191
127	4.5827	0.0190
128	4.6016	0.0189
129	4.6205	0.0189
130	4.6393	0.0188
131	4.6581	0.0187
132	4.6767	0.0187
133	4.6953	0.0186
134	4.7139	0.0185
135	4.7324	0.0185
136	4.7508	0.0184
137	4.7691	0.0183
138	4.7874	0.0183
139	4.8056	0.0182
140	4.8238	0.0182
141	4.8419	0.0181
142	4.8599	0.0180
143	4.8779	0.0180
144	4.8958	0.0179
145	4.9136	0.0179
146	4.9314	0.0178
147	4.9492	0.0177
148	4.9669	0.0177
149	4.9845	0.0176
150	5.0021	0.0176
151	5.0196	0.0175

152	5.0370	0.0175
153	5.0544	0.0174
154	5.0718	0.0174
155	5.0891	0.0173
156	5.1063	0.0172
157	5.1235	0.0172
158	5.1407	0.0171
159	5.1578	0.0171
160	5.1748	0.0170
161	5.1918	0.0170
162	5.2087	0.0169
163	5.2256	0.0169
164	5.2425	0.0168
165	5.2593	0.0168
166	5.2760	0.0167
167	5.2927	0.0167
168	5.3093	0.0166
169	5.3259	0.0166
170	5.3425	0.0166
171	5.3590	0.0165
172	5.3755	0.0165
173	5.3919	0.0164
174	5.4083	0.0164
175	5.4246	0.0163
176	5.4409	0.0163
177	5.4571	0.0162
178	5.4733	0.0162
179	5.4895	0.0162
180	5.5056	0.0161
181	5.5217	0.0161
182	5.5377	0.0160
183	5.5537	0.0160
184	5.5696	0.0159
185	5.5855	0.0159
186	5.6014	0.0159
187	5.6172	0.0158
188	5.6330	0.0158
189	5.6487	0.0157
190	5.6644	0.0157
191	5.6801	0.0157
192	5.6957	0.0156
193	5.7113	0.0156
194	5.7268	0.0155
195	5.7424	0.0155
196	5.7578	0.0155
197	5.7733	0.0154
198	5.7887	0.0154
199	5.8040	0.0154
200	5.8193	0.0153
201	5.8346	0.0153
202	5.8499	0.0153
203	5.8651	0.0152
204	5.8803	0.0152
205	5.8954	0.0151

206	5.9105	0.0151
207	5.9256	0.0151
208	5.9407	0.0150
209	5.9557	0.0150
210	5.9706	0.0150
211	5.9856	0.0149
212	6.0005	0.0149
213	6.0154	0.0149
214	6.0302	0.0148
215	6.0450	0.0148
216	6.0598	0.0148
217	6.0745	0.0147
218	6.0892	0.0147
219	6.1039	0.0147
220	6.1186	0.0146
221	6.1332	0.0146
222	6.1478	0.0146
223	6.1623	0.0146
224	6.1768	0.0145
225	6.1913	0.0145
226	6.2058	0.0145
227	6.2202	0.0144
228	6.2346	0.0144
229	6.2490	0.0144
230	6.2633	0.0143
231	6.2776	0.0143
232	6.2919	0.0143
233	6.3062	0.0143
234	6.3204	0.0142
235	6.3346	0.0142
236	6.3488	0.0142
237	6.3629	0.0141
238	6.3770	0.0141
239	6.3911	0.0141
240	6.4051	0.0141
241	6.4192	0.0140
242	6.4332	0.0140
243	6.4471	0.0140
244	6.4611	0.0139
245	6.4750	0.0139
246	6.4889	0.0139
247	6.5027	0.0139
248	6.5166	0.0138
249	6.5304	0.0138
250	6.5442	0.0138
251	6.5579	0.0138
252	6.5717	0.0137
253	6.5854	0.0137
254	6.5991	0.0137
255	6.6127	0.0137
256	6.6263	0.0136
257	6.6399	0.0136
258	6.6535	0.0136
259	6.6671	0.0136

260	6.6806	0.0135
261	6.6941	0.0135
262	6.7076	0.0135
263	6.7210	0.0135
264	6.7345	0.0134
265	6.7479	0.0134
266	6.7613	0.0134
267	6.7746	0.0134
268	6.7880	0.0133
269	6.8013	0.0133
270	6.8146	0.0133
271	6.8278	0.0133
272	6.8411	0.0132
273	6.8543	0.0132
274	6.8675	0.0132
275	6.8807	0.0132
276	6.8938	0.0132
277	6.9069	0.0131
278	6.9200	0.0131
279	6.9331	0.0131
280	6.9462	0.0131
281	6.9592	0.0130
282	6.9722	0.0130
283	6.9852	0.0130
284	6.9982	0.0130
285	7.0112	0.0130
286	7.0241	0.0129
287	7.0370	0.0129
288	7.0499	0.0129

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0129	0.0054	0.0075
2	0.0129	0.0054	0.0075
3	0.0130	0.0055	0.0075
4	0.0130	0.0055	0.0075
5	0.0130	0.0055	0.0075
6	0.0130	0.0055	0.0076
7	0.0131	0.0055	0.0076
8	0.0131	0.0055	0.0076
9	0.0132	0.0055	0.0076
10	0.0132	0.0055	0.0076
11	0.0132	0.0056	0.0077
12	0.0132	0.0056	0.0077
13	0.0133	0.0056	0.0077
14	0.0133	0.0056	0.0077
15	0.0134	0.0056	0.0077
16	0.0134	0.0056	0.0078
17	0.0134	0.0057	0.0078
18	0.0135	0.0057	0.0078
19	0.0135	0.0057	0.0078
20	0.0135	0.0057	0.0078

21	0.0136	0.0057	0.0079
22	0.0136	0.0057	0.0079
23	0.0137	0.0057	0.0079
24	0.0137	0.0058	0.0079
25	0.0137	0.0058	0.0080
26	0.0138	0.0058	0.0080
27	0.0138	0.0058	0.0080
28	0.0138	0.0058	0.0080
29	0.0139	0.0058	0.0080
30	0.0139	0.0059	0.0081
31	0.0140	0.0059	0.0081
32	0.0140	0.0059	0.0081
33	0.0141	0.0059	0.0081
34	0.0141	0.0059	0.0082
35	0.0141	0.0059	0.0082
36	0.0142	0.0060	0.0082
37	0.0142	0.0060	0.0082
38	0.0143	0.0060	0.0083
39	0.0143	0.0060	0.0083
40	0.0143	0.0060	0.0083
41	0.0144	0.0061	0.0083
42	0.0144	0.0061	0.0084
43	0.0145	0.0061	0.0084
44	0.0145	0.0061	0.0084
45	0.0146	0.0061	0.0084
46	0.0146	0.0062	0.0085
47	0.0147	0.0062	0.0085
48	0.0147	0.0062	0.0085
49	0.0148	0.0062	0.0086
50	0.0148	0.0062	0.0086
51	0.0149	0.0063	0.0086
52	0.0149	0.0063	0.0086
53	0.0150	0.0063	0.0087
54	0.0150	0.0063	0.0087
55	0.0151	0.0063	0.0087
56	0.0151	0.0064	0.0088
57	0.0152	0.0064	0.0088
58	0.0152	0.0064	0.0088
59	0.0153	0.0064	0.0089
60	0.0153	0.0064	0.0089
61	0.0154	0.0065	0.0089
62	0.0154	0.0065	0.0089
63	0.0155	0.0065	0.0090
64	0.0155	0.0065	0.0090
65	0.0156	0.0066	0.0090
66	0.0157	0.0066	0.0091
67	0.0157	0.0066	0.0091
68	0.0158	0.0066	0.0091
69	0.0159	0.0067	0.0092
70	0.0159	0.0067	0.0092
71	0.0160	0.0067	0.0093
72	0.0160	0.0067	0.0093
73	0.0161	0.0068	0.0093
74	0.0162	0.0068	0.0094

75	0.0162	0.0068	0.0094
76	0.0163	0.0069	0.0094
77	0.0164	0.0069	0.0095
78	0.0164	0.0069	0.0095
79	0.0165	0.0069	0.0096
80	0.0166	0.0070	0.0096
81	0.0166	0.0070	0.0096
82	0.0167	0.0070	0.0097
83	0.0168	0.0071	0.0097
84	0.0168	0.0071	0.0098
85	0.0169	0.0071	0.0098
86	0.0170	0.0071	0.0098
87	0.0171	0.0072	0.0099
88	0.0171	0.0072	0.0099
89	0.0172	0.0073	0.0100
90	0.0173	0.0073	0.0100
91	0.0174	0.0073	0.0101
92	0.0175	0.0073	0.0101
93	0.0176	0.0074	0.0102
94	0.0176	0.0074	0.0102
95	0.0177	0.0075	0.0103
96	0.0178	0.0075	0.0103
97	0.0179	0.0075	0.0104
98	0.0180	0.0076	0.0104
99	0.0181	0.0076	0.0105
100	0.0182	0.0076	0.0105
101	0.0183	0.0077	0.0106
102	0.0183	0.0077	0.0106
103	0.0185	0.0078	0.0107
104	0.0185	0.0078	0.0107
105	0.0187	0.0079	0.0108
106	0.0187	0.0079	0.0109
107	0.0189	0.0079	0.0109
108	0.0189	0.0080	0.0110
109	0.0191	0.0080	0.0111
110	0.0192	0.0081	0.0111
111	0.0193	0.0081	0.0112
112	0.0194	0.0082	0.0112
113	0.0195	0.0082	0.0113
114	0.0196	0.0083	0.0114
115	0.0198	0.0083	0.0115
116	0.0199	0.0084	0.0115
117	0.0200	0.0084	0.0116
118	0.0201	0.0085	0.0116
119	0.0203	0.0085	0.0117
120	0.0204	0.0086	0.0118
121	0.0205	0.0086	0.0119
122	0.0206	0.0087	0.0120
123	0.0208	0.0088	0.0121
124	0.0209	0.0088	0.0121
125	0.0211	0.0089	0.0122
126	0.0212	0.0089	0.0123
127	0.0214	0.0090	0.0124
128	0.0215	0.0091	0.0125

129	0.0217	0.0091	0.0126
130	0.0218	0.0092	0.0126
131	0.0221	0.0093	0.0128
132	0.0222	0.0093	0.0128
133	0.0224	0.0094	0.0130
134	0.0225	0.0095	0.0130
135	0.0228	0.0096	0.0132
136	0.0229	0.0096	0.0133
137	0.0232	0.0097	0.0134
138	0.0233	0.0098	0.0135
139	0.0236	0.0099	0.0136
140	0.0237	0.0100	0.0137
141	0.0240	0.0101	0.0139
142	0.0241	0.0102	0.0140
143	0.0244	0.0103	0.0142
144	0.0246	0.0104	0.0142
145	0.0254	0.0107	0.0147
146	0.0256	0.0108	0.0148
147	0.0259	0.0109	0.0150
148	0.0261	0.0110	0.0151
149	0.0265	0.0111	0.0153
150	0.0267	0.0112	0.0154
151	0.0271	0.0114	0.0157
152	0.0273	0.0115	0.0158
153	0.0277	0.0116	0.0160
154	0.0279	0.0117	0.0162
155	0.0284	0.0119	0.0164
156	0.0286	0.0120	0.0166
157	0.0291	0.0122	0.0168
158	0.0293	0.0123	0.0170
159	0.0299	0.0126	0.0173
160	0.0301	0.0127	0.0175
161	0.0307	0.0129	0.0178
162	0.0310	0.0131	0.0180
163	0.0317	0.0133	0.0183
164	0.0320	0.0135	0.0185
165	0.0327	0.0138	0.0189
166	0.0331	0.0139	0.0192
167	0.0339	0.0143	0.0196
168	0.0343	0.0144	0.0199
169	0.0352	0.0148	0.0204
170	0.0357	0.0150	0.0207
171	0.0367	0.0154	0.0212
172	0.0372	0.0157	0.0215
173	0.0383	0.0161	0.0222
174	0.0390	0.0164	0.0226
175	0.0403	0.0170	0.0233
176	0.0410	0.0173	0.0238
177	0.0426	0.0179	0.0247
178	0.0435	0.0183	0.0252
179	0.0454	0.0191	0.0263
180	0.0464	0.0195	0.0269
181	0.0488	0.0205	0.0283
182	0.0502	0.0211	0.0291

183	0.0533	0.0224	0.0309
184	0.0551	0.0232	0.0319
185	0.0444	0.0187	0.0257
186	0.0469	0.0198	0.0272
187	0.0533	0.0224	0.0309
188	0.0575	0.0242	0.0333
189	0.0693	0.0291	0.0401
190	0.0782	0.0329	0.0453
191	0.1117	0.0363	0.0755
192	0.1536	0.0363	0.1174
193	0.4809	0.0363	0.4446
194	0.0910	0.0363	0.0547
195	0.0626	0.0264	0.0363
196	0.0498	0.0210	0.0289
197	0.0571	0.0240	0.0331
198	0.0517	0.0217	0.0299
199	0.0476	0.0200	0.0276
200	0.0444	0.0187	0.0257
201	0.0418	0.0176	0.0242
202	0.0396	0.0167	0.0229
203	0.0378	0.0159	0.0219
204	0.0361	0.0152	0.0209
205	0.0347	0.0146	0.0201
206	0.0335	0.0141	0.0194
207	0.0324	0.0136	0.0187
208	0.0313	0.0132	0.0182
209	0.0304	0.0128	0.0176
210	0.0296	0.0125	0.0171
211	0.0288	0.0121	0.0167
212	0.0281	0.0118	0.0163
213	0.0275	0.0116	0.0159
214	0.0269	0.0113	0.0156
215	0.0263	0.0111	0.0152
216	0.0258	0.0108	0.0149
217	0.0248	0.0104	0.0143
218	0.0243	0.0102	0.0141
219	0.0238	0.0100	0.0138
220	0.0234	0.0099	0.0136
221	0.0230	0.0097	0.0133
222	0.0226	0.0095	0.0131
223	0.0223	0.0094	0.0129
224	0.0219	0.0092	0.0127
225	0.0216	0.0091	0.0125
226	0.0213	0.0090	0.0123
227	0.0210	0.0088	0.0122
228	0.0207	0.0087	0.0120
229	0.0205	0.0086	0.0118
230	0.0202	0.0085	0.0117
231	0.0199	0.0084	0.0115
232	0.0197	0.0083	0.0114
233	0.0195	0.0082	0.0113
234	0.0192	0.0081	0.0111
235	0.0190	0.0080	0.0110
236	0.0188	0.0079	0.0109

237	0.0186	0.0078	0.0108
238	0.0184	0.0077	0.0107
239	0.0182	0.0077	0.0106
240	0.0180	0.0076	0.0104
241	0.0179	0.0075	0.0103
242	0.0177	0.0074	0.0102
243	0.0175	0.0074	0.0101
244	0.0174	0.0073	0.0100
245	0.0172	0.0072	0.0100
246	0.0170	0.0072	0.0099
247	0.0169	0.0071	0.0098
248	0.0167	0.0070	0.0097
249	0.0166	0.0070	0.0096
250	0.0165	0.0069	0.0095
251	0.0163	0.0069	0.0095
252	0.0162	0.0068	0.0094
253	0.0161	0.0068	0.0093
254	0.0159	0.0067	0.0092
255	0.0158	0.0067	0.0092
256	0.0157	0.0066	0.0091
257	0.0156	0.0066	0.0090
258	0.0155	0.0065	0.0090
259	0.0154	0.0065	0.0089
260	0.0153	0.0064	0.0088
261	0.0151	0.0064	0.0088
262	0.0150	0.0063	0.0087
263	0.0149	0.0063	0.0087
264	0.0148	0.0062	0.0086
265	0.0147	0.0062	0.0085
266	0.0146	0.0062	0.0085
267	0.0146	0.0061	0.0084
268	0.0145	0.0061	0.0084
269	0.0144	0.0060	0.0083
270	0.0143	0.0060	0.0083
271	0.0142	0.0060	0.0082
272	0.0141	0.0059	0.0082
273	0.0140	0.0059	0.0081
274	0.0139	0.0059	0.0081
275	0.0139	0.0058	0.0080
276	0.0138	0.0058	0.0080
277	0.0137	0.0058	0.0079
278	0.0136	0.0057	0.0079
279	0.0136	0.0057	0.0079
280	0.0135	0.0057	0.0078
281	0.0134	0.0056	0.0078
282	0.0133	0.0056	0.0077
283	0.0133	0.0056	0.0077
284	0.0132	0.0056	0.0076
285	0.0131	0.0055	0.0076
286	0.0131	0.0055	0.0076
287	0.0130	0.0055	0.0075
288	0.0129	0.0054	0.0075

Total soil rain loss = 2.76(In)
Total effective rainfall = 4.29(In)
Peak flow rate in flood hydrograph = 32.12(CFS)

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24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	10.0	20.0	30.0	40.0
0+ 5	0.0004	0.06	Q				
0+10	0.0029	0.36	Q				
0+15	0.0084	0.80	Q				
0+20	0.0152	0.99	Q				
0+25	0.0225	1.06	VQ				
0+30	0.0299	1.07	VQ				
0+35	0.0373	1.08	VQ				
0+40	0.0448	1.09	VQ				
0+45	0.0523	1.09	VQ				
0+50	0.0599	1.09	VQ				
0+55	0.0674	1.10	VQ				
1+ 0	0.0750	1.10	VQ				
1+ 5	0.0826	1.10	VQ				
1+10	0.0902	1.10	VQ				
1+15	0.0978	1.11	VQ				
1+20	0.1054	1.11	VQ				
1+25	0.1131	1.11	|Q				
1+30	0.1208	1.12	|Q				
1+35	0.1285	1.12	|Q				
1+40	0.1362	1.12	|Q				
1+45	0.1440	1.13	|Q				
1+50	0.1517	1.13	|Q				
1+55	0.1595	1.13	|Q				
2+ 0	0.1673	1.13	|Q				
2+ 5	0.1752	1.14	|Q				
2+10	0.1830	1.14	|Q				
2+15	0.1909	1.14	|Q				
2+20	0.1988	1.15	|Q				
2+25	0.2067	1.15	|Q				
2+30	0.2147	1.15	|QV				
2+35	0.2227	1.16	|QV				
2+40	0.2307	1.16	|QV				
2+45	0.2387	1.16	|QV				
2+50	0.2467	1.17	|QV				
2+55	0.2548	1.17	|QV				
3+ 0	0.2629	1.17	|QV				
3+ 5	0.2710	1.18	|QV				
3+10	0.2791	1.18	|QV				
3+15	0.2873	1.19	|QV				
3+20	0.2955	1.19	|QV				
3+25	0.3037	1.19	|QV				

3+30	0.3119	1.20	|QV	|	|	|	|
3+35	0.3202	1.20	|Q V	|	|	|	|
3+40	0.3285	1.20	|Q V	|	|	|	|
3+45	0.3368	1.21	|Q V	|	|	|	|
3+50	0.3451	1.21	|Q V	|	|	|	|
3+55	0.3535	1.22	|Q V	|	|	|	|
4+ 0	0.3619	1.22	|Q V	|	|	|	|
4+ 5	0.3703	1.22	|Q V	|	|	|	|
4+10	0.3788	1.23	|Q V	|	|	|	|
4+15	0.3872	1.23	|Q V	|	|	|	|
4+20	0.3957	1.23	|Q V	|	|	|	|
4+25	0.4043	1.24	|Q V	|	|	|	|
4+30	0.4128	1.24	|Q V	|	|	|	|
4+35	0.4214	1.25	|Q V	|	|	|	|
4+40	0.4300	1.25	|Q V	|	|	|	|
4+45	0.4387	1.26	|Q V	|	|	|	|
4+50	0.4474	1.26	|Q V	|	|	|	|
4+55	0.4561	1.26	|Q V	|	|	|	|
5+ 0	0.4648	1.27	|Q V	|	|	|	|
5+ 5	0.4736	1.27	|Q V	|	|	|	|
5+10	0.4824	1.28	|Q V	|	|	|	|
5+15	0.4912	1.28	|Q V	|	|	|	|
5+20	0.5001	1.29	|Q V	|	|	|	|
5+25	0.5090	1.29	|Q V	|	|	|	|
5+30	0.5179	1.30	|Q V	|	|	|	|
5+35	0.5269	1.30	|Q V	|	|	|	|
5+40	0.5359	1.31	|Q V	|	|	|	|
5+45	0.5449	1.31	|Q V	|	|	|	|
5+50	0.5540	1.32	|Q V	|	|	|	|
5+55	0.5631	1.32	|Q V	|	|	|	|
6+ 0	0.5722	1.33	|Q V	|	|	|	|
6+ 5	0.5814	1.33	|Q V	|	|	|	|
6+10	0.5906	1.34	|Q V	|	|	|	|
6+15	0.5999	1.34	|Q V	|	|	|	|
6+20	0.6091	1.35	|Q V	|	|	|	|
6+25	0.6185	1.35	|Q V	|	|	|	|
6+30	0.6278	1.36	|Q V	|	|	|	|
6+35	0.6372	1.36	|Q V	|	|	|	|
6+40	0.6466	1.37	|Q V	|	|	|	|
6+45	0.6561	1.38	|Q V	|	|	|	|
6+50	0.6656	1.38	|Q V	|	|	|	|
6+55	0.6752	1.39	|Q V	|	|	|	|
7+ 0	0.6848	1.39	|Q V	|	|	|	|
7+ 5	0.6944	1.40	|Q V	|	|	|	|
7+10	0.7041	1.40	|Q V	|	|	|	|
7+15	0.7138	1.41	|Q V	|	|	|	|
7+20	0.7235	1.42	|Q V	|	|	|	|
7+25	0.7334	1.42	|Q V	|	|	|	|
7+30	0.7432	1.43	|Q V	|	|	|	|
7+35	0.7531	1.44	|Q V	|	|	|	|
7+40	0.7630	1.44	|Q V	|	|	|	|
7+45	0.7730	1.45	|Q V	|	|	|	|
7+50	0.7831	1.46	|Q V	|	|	|	|
7+55	0.7931	1.46	|Q V	|	|	|	|

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 8+ 0       0.8033      1.47  |Q     V  |          |          |          |
 8+ 5       0.8134      1.48  |Q     V  |          |          |          |
 8+10       0.8237      1.48  |Q     V  |          |          |          |
 8+15       0.8339      1.49  |Q     V  |          |          |          |
 8+20       0.8443      1.50  |Q     V  |          |          |          |
 8+25       0.8546      1.51  |Q      V |          |          |          |
 8+30       0.8651      1.51  |Q      V |          |          |          |
 8+35       0.8756      1.52  |Q      V |          |          |          |
 8+40       0.8861      1.53  |Q      V |          |          |          |
 8+45       0.8967      1.54  |Q      V |          |          |          |
 8+50       0.9074      1.55  |Q      V |          |          |          |
 8+55       0.9181      1.56  |Q      V |          |          |          |
 9+ 0       0.9288      1.56  |Q      V |          |          |          |
 9+ 5       0.9397      1.57  |Q      V |          |          |          |
 9+10       0.9506      1.58  |Q      V |          |          |          |
 9+15       0.9615      1.59  |Q       V|          |          |          |
 9+20       0.9725      1.60  |Q       V|          |          |          |
 9+25       0.9836      1.61  |Q       V|          |          |          |
 9+30       0.9947      1.62  |Q       V|          |          |          |
 9+35       1.0059      1.63  |Q       V|          |          |          |
 9+40       1.0172      1.64  |Q       V|          |          |          |
 9+45       1.0286      1.65  |Q       V|          |          |          |
 9+50       1.0400      1.66  |Q       V|          |          |          |
 9+55       1.0515      1.67  |Q       V|          |          |          |
10+ 0       1.0630      1.68  |Q       V|          |          |          |
10+ 5       1.0746      1.69  |Q        V          |          |          |
10+10       1.0863      1.70  |Q        V          |          |          |
10+15       1.0981      1.71  |Q        V          |          |          |
10+20       1.1100      1.72  |Q        V          |          |          |
10+25       1.1219      1.73  |Q        V          |          |          |
10+30       1.1340      1.75  |Q        V          |          |          |
10+35       1.1461      1.76  |Q        V          |          |          |
10+40       1.1583      1.77  |Q        V          |          |          |
10+45       1.1705      1.78  |Q        |V          |          |          |
10+50       1.1829      1.80  |Q        |V          |          |          |
10+55       1.1954      1.81  |Q        |V          |          |          |
11+ 0       1.2079      1.82  |Q        |V          |          |          |
11+ 5       1.2206      1.84  |Q        |V          |          |          |
11+10       1.2333      1.85  |Q        |V          |          |          |
11+15       1.2462      1.87  |Q        |V          |          |          |
11+20       1.2591      1.88  |Q        |V          |          |          |
11+25       1.2722      1.90  |Q        |V          |          |          |
11+30       1.2853      1.91  |Q        | V         |          |          |
11+35       1.2986      1.93  |Q        | V         |          |          |
11+40       1.3120      1.94  |Q        | V         |          |          |
11+45       1.3255      1.96  |Q        | V         |          |          |
11+50       1.3392      1.98  |Q        | V         |          |          |
11+55       1.3529      2.00  |Q        | V         |          |          |
12+ 0       1.3668      2.02  | Q       | V         |          |          |
12+ 5       1.3808      2.04  | Q       | V         |          |          |
12+10       1.3951      2.07  | Q       |  V        |          |          |
12+15       1.4096      2.11  | Q       |  V        |          |          |
12+20       1.4243      2.13  | Q       |  V        |          |          |
12+25       1.4391      2.16  | Q       |  V        |          |          |
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12+30	1.4541	2.18	Q	V			
12+35	1.4693	2.20	Q	V			
12+40	1.4847	2.23	Q	V			
12+45	1.5002	2.25	Q	V			
12+50	1.5159	2.28	Q	V			
12+55	1.5317	2.30	Q	V			
13+ 0	1.5478	2.33	Q	V			
13+ 5	1.5640	2.36	Q	V			
13+10	1.5805	2.39	Q	V			
13+15	1.5971	2.42	Q	V			
13+20	1.6140	2.45	Q	V			
13+25	1.6312	2.49	Q	V			
13+30	1.6485	2.52	Q	V			
13+35	1.6661	2.56	Q	V			
13+40	1.6840	2.59	Q	V			
13+45	1.7021	2.64	Q	V			
13+50	1.7206	2.68	Q	V			
13+55	1.7393	2.72	Q	V			
14+ 0	1.7584	2.77	Q	V			
14+ 5	1.7778	2.82	Q	V			
14+10	1.7975	2.87	Q	V			
14+15	1.8177	2.93	Q	V			
14+20	1.8383	2.99	Q	V			
14+25	1.8593	3.05	Q	V			
14+30	1.8807	3.12	Q	V			
14+35	1.9027	3.19	Q	V			
14+40	1.9252	3.27	Q	V			
14+45	1.9482	3.35	Q	V			
14+50	1.9719	3.44	Q	V			
14+55	1.9963	3.54	Q	V			
15+ 0	2.0215	3.65	Q	V			
15+ 5	2.0474	3.77	Q	V			
15+10	2.0743	3.91	Q	V			
15+15	2.1023	4.06	Q	V			
15+20	2.1314	4.23	Q	V			
15+25	2.1615	4.36	Q	V			
15+30	2.1907	4.24	Q	V			
15+35	2.2183	4.01	Q	V			
15+40	2.2467	4.12	Q	V			
15+45	2.2775	4.47	Q	V			
15+50	2.3121	5.03	Q	V			
15+55	2.3531	5.95	Q	V			
16+ 0	2.4083	8.01	Q	V			
16+ 5	2.5056	14.13	Q	V			
16+10	2.6979	27.92	Q	V			
16+15	2.9191	32.12	Q	V			
16+20	3.0414	17.76	Q	V			
16+25	3.1021	8.80	Q	V			
16+30	3.1406	5.60	Q	V			
16+35	3.1756	5.08	Q	V			
16+40	3.2052	4.30	Q	V			
16+45	3.2326	3.98	Q	V			
16+50	3.2582	3.72	Q	V			
16+55	3.2824	3.50	Q	V			

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17+ 0       3.3052      3.31  |  Q      |         |         |V        |
17+ 5       3.3269      3.16  |  Q      |         |         |V        |
17+10       3.3477      3.02  |  Q      |         |         |V        |
17+15       3.3677      2.90  | Q       |         |         |V        |
17+20       3.3869      2.79  | Q       |         |         |V        |
17+25       3.4055      2.70  | Q       |         |         | V       |
17+30       3.4236      2.62  | Q       |         |         | V       |
17+35       3.4410      2.54  | Q       |         |         | V       |
17+40       3.4580      2.47  | Q       |         |         | V       |
17+45       3.4746      2.40  | Q       |         |         | V       |
17+50       3.4908      2.35  | Q       |         |         | V       |
17+55       3.5065      2.29  | Q       |         |         | V       |
18+ 0       3.5220      2.24  | Q       |         |         |  V      |
18+ 5       3.5370      2.19  | Q       |         |         |  V      |
18+10       3.5517      2.13  | Q       |         |         |  V      |
18+15       3.5660      2.08  | Q       |         |         |  V      |
18+20       3.5800      2.03  | Q       |         |         |  V      |
18+25       3.5937      1.99  |Q        |         |         |  V      |
18+30       3.6071      1.95  |Q        |         |         |  V      |
18+35       3.6204      1.92  |Q        |         |         |   V     |
18+40       3.6334      1.89  |Q        |         |         |   V     |
18+45       3.6462      1.86  |Q        |         |         |   V     |
18+50       3.6588      1.83  |Q        |         |         |   V     |
18+55       3.6712      1.80  |Q        |         |         |   V     |
19+ 0       3.6834      1.78  |Q        |         |         |   V     |
19+ 5       3.6955      1.75  |Q        |         |         |   V     |
19+10       3.7074      1.73  |Q        |         |         |   V     |
19+15       3.7191      1.70  |Q        |         |         |   V     |
19+20       3.7307      1.68  |Q        |         |         |    V    |
19+25       3.7421      1.66  |Q        |         |         |    V    |
19+30       3.7534      1.64  |Q        |         |         |    V    |
19+35       3.7646      1.62  |Q        |         |         |    V    |
19+40       3.7757      1.60  |Q        |         |         |    V    |
19+45       3.7866      1.59  |Q        |         |         |    V    |
19+50       3.7974      1.57  |Q        |         |         |    V    |
19+55       3.8081      1.55  |Q        |         |         |    V    |
20+ 0       3.8186      1.53  |Q        |         |         |    V    |
20+ 5       3.8291      1.52  |Q        |         |         |     V   |
20+10       3.8394      1.50  |Q        |         |         |     V   |
20+15       3.8497      1.49  |Q        |         |         |     V   |
20+20       3.8598      1.47  |Q        |         |         |     V   |
20+25       3.8699      1.46  |Q        |         |         |     V   |
20+30       3.8798      1.45  |Q        |         |         |     V   |
20+35       3.8897      1.43  |Q        |         |         |     V   |
20+40       3.8995      1.42  |Q        |         |         |     V   |
20+45       3.9092      1.41  |Q        |         |         |     V   |
20+50       3.9188      1.40  |Q        |         |         |     V   |
20+55       3.9283      1.38  |Q        |         |         |     V   |
21+ 0       3.9378      1.37  |Q        |         |         |      V  |
21+ 5       3.9472      1.36  |Q        |         |         |      V  |
21+10       3.9565      1.35  |Q        |         |         |      V  |
21+15       3.9657      1.34  |Q        |         |         |      V  |
21+20       3.9748      1.33  |Q        |         |         |      V  |
21+25       3.9839      1.32  |Q        |         |         |      V  |
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   21+30       3.9929      1.31  |Q        |         |         |      V  |
   21+35       4.0019      1.30  |Q        |         |         |      V  |
   21+40       4.0108      1.29  |Q        |         |         |      V  |
   21+45       4.0196      1.28  |Q        |         |         |      V  |
   21+50       4.0283      1.27  |Q        |         |         |      V  |
   21+55       4.0370      1.26  |Q        |         |         |      V  |
   22+ 0       4.0457      1.25  |Q        |         |         |       V |
   22+ 5       4.0542      1.25  |Q        |         |         |       V |
   22+10       4.0627      1.24  |Q        |         |         |       V |
   22+15       4.0712      1.23  |Q        |         |         |       V |
   22+20       4.0796      1.22  |Q        |         |         |       V |
   22+25       4.0880      1.21  |Q        |         |         |       V |
   22+30       4.0963      1.21  |Q        |         |         |       V |
   22+35       4.1045      1.20  |Q        |         |         |       V |
   22+40       4.1127      1.19  |Q        |         |         |       V |
   22+45       4.1209      1.18  |Q        |         |         |       V |
   22+50       4.1290      1.18  |Q        |         |         |       V |
   22+55       4.1370      1.17  |Q        |         |         |       V |
   23+ 0       4.1450      1.16  |Q        |         |         |       V |
   23+ 5       4.1530      1.16  |Q        |         |         |        V|
   23+10       4.1609      1.15  |Q        |         |         |        V|
   23+15       4.1688      1.14  |Q        |         |         |        V|
   23+20       4.1766      1.14  |Q        |         |         |        V|
   23+25       4.1844      1.13  |Q        |         |         |        V|
   23+30       4.1921      1.12  |Q        |         |         |        V|
   23+35       4.1998      1.12  |Q        |         |         |        V|
   23+40       4.2074      1.11  |Q        |         |         |        V|
   23+45       4.2151      1.11  |Q        |         |         |        V|
   23+50       4.2226      1.10  |Q        |         |         |        V|
   23+55       4.2302      1.09  |Q        |         |         |        V|
   24+ 0       4.2377      1.09  |Q        |         |         |        V|
   24+ 5       4.2447      1.03  |Q        |         |         |        V|
   24+10       4.2497      0.72  Q         |         |         |        V|
   24+15       4.2516      0.28  Q         |         |         |        V|
   24+20       4.2522      0.08  Q         |         |         |        V|
   24+25       4.2523      0.02  Q         |         |         |        V|
   24+30       4.2524      0.01  Q         |         |         |        V|
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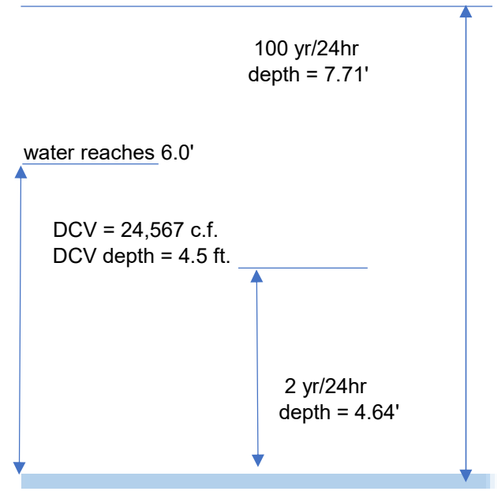
TRACT 20394
DETENTION BASIN
STAGE-VOLUME-DISCHARGE RELATIONSHIP

Basin	Elevation	Depth	Total Area	Volume	Volume	Cumulative Volume	Outflow see note #1	Outflow see note #2	Outflow see note #3	Cumulative Outflow
	(ft)	(ft)	(sf)	(cf)	(ac-ft)	(ac-ft)	(cfs)	(cfs)	(cfs)	(cfs)
	839.0	8.0	12835			1.522	0.119	0.220	13.970	14.309
				12168	0.2793					
	838.0	7.0	11500			1.242	0.106	0.220	8.850	9.176
				7281	0.1671					
	837.7	6.7	11112			1.075	0.103	0.220	4.600	4.923
				7518	0.1726					
	837.0	6.0	10367			0.903	0.096	0.220	0.000	0.316
				9806	0.2251					
	836.0	5.0	9244			0.678	0.086	0.220	0.000	0.306
				8658	0.1987					
	835.0	4.0	8071			0.479	0.075	0.220	0.000	0.295
				7493	0.1720					
	834.0	3.0	6914			0.307	0.064	0.220	0.000	0.284
				6317	0.1450					
	833.0	2.0	5719			0.162	0.053	0.220	0.000	0.273
				5099	0.1170					
	832.0	1.0	4478			0.045	0.041	0.220	0.000	0.261
				1948	0.0447					
	831.0	0.0	3313			0.000	0.031	0.220	0.000	0.251



Note #1: outflow with Infiltration Rate = 0.4 in/hr
Note #2: Project used 2 Drywells, Percolation Rate = 0.11 cfs / drywell (per Torrent Resources w/ infiltration rate 10 in/hr), Percolation Rate (Drywell) = 2 x 0.11 = 0.22 cfs
Note #3: outflow 3'L x 0.67'H opening when water reaches 6.0 ft at elevation 437.0
Infiltration Rate 0.4 " per hour (per Soil Report)

DRAFT

Maxwell® IV Drainage System Calculations Prepared on July 27, 2021

Project: **Example Project - California**

Contact: Dylan Nguyen at MDS Consulting - Irvine, CA

Given:

Measured Infiltration Rate	10.00	in/hr	(Provided by civil)
Safety Factor	1.00		
Design Infiltration Rate	10.00	in/hr	
Required Drawdown Time	96	hours	
Depth to Emergency Overflow	0	ft	
Min. Depth to Infiltration	10	ft	
Groundwater Depth for Design	80	ft	

Proposed:

Drywell Rock Shaft Diameter	4	ft
Drywell Chamber Depth	15	ft
Rock Porosity	40	%
Depth to Infiltration	11	ft
Drywell Bottom Depth	45	ft

Apply Safety Factor to get Design Rate.

$10.00 \ \frac{in}{hr} \div 1 = 10.00 \ \frac{in}{hr}$

Convert Design Rate from in/hr to ft/sec.

$10.00 \ \frac{in}{hr} \times \frac{1 \ ft}{12 \ in} \times \frac{1 \ hr}{3600 \ sec} = 0.000231 \ \frac{ft}{sec}$

A 4 foot diameter drywell provides 12.57 SF of infiltration area per foot of depth, plus 12.57 SF at the bottom.

For a 45 foot deep drywell, infiltration occurs between 11 feet and 45 feet below grade. This provides 34 feet of infiltration depth in addition to the bottom area. Infiltration area per drywell is calculated below.

$6 \ ft \times 18.85 \ \frac{ft^2}{ft} + 28 \ ft \times 12.57 \ \frac{ft^2}{ft} + 12.57 \ ft^2 = 478 \ ft^2$

Combine design rate with infiltration area to get flow (disposal) rate for each drywell.

$0.000231 \ \frac{ft}{sec} \times 478 \ ft^2 = 0.11054 \ \frac{ft^3}{sec}$

Volume of disposal for each drywell based on various time frames are included below.

96 hrs: 0.1105 CFS x 96 hours x $\frac{3600 \ sec}{1 \ hr}$ = 38,202 cubic feet of retained water disposed of.

3 hrs: 0.1105 CFS x 3 hours x $\frac{3600 \ sec}{1 \ hr}$ = 1,194 cubic feet of retained water disposed of.

Chamber diameter = 4 feet. Drywell rock shaft diameter = 4 feet.

Volume provided in each drywell with chamber depth of 15 feet.

$15 \ ft \times 12.57 \ ft^2 + 2 \ ft \times 28.27 \ ft^2 \times 40 \ \% + 28 \ ft \times 12.57 \ ft^2 \times 40 \ \% = 352 \ ft^3$

The MaxWell System is composed of 1 drywell(s) .

Total volume provided = 352 ft^3

Total 3 hour infiltration volume = 1,194 ft^3

Total 96 hour infiltration volume = 38,202 ft^3

Total infiltration flowrate = 0.11054 $\frac{ft^3}{sec}$

Torrent Resources (CA) Incorporated
9950 Alder Avenue
Bloomington, CA 92316
Phone 909-829-0740

FLOOD HYDROGRAPH ROUTING PROGRAM

Study date: 11/05/21

2-year / 24-hour

Program License Serial Number 4027

********** HYDROGRAPH INFORMATION **********

From study/file name: PostDev.rte
**********HYDROGRAPH DATA**********
Number of intervals = 294
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 11.922 (CFS)
Total volume = 1.072 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

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Process from Point/Station 0.000 to Point/Station 0.000
**** RETARDING BASIN ROUTING ****

User entry of depth-outflow-storage data

Total number of inflow hydrograph intervals = 294
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

Basin Depth	Storage	Outflow	(S-O*dt/2)	(S+O*dt/2)

(Ft.)	(Ac.Ft)	(CFS)	(Ac.Ft)	(Ac.Ft)
0.000	0.000	0.000	0.000	0.000
1.000	0.045	0.261	0.044	0.046
2.000	0.162	0.273	0.161	0.163
3.000	0.307	0.284	0.306	0.308
4.000	0.479	0.295	0.478	0.480
5.000	0.678	0.306	0.677	0.679
6.000	0.903	0.316	0.902	0.904
6.700	1.075	4.923	1.058	1.092
7.000	1.242	9.176	1.210	1.274
8.000	1.522	14.309	1.473	1.571

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	3.0	5.96	8.94	11.92	Depth (Ft.)
0.083	0.01	0.00	0.000	O	|	|	|	|	0.00
0.167	0.07	0.00	0.000	O	|	|	|	|	0.01
0.250	0.14	0.01	0.001	O	|	|	|	|	0.02
0.333	0.18	0.01	0.002	O	|	|	|	|	0.05
0.417	0.19	0.02	0.003	O	|	|	|	|	0.07
0.500	0.20	0.03	0.004	O	|	|	|	|	0.10
0.583	0.20	0.03	0.006	O	|	|	|	|	0.12
0.667	0.20	0.04	0.007	O	|	|	|	|	0.15
0.750	0.20	0.04	0.008	O	|	|	|	|	0.17
0.833	0.20	0.05	0.009	O	|	|	|	|	0.20
0.917	0.20	0.06	0.010	O	|	|	|	|	0.22
1.000	0.20	0.06	0.011	O	|	|	|	|	0.24
1.083	0.20	0.07	0.012	O	|	|	|	|	0.26
1.167	0.20	0.07	0.013	O	|	|	|	|	0.28
1.250	0.20	0.08	0.013	O	|	|	|	|	0.30
1.333	0.20	0.08	0.014	O	|	|	|	|	0.32
1.417	0.20	0.09	0.015	O	|	|	|	|	0.34
1.500	0.21	0.09	0.016	O	|	|	|	|	0.35
1.583	0.21	0.10	0.017	O	|	|	|	|	0.37
1.667	0.21	0.10	0.017	O	|	|	|	|	0.39
1.750	0.21	0.11	0.018	O	|	|	|	|	0.40
1.833	0.21	0.11	0.019	O	|	|	|	|	0.42
1.917	0.21	0.11	0.020	O	|	|	|	|	0.43
2.000	0.21	0.12	0.020	O	|	|	|	|	0.45
2.083	0.21	0.12	0.021	O	|	|	|	|	0.46
2.167	0.21	0.12	0.021	O	|	|	|	|	0.48
2.250	0.21	0.13	0.022	O	|	|	|	|	0.49
2.333	0.21	0.13	0.023	O	|	|	|	|	0.50
2.417	0.21	0.13	0.023	O	|	|	|	|	0.51
2.500	0.21	0.14	0.024	O	|	|	|	|	0.53
2.583	0.21	0.14	0.024	O	|	|	|	|	0.54
2.667	0.22	0.14	0.025	O	|	|	|	|	0.55
2.750	0.22	0.15	0.025	O	|	|	|	|	0.56
2.833	0.22	0.15	0.026	O	|	|	|	|	0.57

2.917	0.22	0.15	0.026	O	|	|	|	0.58
3.000	0.22	0.15	0.027	O	|	|	|	0.59
3.083	0.22	0.16	0.027	O	|	|	|	0.60
3.167	0.22	0.16	0.027	O	|	|	|	0.61
3.250	0.22	0.16	0.028	O	|	|	|	0.62
3.333	0.22	0.16	0.028	O	|	|	|	0.63
3.417	0.22	0.17	0.029	O	|	|	|	0.64
3.500	0.22	0.17	0.029	O	|	|	|	0.65
3.583	0.22	0.17	0.029	O	|	|	|	0.65
3.667	0.23	0.17	0.030	O	|	|	|	0.66
3.750	0.23	0.17	0.030	O	|	|	|	0.67
3.833	0.23	0.18	0.030	O	|	|	|	0.68
3.917	0.23	0.18	0.031	O	|	|	|	0.69
4.000	0.23	0.18	0.031	O	|	|	|	0.69
4.083	0.23	0.18	0.032	O	|	|	|	0.70
4.167	0.23	0.18	0.032	O	|	|	|	0.71
4.250	0.23	0.19	0.032	O	|	|	|	0.71
4.333	0.23	0.19	0.032	O	|	|	|	0.72
4.417	0.23	0.19	0.033	O	|	|	|	0.73
4.500	0.24	0.19	0.033	O	|	|	|	0.74
4.583	0.24	0.19	0.033	O	|	|	|	0.74
4.667	0.24	0.20	0.034	O	|	|	|	0.75
4.750	0.24	0.20	0.034	O	|	|	|	0.75
4.833	0.24	0.20	0.034	O	|	|	|	0.76
4.917	0.24	0.20	0.035	O	|	|	|	0.77
5.000	0.24	0.20	0.035	O	|	|	|	0.77
5.083	0.24	0.20	0.035	O	|	|	|	0.78
5.167	0.24	0.20	0.035	O	|	|	|	0.79
5.250	0.25	0.21	0.036	O	|	|	|	0.79
5.333	0.25	0.21	0.036	O	|	|	|	0.80
5.417	0.25	0.21	0.036	O	|	|	|	0.80
5.500	0.25	0.21	0.036	O	|	|	|	0.81
5.583	0.25	0.21	0.037	O	|	|	|	0.81
5.667	0.25	0.21	0.037	O	|	|	|	0.82
5.750	0.25	0.22	0.037	O	|	|	|	0.83
5.833	0.25	0.22	0.037	O	|	|	|	0.83
5.917	0.25	0.22	0.038	O	|	|	|	0.84
6.000	0.26	0.22	0.038	O	|	|	|	0.84
6.083	0.26	0.22	0.038	O	|	|	|	0.85
6.167	0.26	0.22	0.038	O	|	|	|	0.85
6.250	0.26	0.22	0.039	O	|	|	|	0.86
6.333	0.26	0.23	0.039	O	|	|	|	0.86
6.417	0.26	0.23	0.039	O	|	|	|	0.87
6.500	0.26	0.23	0.039	O	|	|	|	0.88
6.583	0.27	0.23	0.040	O	|	|	|	0.88
6.667	0.27	0.23	0.040	O	|	|	|	0.89
6.750	0.27	0.23	0.040	O	|	|	|	0.89
6.833	0.27	0.23	0.040	O	|	|	|	0.90
6.917	0.27	0.24	0.041	O	|	|	|	0.90
7.000	0.27	0.24	0.041	O	|	|	|	0.91
7.083	0.27	0.24	0.041	O	|	|	|	0.91
7.167	0.28	0.24	0.041	O	|	|	|	0.92
7.250	0.28	0.24	0.042	O	|	|	|	0.92
7.333	0.28	0.24	0.042	O	|	|	|	0.93

7.417	0.28	0.24	0.042	O	|	|	|	0.93
7.500	0.28	0.25	0.042	O	|	|	|	0.94
7.583	0.28	0.25	0.043	O	|	|	|	0.95
7.667	0.28	0.25	0.043	O	|	|	|	0.95
7.750	0.29	0.25	0.043	O	|	|	|	0.96
7.833	0.29	0.25	0.043	O	|	|	|	0.96
7.917	0.29	0.25	0.044	O	|	|	|	0.97
8.000	0.29	0.25	0.044	O	|	|	|	0.97
8.083	0.29	0.26	0.044	O	|	|	|	0.98
8.167	0.30	0.26	0.044	O	|	|	|	0.99
8.250	0.30	0.26	0.045	O	|	|	|	0.99
8.333	0.30	0.26	0.045	O	|	|	|	1.00
8.417	0.30	0.26	0.045	O	|	|	|	1.00
8.500	0.30	0.26	0.045	O	|	|	|	1.00
8.583	0.31	0.26	0.046	O	|	|	|	1.01
8.667	0.31	0.26	0.046	O	|	|	|	1.01
8.750	0.31	0.26	0.046	O	|	|	|	1.01
8.833	0.31	0.26	0.047	O	|	|	|	1.01
8.917	0.31	0.26	0.047	O	|	|	|	1.02
9.000	0.32	0.26	0.047	O	|	|	|	1.02
9.083	0.32	0.26	0.048	O	|	|	|	1.02
9.167	0.32	0.26	0.048	O	|	|	|	1.03
9.250	0.32	0.26	0.049	O	|	|	|	1.03
9.333	0.32	0.26	0.049	O	|	|	|	1.03
9.417	0.33	0.26	0.050	O	|	|	|	1.04
9.500	0.33	0.26	0.050	O	|	|	|	1.04
9.583	0.33	0.26	0.050	O	|	|	|	1.05
9.667	0.33	0.26	0.051	O	|	|	|	1.05
9.750	0.34	0.26	0.051	O	|	|	|	1.06
9.833	0.34	0.26	0.052	O	|	|	|	1.06
9.917	0.34	0.26	0.053	O	|	|	|	1.06
10.000	0.35	0.26	0.053	O	|	|	|	1.07
10.083	0.35	0.26	0.054	O	|	|	|	1.07
10.167	0.35	0.26	0.054	O	|	|	|	1.08
10.250	0.35	0.26	0.055	O	|	|	|	1.08
10.333	0.36	0.26	0.056	O	|	|	|	1.09
10.417	0.36	0.26	0.056	O	|	|	|	1.10
10.500	0.36	0.26	0.057	O	|	|	|	1.10
10.583	0.37	0.26	0.058	O	|	|	|	1.11
10.667	0.37	0.26	0.058	O	|	|	|	1.11
10.750	0.37	0.26	0.059	OI	|	|	|	1.12
10.833	0.38	0.26	0.060	OI	|	|	|	1.13
10.917	0.38	0.26	0.061	OI	|	|	|	1.13
11.000	0.38	0.26	0.062	OI	|	|	|	1.14
11.083	0.39	0.26	0.062	OI	|	|	|	1.15
11.167	0.39	0.26	0.063	OI	|	|	|	1.16
11.250	0.40	0.26	0.064	OI	|	|	|	1.16
11.333	0.40	0.26	0.065	OI	|	|	|	1.17
11.417	0.40	0.26	0.066	OI	|	|	|	1.18
11.500	0.41	0.26	0.067	OI	|	|	|	1.19
11.583	0.41	0.26	0.068	OI	|	|	|	1.20
11.667	0.42	0.26	0.069	OI	|	|	|	1.21
11.750	0.42	0.26	0.070	OI	|	|	|	1.22
11.833	0.43	0.26	0.071	OI	|	|	|	1.22

11.917	0.43	0.26	0.072	OI	|	|	|	|	1.23
12.000	0.44	0.26	0.074	OI	|	|	|	|	1.24
12.083	0.45	0.26	0.075	OI	|	|	|	|	1.25
12.167	0.49	0.26	0.076	OI	|	|	|	|	1.27
12.250	0.54	0.26	0.078	OI	|	|	|	|	1.28
12.333	0.57	0.26	0.080	OI	|	|	|	|	1.30
12.417	0.58	0.26	0.082	OI	|	|	|	|	1.32
12.500	0.59	0.27	0.084	OI	|	|	|	|	1.34
12.583	0.59	0.27	0.086	OI	|	|	|	|	1.35
12.667	0.60	0.27	0.089	OI	|	|	|	|	1.37
12.750	0.61	0.27	0.091	OI	|	|	|	|	1.39
12.833	0.62	0.27	0.093	OI	|	|	|	|	1.41
12.917	0.62	0.27	0.096	OI	|	|	|	|	1.43
13.000	0.63	0.27	0.098	OI	|	|	|	|	1.46
13.083	0.64	0.27	0.101	OI	|	|	|	|	1.48
13.167	0.65	0.27	0.104	OI	|	|	|	|	1.50
13.250	0.66	0.27	0.106	OI	|	|	|	|	1.52
13.333	0.67	0.27	0.109	OI	|	|	|	|	1.55
13.417	0.68	0.27	0.112	OI	|	|	|	|	1.57
13.500	0.69	0.27	0.115	OI	|	|	|	|	1.59
13.583	0.70	0.27	0.117	OI	|	|	|	|	1.62
13.667	0.71	0.27	0.120	OI	|	|	|	|	1.65
13.750	0.72	0.27	0.124	OI	|	|	|	|	1.67
13.833	0.73	0.27	0.127	OI	|	|	|	|	1.70
13.917	0.75	0.27	0.130	O I	|	|	|	|	1.73
14.000	0.76	0.27	0.133	O I	|	|	|	|	1.75
14.083	0.78	0.27	0.137	O I	|	|	|	|	1.78
14.167	0.79	0.27	0.140	O I	|	|	|	|	1.81
14.250	0.81	0.27	0.144	O I	|	|	|	|	1.85
14.333	0.83	0.27	0.148	O I	|	|	|	|	1.88
14.417	0.85	0.27	0.152	O I	|	|	|	|	1.91
14.500	0.87	0.27	0.156	O I	|	|	|	|	1.95
14.583	0.89	0.27	0.160	O I	|	|	|	|	1.98
14.667	0.91	0.27	0.164	O I	|	|	|	|	2.01
14.750	0.94	0.27	0.169	O I	|	|	|	|	2.05
14.833	0.97	0.27	0.173	O I	|	|	|	|	2.08
14.917	1.00	0.27	0.178	O I	|	|	|	|	2.11
15.000	1.03	0.27	0.183	O I	|	|	|	|	2.15
15.083	1.07	0.28	0.189	O I	|	|	|	|	2.18
15.167	1.11	0.28	0.194	O I	|	|	|	|	2.22
15.250	1.16	0.28	0.200	O I	|	|	|	|	2.26
15.333	1.21	0.28	0.206	O I	|	|	|	|	2.31
15.417	1.26	0.28	0.213	O I	|	|	|	|	2.35
15.500	1.26	0.28	0.220	O I	|	|	|	|	2.40
15.583	1.24	0.28	0.227	O I	|	|	|	|	2.45
15.667	1.29	0.28	0.233	O I	|	|	|	|	2.49
15.750	1.41	0.28	0.241	O I	|	|	|	|	2.54
15.833	1.59	0.28	0.249	O I	|	|	|	|	2.60
15.917	1.86	0.28	0.259	O I	|	|	|	|	2.67
16.000	2.32	0.28	0.272	O I	|	|	|	|	2.76
16.083	4.15	0.28	0.292	O	| I	|	|	|	2.90
16.167	9.61	0.29	0.337	O	|	|	|I	|	3.18
16.250	11.92	0.29	0.409	O	|	|	|	I	3.60
16.333	6.52	0.29	0.471	O	|	|I	|	|	3.95

16.417	3.06	0.30	0.502	O I	|	|	|	4.12
16.500	1.79	0.30	0.517	O I	|	|	|	4.19
16.583	1.57	0.30	0.526	O I	|	|	|	4.24
16.667	1.24	0.30	0.534	O I	|	|	|	4.28
16.750	1.14	0.30	0.540	O I	|	|	|	4.31
16.833	1.06	0.30	0.545	O I	|	|	|	4.33
16.917	0.99	0.30	0.550	O I	|	|	|	4.36
17.000	0.93	0.30	0.555	O I	|	|	|	4.38
17.083	0.88	0.30	0.559	O I	|	|	|	4.40
17.167	0.84	0.30	0.563	O I	|	|	|	4.42
17.250	0.80	0.30	0.567	O I	|	|	|	4.44
17.333	0.77	0.30	0.570	O I	|	|	|	4.46
17.417	0.74	0.30	0.573	OI	|	|	|	4.47
17.500	0.72	0.30	0.576	OI	|	|	|	4.49
17.583	0.69	0.30	0.579	OI	|	|	|	4.50
17.667	0.67	0.30	0.581	OI	|	|	|	4.51
17.750	0.65	0.30	0.584	OI	|	|	|	4.53
17.833	0.64	0.30	0.586	OI	|	|	|	4.54
17.917	0.62	0.30	0.589	OI	|	|	|	4.55
18.000	0.60	0.30	0.591	OI	|	|	|	4.56
18.083	0.58	0.30	0.593	OI	|	|	|	4.57
18.167	0.54	0.30	0.595	OI	|	|	|	4.58
18.250	0.48	0.30	0.596	OI	|	|	|	4.59
18.333	0.45	0.30	0.597	OI	|	|	|	4.59
18.417	0.43	0.30	0.598	OI	|	|	|	4.60
18.500	0.42	0.30	0.599	OI	|	|	|	4.60
18.583	0.41	0.30	0.600	OI	|	|	|	4.61
18.667	0.40	0.30	0.600	OI	|	|	|	4.61
18.750	0.39	0.30	0.601	OI	|	|	|	4.61
18.833	0.39	0.30	0.602	OI	|	|	|	4.62
18.917	0.38	0.30	0.602	OI	|	|	|	4.62
19.000	0.37	0.30	0.603	O	|	|	|	4.62
19.083	0.37	0.30	0.603	O	|	|	|	4.62
19.167	0.36	0.30	0.604	O	|	|	|	4.63
19.250	0.35	0.30	0.604	O	|	|	|	4.63
19.333	0.35	0.30	0.604	O	|	|	|	4.63
19.417	0.34	0.30	0.605	O	|	|	|	4.63
19.500	0.34	0.30	0.605	O	|	|	|	4.63
19.583	0.33	0.30	0.605	O	|	|	|	4.63
19.667	0.33	0.30	0.605	O	|	|	|	4.63
19.750	0.32	0.30	0.605	O	|	|	|	4.64
19.833	0.32	0.30	0.606	O	|	|	|	4.64
19.917	0.31	0.30	0.606	O	|	|	|	4.64
20.000	0.31	0.30	0.606	O	|	|	|	4.64
20.083	0.30	0.30	0.606	O	|	|	|	4.64
20.167	0.30	0.30	0.606	O	|	|	|	4.64
20.250	0.30	0.30	0.606	O	|	|	|	4.64
20.333	0.29	0.30	0.606	O	|	|	|	4.64
20.417	0.29	0.30	0.606	O	|	|	|	4.64
20.500	0.29	0.30	0.606	O	|	|	|	4.64
20.583	0.28	0.30	0.605	O	|	|	|	4.64
20.667	0.28	0.30	0.605	O	|	|	|	4.63
20.750	0.28	0.30	0.605	O	|	|	|	4.63
20.833	0.27	0.30	0.605	O	|	|	|	4.63

20.917	0.27	0.30	0.605	O	|	|	|	4.63
21.000	0.27	0.30	0.604	O	|	|	|	4.63
21.083	0.26	0.30	0.604	O	|	|	|	4.63
21.167	0.26	0.30	0.604	O	|	|	|	4.63
21.250	0.26	0.30	0.604	O	|	|	|	4.63
21.333	0.26	0.30	0.603	O	|	|	|	4.62
21.417	0.25	0.30	0.603	O	|	|	|	4.62
21.500	0.25	0.30	0.603	O	|	|	|	4.62
21.583	0.25	0.30	0.602	O	|	|	|	4.62
21.667	0.25	0.30	0.602	O	|	|	|	4.62
21.750	0.24	0.30	0.602	O	|	|	|	4.62
21.833	0.24	0.30	0.601	O	|	|	|	4.61
21.917	0.24	0.30	0.601	O	|	|	|	4.61
22.000	0.24	0.30	0.600	O	|	|	|	4.61
22.083	0.24	0.30	0.600	O	|	|	|	4.61
22.167	0.23	0.30	0.599	O	|	|	|	4.61
22.250	0.23	0.30	0.599	O	|	|	|	4.60
22.333	0.23	0.30	0.598	O	|	|	|	4.60
22.417	0.23	0.30	0.598	O	|	|	|	4.60
22.500	0.23	0.30	0.597	O	|	|	|	4.60
22.583	0.22	0.30	0.597	O	|	|	|	4.59
22.667	0.22	0.30	0.596	O	|	|	|	4.59
22.750	0.22	0.30	0.596	O	|	|	|	4.59
22.833	0.22	0.30	0.595	O	|	|	|	4.58
22.917	0.22	0.30	0.595	O	|	|	|	4.58
23.000	0.22	0.30	0.594	O	|	|	|	4.58
23.083	0.21	0.30	0.594	O	|	|	|	4.58
23.167	0.21	0.30	0.593	O	|	|	|	4.57
23.250	0.21	0.30	0.592	O	|	|	|	4.57
23.333	0.21	0.30	0.592	O	|	|	|	4.57
23.417	0.21	0.30	0.591	O	|	|	|	4.56
23.500	0.21	0.30	0.590	O	|	|	|	4.56
23.583	0.21	0.30	0.590	O	|	|	|	4.56
23.667	0.20	0.30	0.589	O	|	|	|	4.55
23.750	0.20	0.30	0.588	O	|	|	|	4.55
23.833	0.20	0.30	0.588	O	|	|	|	4.55
23.917	0.20	0.30	0.587	O	|	|	|	4.54
24.000	0.20	0.30	0.586	O	|	|	|	4.54
24.083	0.19	0.30	0.586	O	|	|	|	4.54
24.167	0.13	0.30	0.585	O	|	|	|	4.53
24.250	0.05	0.30	0.583	O	|	|	|	4.52
24.333	0.02	0.30	0.581	O	|	|	|	4.51
24.417	0.00	0.30	0.579	O	|	|	|	4.50
24.500	0.00	0.30	0.577	O	|	|	|	4.49
24.583	0.00	0.30	0.575	O	|	|	|	4.48
24.667	0.00	0.30	0.573	O	|	|	|	4.47
24.750	0.00	0.30	0.571	O	|	|	|	4.46
24.833	0.00	0.30	0.569	O	|	|	|	4.45
24.917	0.00	0.30	0.567	O	|	|	|	4.44
25.000	0.00	0.30	0.565	O	|	|	|	4.43
25.083	0.00	0.30	0.563	O	|	|	|	4.42
25.167	0.00	0.30	0.561	O	|	|	|	4.41
25.250	0.00	0.30	0.559	O	|	|	|	4.40
25.333	0.00	0.30	0.557	O	|	|	|	4.39

25.417	0.00	0.30	0.555	O	|	|	|	4.38
25.500	0.00	0.30	0.553	O	|	|	|	4.37
25.583	0.00	0.30	0.550	O	|	|	|	4.36
25.667	0.00	0.30	0.548	O	|	|	|	4.35
25.750	0.00	0.30	0.546	O	|	|	|	4.34
25.833	0.00	0.30	0.544	O	|	|	|	4.33
25.917	0.00	0.30	0.542	O	|	|	|	4.32
26.000	0.00	0.30	0.540	O	|	|	|	4.31
26.083	0.00	0.30	0.538	O	|	|	|	4.30
26.167	0.00	0.30	0.536	O	|	|	|	4.29
26.250	0.00	0.30	0.534	O	|	|	|	4.28
26.333	0.00	0.30	0.532	O	|	|	|	4.27
26.417	0.00	0.30	0.530	O	|	|	|	4.26
26.500	0.00	0.30	0.528	O	|	|	|	4.25
26.583	0.00	0.30	0.526	O	|	|	|	4.24
26.667	0.00	0.30	0.524	O	|	|	|	4.22
26.750	0.00	0.30	0.522	O	|	|	|	4.21
26.833	0.00	0.30	0.520	O	|	|	|	4.20
26.917	0.00	0.30	0.518	O	|	|	|	4.19
27.000	0.00	0.30	0.516	O	|	|	|	4.18
27.083	0.00	0.30	0.514	O	|	|	|	4.17
27.167	0.00	0.30	0.511	O	|	|	|	4.16
27.250	0.00	0.30	0.509	O	|	|	|	4.15
27.333	0.00	0.30	0.507	O	|	|	|	4.14
27.417	0.00	0.30	0.505	O	|	|	|	4.13
27.500	0.00	0.30	0.503	O	|	|	|	4.12
27.583	0.00	0.30	0.501	O	|	|	|	4.11
27.667	0.00	0.30	0.499	O	|	|	|	4.10
27.750	0.00	0.30	0.497	O	|	|	|	4.09
27.833	0.00	0.30	0.495	O	|	|	|	4.08
27.917	0.00	0.30	0.493	O	|	|	|	4.07
28.000	0.00	0.30	0.491	O	|	|	|	4.06
28.083	0.00	0.30	0.489	O	|	|	|	4.05
28.167	0.00	0.30	0.487	O	|	|	|	4.04
28.250	0.00	0.30	0.485	O	|	|	|	4.03
28.333	0.00	0.30	0.483	O	|	|	|	4.02
28.417	0.00	0.30	0.481	O	|	|	|	4.01
28.500	0.00	0.29	0.479	O	|	|	|	4.00
28.583	0.00	0.29	0.477	O	|	|	|	3.99
28.667	0.00	0.29	0.475	O	|	|	|	3.98
28.750	0.00	0.29	0.473	O	|	|	|	3.96
28.833	0.00	0.29	0.471	O	|	|	|	3.95
28.917	0.00	0.29	0.469	O	|	|	|	3.94
29.000	0.00	0.29	0.467	O	|	|	|	3.93
29.083	0.00	0.29	0.465	O	|	|	|	3.92
29.167	0.00	0.29	0.463	O	|	|	|	3.90
29.250	0.00	0.29	0.461	O	|	|	|	3.89
29.333	0.00	0.29	0.459	O	|	|	|	3.88
29.417	0.00	0.29	0.457	O	|	|	|	3.87
29.500	0.00	0.29	0.455	O	|	|	|	3.86
29.583	0.00	0.29	0.453	O	|	|	|	3.85
29.667	0.00	0.29	0.451	O	|	|	|	3.83
29.750	0.00	0.29	0.448	O	|	|	|	3.82
29.833	0.00	0.29	0.446	O	|	|	|	3.81

29.917	0.00	0.29	0.444	O	|	|	|	3.80
30.000	0.00	0.29	0.442	O	|	|	|	3.79
30.083	0.00	0.29	0.440	O	|	|	|	3.78
30.167	0.00	0.29	0.438	O	|	|	|	3.76
30.250	0.00	0.29	0.436	O	|	|	|	3.75
30.333	0.00	0.29	0.434	O	|	|	|	3.74
30.417	0.00	0.29	0.432	O	|	|	|	3.73
30.500	0.00	0.29	0.430	O	|	|	|	3.72
30.583	0.00	0.29	0.428	O	|	|	|	3.71
30.667	0.00	0.29	0.426	O	|	|	|	3.69
30.750	0.00	0.29	0.424	O	|	|	|	3.68
30.833	0.00	0.29	0.422	O	|	|	|	3.67
30.917	0.00	0.29	0.420	O	|	|	|	3.66
31.000	0.00	0.29	0.418	O	|	|	|	3.65
31.083	0.00	0.29	0.416	O	|	|	|	3.64
31.167	0.00	0.29	0.414	O	|	|	|	3.62
31.250	0.00	0.29	0.412	O	|	|	|	3.61
31.333	0.00	0.29	0.410	O	|	|	|	3.60
31.417	0.00	0.29	0.408	O	|	|	|	3.59
31.500	0.00	0.29	0.406	O	|	|	|	3.58
31.583	0.00	0.29	0.404	O	|	|	|	3.57
31.667	0.00	0.29	0.402	O	|	|	|	3.55
31.750	0.00	0.29	0.400	O	|	|	|	3.54
31.833	0.00	0.29	0.398	O	|	|	|	3.53
31.917	0.00	0.29	0.396	O	|	|	|	3.52
32.000	0.00	0.29	0.394	O	|	|	|	3.51
32.083	0.00	0.29	0.392	O	|	|	|	3.50
32.167	0.00	0.29	0.390	O	|	|	|	3.48
32.250	0.00	0.29	0.388	O	|	|	|	3.47
32.333	0.00	0.29	0.386	O	|	|	|	3.46
32.417	0.00	0.29	0.384	O	|	|	|	3.45
32.500	0.00	0.29	0.382	O	|	|	|	3.44
32.583	0.00	0.29	0.380	O	|	|	|	3.43
32.667	0.00	0.29	0.378	O	|	|	|	3.42
32.750	0.00	0.29	0.376	O	|	|	|	3.40
32.833	0.00	0.29	0.374	O	|	|	|	3.39
32.917	0.00	0.29	0.372	O	|	|	|	3.38
33.000	0.00	0.29	0.370	O	|	|	|	3.37
33.083	0.00	0.29	0.368	O	|	|	|	3.36
33.167	0.00	0.29	0.366	O	|	|	|	3.35
33.250	0.00	0.29	0.365	O	|	|	|	3.33
33.333	0.00	0.29	0.363	O	|	|	|	3.32
33.417	0.00	0.29	0.361	O	|	|	|	3.31
33.500	0.00	0.29	0.359	O	|	|	|	3.30
33.583	0.00	0.29	0.357	O	|	|	|	3.29
33.667	0.00	0.29	0.355	O	|	|	|	3.28
33.750	0.00	0.29	0.353	O	|	|	|	3.27
33.833	0.00	0.29	0.351	O	|	|	|	3.25
33.917	0.00	0.29	0.349	O	|	|	|	3.24
34.000	0.00	0.29	0.347	O	|	|	|	3.23
34.083	0.00	0.29	0.345	O	|	|	|	3.22
34.167	0.00	0.29	0.343	O	|	|	|	3.21
34.250	0.00	0.29	0.341	O	|	|	|	3.20
34.333	0.00	0.29	0.339	O	|	|	|	3.18

34.417	0.00	0.29	0.337	O	|	|	|	3.17
34.500	0.00	0.29	0.335	O	|	|	|	3.16
34.583	0.00	0.29	0.333	O	|	|	|	3.15
34.667	0.00	0.29	0.331	O	|	|	|	3.14
34.750	0.00	0.29	0.329	O	|	|	|	3.13
34.833	0.00	0.29	0.327	O	|	|	|	3.12
34.917	0.00	0.29	0.325	O	|	|	|	3.10
35.000	0.00	0.29	0.323	O	|	|	|	3.09
35.083	0.00	0.28	0.321	O	|	|	|	3.08
35.167	0.00	0.28	0.319	O	|	|	|	3.07
35.250	0.00	0.28	0.317	O	|	|	|	3.06
35.333	0.00	0.28	0.315	O	|	|	|	3.05
35.417	0.00	0.28	0.313	O	|	|	|	3.04
35.500	0.00	0.28	0.311	O	|	|	|	3.03
35.583	0.00	0.28	0.309	O	|	|	|	3.01
35.667	0.00	0.28	0.307	O	|	|	|	3.00
35.750	0.00	0.28	0.305	O	|	|	|	2.99
35.833	0.00	0.28	0.304	O	|	|	|	2.98
35.917	0.00	0.28	0.302	O	|	|	|	2.96
36.000	0.00	0.28	0.300	O	|	|	|	2.95
36.083	0.00	0.28	0.298	O	|	|	|	2.94
36.167	0.00	0.28	0.296	O	|	|	|	2.92
36.250	0.00	0.28	0.294	O	|	|	|	2.91
36.333	0.00	0.28	0.292	O	|	|	|	2.90
36.417	0.00	0.28	0.290	O	|	|	|	2.88
36.500	0.00	0.28	0.288	O	|	|	|	2.87
36.583	0.00	0.28	0.286	O	|	|	|	2.85
36.667	0.00	0.28	0.284	O	|	|	|	2.84
36.750	0.00	0.28	0.282	O	|	|	|	2.83
36.833	0.00	0.28	0.280	O	|	|	|	2.81
36.917	0.00	0.28	0.278	O	|	|	|	2.80
37.000	0.00	0.28	0.276	O	|	|	|	2.79
37.083	0.00	0.28	0.274	O	|	|	|	2.77
37.167	0.00	0.28	0.272	O	|	|	|	2.76
37.250	0.00	0.28	0.270	O	|	|	|	2.75
37.333	0.00	0.28	0.268	O	|	|	|	2.73
37.417	0.00	0.28	0.267	O	|	|	|	2.72
37.500	0.00	0.28	0.265	O	|	|	|	2.71
37.583	0.00	0.28	0.263	O	|	|	|	2.69
37.667	0.00	0.28	0.261	O	|	|	|	2.68
37.750	0.00	0.28	0.259	O	|	|	|	2.67
37.833	0.00	0.28	0.257	O	|	|	|	2.65
37.917	0.00	0.28	0.255	O	|	|	|	2.64
38.000	0.00	0.28	0.253	O	|	|	|	2.63
38.083	0.00	0.28	0.251	O	|	|	|	2.61
38.167	0.00	0.28	0.249	O	|	|	|	2.60
38.250	0.00	0.28	0.247	O	|	|	|	2.59
38.333	0.00	0.28	0.245	O	|	|	|	2.57
38.417	0.00	0.28	0.243	O	|	|	|	2.56
38.500	0.00	0.28	0.241	O	|	|	|	2.55
38.583	0.00	0.28	0.240	O	|	|	|	2.53
38.667	0.00	0.28	0.238	O	|	|	|	2.52
38.750	0.00	0.28	0.236	O	|	|	|	2.51
38.833	0.00	0.28	0.234	O	|	|	|	2.50

38.917	0.00	0.28	0.232	O	|	|	|	2.48
39.000	0.00	0.28	0.230	O	|	|	|	2.47
39.083	0.00	0.28	0.228	O	|	|	|	2.46
39.167	0.00	0.28	0.226	O	|	|	|	2.44
39.250	0.00	0.28	0.224	O	|	|	|	2.43
39.333	0.00	0.28	0.222	O	|	|	|	2.42
39.417	0.00	0.28	0.220	O	|	|	|	2.40
39.500	0.00	0.28	0.219	O	|	|	|	2.39
39.583	0.00	0.28	0.217	O	|	|	|	2.38
39.667	0.00	0.28	0.215	O	|	|	|	2.36
39.750	0.00	0.28	0.213	O	|	|	|	2.35
39.833	0.00	0.28	0.211	O	|	|	|	2.34
39.917	0.00	0.28	0.209	O	|	|	|	2.32
40.000	0.00	0.28	0.207	O	|	|	|	2.31
40.083	0.00	0.28	0.205	O	|	|	|	2.30
40.167	0.00	0.28	0.203	O	|	|	|	2.28
40.250	0.00	0.28	0.201	O	|	|	|	2.27
40.333	0.00	0.28	0.199	O	|	|	|	2.26
40.417	0.00	0.28	0.198	O	|	|	|	2.25
40.500	0.00	0.28	0.196	O	|	|	|	2.23
40.583	0.00	0.28	0.194	O	|	|	|	2.22
40.667	0.00	0.28	0.192	O	|	|	|	2.21
40.750	0.00	0.28	0.190	O	|	|	|	2.19
40.833	0.00	0.27	0.188	O	|	|	|	2.18
40.917	0.00	0.27	0.186	O	|	|	|	2.17
41.000	0.00	0.27	0.184	O	|	|	|	2.15
41.083	0.00	0.27	0.182	O	|	|	|	2.14
41.167	0.00	0.27	0.181	O	|	|	|	2.13
41.250	0.00	0.27	0.179	O	|	|	|	2.11
41.333	0.00	0.27	0.177	O	|	|	|	2.10
41.417	0.00	0.27	0.175	O	|	|	|	2.09
41.500	0.00	0.27	0.173	O	|	|	|	2.08
41.583	0.00	0.27	0.171	O	|	|	|	2.06
41.667	0.00	0.27	0.169	O	|	|	|	2.05
41.750	0.00	0.27	0.167	O	|	|	|	2.04
41.833	0.00	0.27	0.165	O	|	|	|	2.02
41.917	0.00	0.27	0.164	O	|	|	|	2.01
42.000	0.00	0.27	0.162	O	|	|	|	2.00
42.083	0.00	0.27	0.160	O	|	|	|	1.98
42.167	0.00	0.27	0.158	O	|	|	|	1.96
42.250	0.00	0.27	0.156	O	|	|	|	1.95
42.333	0.00	0.27	0.154	O	|	|	|	1.93
42.417	0.00	0.27	0.152	O	|	|	|	1.92
42.500	0.00	0.27	0.150	O	|	|	|	1.90
42.583	0.00	0.27	0.149	O	|	|	|	1.88
42.667	0.00	0.27	0.147	O	|	|	|	1.87
42.750	0.00	0.27	0.145	O	|	|	|	1.85
42.833	0.00	0.27	0.143	O	|	|	|	1.84
42.917	0.00	0.27	0.141	O	|	|	|	1.82
43.000	0.00	0.27	0.139	O	|	|	|	1.81
43.083	0.00	0.27	0.137	O	|	|	|	1.79
43.167	0.00	0.27	0.135	O	|	|	|	1.77
43.250	0.00	0.27	0.134	O	|	|	|	1.76
43.333	0.00	0.27	0.132	O	|	|	|	1.74

43.417	0.00	0.27	0.130	O	|	|	|	1.73
43.500	0.00	0.27	0.128	O	|	|	|	1.71
43.583	0.00	0.27	0.126	O	|	|	|	1.69
43.667	0.00	0.27	0.124	O	|	|	|	1.68
43.750	0.00	0.27	0.122	O	|	|	|	1.66
43.833	0.00	0.27	0.121	O	|	|	|	1.65
43.917	0.00	0.27	0.119	O	|	|	|	1.63
44.000	0.00	0.27	0.117	O	|	|	|	1.61
44.083	0.00	0.27	0.115	O	|	|	|	1.60
44.167	0.00	0.27	0.113	O	|	|	|	1.58
44.250	0.00	0.27	0.111	O	|	|	|	1.57
44.333	0.00	0.27	0.110	O	|	|	|	1.55
44.417	0.00	0.27	0.108	O	|	|	|	1.54
44.500	0.00	0.27	0.106	O	|	|	|	1.52
44.583	0.00	0.27	0.104	O	|	|	|	1.50
44.667	0.00	0.27	0.102	O	|	|	|	1.49
44.750	0.00	0.27	0.100	O	|	|	|	1.47
44.833	0.00	0.27	0.099	O	|	|	|	1.46
44.917	0.00	0.27	0.097	O	|	|	|	1.44
45.000	0.00	0.27	0.095	O	|	|	|	1.43
45.083	0.00	0.27	0.093	O	|	|	|	1.41
45.167	0.00	0.27	0.091	O	|	|	|	1.39
45.250	0.00	0.27	0.089	O	|	|	|	1.38
45.333	0.00	0.27	0.088	O	|	|	|	1.36
45.417	0.00	0.27	0.086	O	|	|	|	1.35
45.500	0.00	0.26	0.084	O	|	|	|	1.33
45.583	0.00	0.26	0.082	O	|	|	|	1.32
45.667	0.00	0.26	0.080	O	|	|	|	1.30
45.750	0.00	0.26	0.078	O	|	|	|	1.29
45.833	0.00	0.26	0.077	O	|	|	|	1.27
45.917	0.00	0.26	0.075	O	|	|	|	1.25
46.000	0.00	0.26	0.073	O	|	|	|	1.24
46.083	0.00	0.26	0.071	O	|	|	|	1.22
46.167	0.00	0.26	0.069	O	|	|	|	1.21
46.250	0.00	0.26	0.067	O	|	|	|	1.19
46.333	0.00	0.26	0.066	O	|	|	|	1.18
46.417	0.00	0.26	0.064	O	|	|	|	1.16
46.500	0.00	0.26	0.062	O	|	|	|	1.15
46.583	0.00	0.26	0.060	O	|	|	|	1.13
46.667	0.00	0.26	0.058	O	|	|	|	1.11
46.750	0.00	0.26	0.057	O	|	|	|	1.10
46.833	0.00	0.26	0.055	O	|	|	|	1.08
46.917	0.00	0.26	0.053	O	|	|	|	1.07
47.000	0.00	0.26	0.051	O	|	|	|	1.05
47.083	0.00	0.26	0.049	O	|	|	|	1.04
47.167	0.00	0.26	0.048	O	|	|	|	1.02
47.250	0.00	0.26	0.046	O	|	|	|	1.01
47.333	0.00	0.26	0.044	O	|	|	|	0.98
47.417	0.00	0.25	0.042	O	|	|	|	0.94
47.500	0.00	0.24	0.041	O	|	|	|	0.90
47.583	0.00	0.23	0.039	O	|	|	|	0.87
47.667	0.00	0.22	0.038	O	|	|	|	0.83
47.750	0.00	0.21	0.036	O	|	|	|	0.80
47.833	0.00	0.20	0.035	O	|	|	|	0.77

47.917	0.00	0.19	0.033	O	|	|	|	0.74
48.000	0.00	0.19	0.032	O	|	|	|	0.71
48.083	0.00	0.18	0.031	O	|	|	|	0.68
48.167	0.00	0.17	0.030	O	|	|	|	0.66
48.250	0.00	0.16	0.028	O	|	|	|	0.63
48.333	0.00	0.16	0.027	O	|	|	|	0.61
48.417	0.00	0.15	0.026	O	|	|	|	0.58
48.500	0.00	0.15	0.025	O	|	|	|	0.56
48.583	0.00	0.14	0.024	O	|	|	|	0.54
48.667	0.00	0.13	0.023	O	|	|	|	0.52
48.750	0.00	0.13	0.022	O	|	|	|	0.50
48.833	0.00	0.12	0.021	O	|	|	|	0.48
48.917	0.00	0.12	0.021	O	|	|	|	0.46
49.000	0.00	0.11	0.020	O	|	|	|	0.44
49.083	0.00	0.11	0.019	O	|	|	|	0.42
49.167	0.00	0.11	0.018	O	|	|	|	0.41
49.250	0.00	0.10	0.018	O	|	|	|	0.39
49.333	0.00	0.10	0.017	O	|	|	|	0.38

Remaining water in basin = 0.02 (Ac.Ft)

**********HYDROGRAPH DATA**********

Number of intervals = 592
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 0.302 (CFS)
Total volume = 1.055 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

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FLOOD HYDROGRAPH ROUTING PROGRAM

Study date: 11/05/21

100-year / 24-hour

Program License Serial Number 4027

********** HYDROGRAPH INFORMATION **********

From study/file name: PostDev.rte
**********HYDROGRAPH DATA**********
Number of intervals = 294
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 32.119 (CFS)
Total volume = 4.252 (Ac.Ft)
Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

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Process from Point/Station 0.000 to Point/Station 0.000
**** RETARDING BASIN ROUTING ****
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User entry of depth-outflow-storage data

Total number of inflow hydrograph intervals = 294
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

Basin Depth	Storage	Outflow	(S-O*dt/2)	(S+O*dt/2)

(Ft.)	(Ac.Ft)	(CFS)	(Ac.Ft)	(Ac.Ft)
0.000	0.000	0.000	0.000	0.000
1.000	0.045	0.261	0.044	0.046
2.000	0.162	0.273	0.161	0.163
3.000	0.307	0.284	0.306	0.308
4.000	0.479	0.295	0.478	0.480
5.000	0.678	0.306	0.677	0.679
6.000	0.903	0.316	0.902	0.904
6.700	1.075	4.923	1.058	1.092
7.000	1.242	9.176	1.210	1.274
8.000	1.522	14.309	1.473	1.571

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	8.0	16.06	24.09	32.12	Depth (Ft.)
0.083	0.06	0.00	0.000	O	|	|	|	|	0.00
0.167	0.36	0.01	0.002	O	|	|	|	|	0.04
0.250	0.80	0.03	0.005	O	|	|	|	|	0.12
0.333	0.99	0.07	0.011	O	|	|	|	|	0.25
0.417	1.06	0.10	0.018	OI	|	|	|	|	0.39
0.500	1.07	0.14	0.024	OI	|	|	|	|	0.54
0.583	1.08	0.18	0.031	OI	|	|	|	|	0.68
0.667	1.09	0.21	0.037	OI	|	|	|	|	0.82
0.750	1.09	0.25	0.043	OI	|	|	|	|	0.95
0.833	1.09	0.26	0.048	OI	|	|	|	|	1.03
0.917	1.10	0.26	0.054	OI	|	|	|	|	1.08
1.000	1.10	0.26	0.060	OI	|	|	|	|	1.13
1.083	1.10	0.26	0.066	OI	|	|	|	|	1.18
1.167	1.10	0.26	0.071	OI	|	|	|	|	1.23
1.250	1.11	0.26	0.077	OI	|	|	|	|	1.28
1.333	1.11	0.26	0.083	OI	|	|	|	|	1.33
1.417	1.11	0.27	0.089	OI	|	|	|	|	1.37
1.500	1.12	0.27	0.095	OI	|	|	|	|	1.42
1.583	1.12	0.27	0.101	OI	|	|	|	|	1.47
1.667	1.12	0.27	0.106	OI	|	|	|	|	1.53
1.750	1.13	0.27	0.112	OI	|	|	|	|	1.58
1.833	1.13	0.27	0.118	OI	|	|	|	|	1.63
1.917	1.13	0.27	0.124	OI	|	|	|	|	1.68
2.000	1.13	0.27	0.130	OI	|	|	|	|	1.73
2.083	1.14	0.27	0.136	OI	|	|	|	|	1.78
2.167	1.14	0.27	0.142	OI	|	|	|	|	1.83
2.250	1.14	0.27	0.148	OI	|	|	|	|	1.88
2.333	1.15	0.27	0.154	OI	|	|	|	|	1.93
2.417	1.15	0.27	0.160	OI	|	|	|	|	1.98
2.500	1.15	0.27	0.166	OI	|	|	|	|	2.03
2.583	1.16	0.27	0.172	OI	|	|	|	|	2.07
2.667	1.16	0.27	0.178	OI	|	|	|	|	2.11
2.750	1.16	0.27	0.184	OI	|	|	|	|	2.15
2.833	1.17	0.28	0.191	OI	|	|	|	|	2.20

2.917	1.17	0.28	0.197	OI	|	|	|	2.24
3.000	1.17	0.28	0.203	OI	|	|	|	2.28
3.083	1.18	0.28	0.209	OI	|	|	|	2.33
3.167	1.18	0.28	0.215	OI	|	|	|	2.37
3.250	1.19	0.28	0.222	OI	|	|	|	2.41
3.333	1.19	0.28	0.228	OI	|	|	|	2.45
3.417	1.19	0.28	0.234	OI	|	|	|	2.50
3.500	1.20	0.28	0.240	OI	|	|	|	2.54
3.583	1.20	0.28	0.247	OI	|	|	|	2.58
3.667	1.20	0.28	0.253	OI	|	|	|	2.63
3.750	1.21	0.28	0.259	OI	|	|	|	2.67
3.833	1.21	0.28	0.266	OI	|	|	|	2.72
3.917	1.22	0.28	0.272	OI	|	|	|	2.76
4.000	1.22	0.28	0.279	OI	|	|	|	2.81
4.083	1.22	0.28	0.285	OI	|	|	|	2.85
4.167	1.23	0.28	0.292	OI	|	|	|	2.89
4.250	1.23	0.28	0.298	OI	|	|	|	2.94
4.333	1.23	0.28	0.305	OI	|	|	|	2.98
4.417	1.24	0.28	0.311	OI	|	|	|	3.03
4.500	1.24	0.28	0.318	OI	|	|	|	3.06
4.583	1.25	0.29	0.325	OI	|	|	|	3.10
4.667	1.25	0.29	0.331	OI	|	|	|	3.14
4.750	1.26	0.29	0.338	OI	|	|	|	3.18
4.833	1.26	0.29	0.345	OI	|	|	|	3.22
4.917	1.26	0.29	0.351	OI	|	|	|	3.26
5.000	1.27	0.29	0.358	OI	|	|	|	3.30
5.083	1.27	0.29	0.365	OI	|	|	|	3.34
5.167	1.28	0.29	0.372	OI	|	|	|	3.38
5.250	1.28	0.29	0.378	OI	|	|	|	3.42
5.333	1.29	0.29	0.385	OI	|	|	|	3.46
5.417	1.29	0.29	0.392	OI	|	|	|	3.50
5.500	1.30	0.29	0.399	OI	|	|	|	3.54
5.583	1.30	0.29	0.406	OI	|	|	|	3.58
5.667	1.31	0.29	0.413	OI	|	|	|	3.62
5.750	1.31	0.29	0.420	OI	|	|	|	3.66
5.833	1.32	0.29	0.427	OI	|	|	|	3.70
5.917	1.32	0.29	0.434	OI	|	|	|	3.74
6.000	1.33	0.29	0.441	OI	|	|	|	3.78
6.083	1.33	0.29	0.448	OI	|	|	|	3.82
6.167	1.34	0.29	0.456	OI	|	|	|	3.86
6.250	1.34	0.29	0.463	OI	|	|	|	3.91
6.333	1.35	0.29	0.470	OI	|	|	|	3.95
6.417	1.35	0.29	0.477	OI	|	|	|	3.99
6.500	1.36	0.30	0.485	OI	|	|	|	4.03
6.583	1.36	0.30	0.492	OI	|	|	|	4.06
6.667	1.37	0.30	0.499	OI	|	|	|	4.10
6.750	1.38	0.30	0.507	OI	|	|	|	4.14
6.833	1.38	0.30	0.514	OI	|	|	|	4.18
6.917	1.39	0.30	0.522	OI	|	|	|	4.21
7.000	1.39	0.30	0.529	OI	|	|	|	4.25
7.083	1.40	0.30	0.537	OI	|	|	|	4.29
7.167	1.40	0.30	0.544	OI	|	|	|	4.33
7.250	1.41	0.30	0.552	OI	|	|	|	4.37
7.333	1.42	0.30	0.560	OI	|	|	|	4.41

7.417	1.42	0.30	0.567	OI				4.44
7.500	1.43	0.30	0.575	OI				4.48
7.583	1.44	0.30	0.583	OI				4.52
7.667	1.44	0.30	0.591	OI				4.56
7.750	1.45	0.30	0.599	OI				4.60
7.833	1.46	0.30	0.607	OI				4.64
7.917	1.46	0.30	0.615	OI				4.68
8.000	1.47	0.30	0.623	OI				4.72
8.083	1.48	0.30	0.631	OI				4.76
8.167	1.48	0.30	0.639	OI				4.80
8.250	1.49	0.30	0.647	OI				4.84
8.333	1.50	0.30	0.655	OI				4.88
8.417	1.51	0.31	0.663	OI				4.93
8.500	1.51	0.31	0.672	OI				4.97
8.583	1.52	0.31	0.680	OI				5.01
8.667	1.53	0.31	0.688	OI				5.05
8.750	1.54	0.31	0.697	OI				5.08
8.833	1.55	0.31	0.705	OI				5.12
8.917	1.56	0.31	0.714	OI				5.16
9.000	1.56	0.31	0.723	OI				5.20
9.083	1.57	0.31	0.731	OI				5.24
9.167	1.58	0.31	0.740	OI				5.28
9.250	1.59	0.31	0.749	OI				5.31
9.333	1.60	0.31	0.758	OI				5.35
9.417	1.61	0.31	0.767	OI				5.39
9.500	1.62	0.31	0.775	OI				5.43
9.583	1.63	0.31	0.785	OI				5.47
9.667	1.64	0.31	0.794	OI				5.51
9.750	1.65	0.31	0.803	OI				5.55
9.833	1.66	0.31	0.812	OI				5.60
9.917	1.67	0.31	0.821	OI				5.64
10.000	1.68	0.31	0.831	OI				5.68
10.083	1.69	0.31	0.840	OI				5.72
10.167	1.70	0.31	0.850	OI				5.76
10.250	1.71	0.31	0.859	OI				5.81
10.333	1.72	0.31	0.869	OI				5.85
10.417	1.73	0.31	0.879	OI				5.89
10.500	1.75	0.32	0.888	OI				5.94
10.583	1.76	0.32	0.898	OI				5.98
10.667	1.77	0.45	0.908	OI				6.02
10.750	1.78	0.67	0.916	OI				6.05
10.833	1.80	0.86	0.923	OI				6.08
10.917	1.81	1.02	0.929	|O				6.11
11.000	1.82	1.15	0.934	|O				6.13
11.083	1.84	1.27	0.939	|O				6.14
11.167	1.85	1.37	0.942	|O				6.16
11.250	1.87	1.45	0.945	|O				6.17
11.333	1.88	1.52	0.948	|O				6.18
11.417	1.90	1.58	0.950	|O				6.19
11.500	1.91	1.64	0.952	|O				6.20
11.583	1.93	1.68	0.954	|O				6.21
11.667	1.94	1.73	0.956	|O				6.21
11.750	1.96	1.77	0.957	|O				6.22
11.833	1.98	1.80	0.958	|O				6.23

11.917	2.00	1.83	0.960	O				6.23
12.000	2.02	1.86	0.961	OI				6.23
12.083	2.04	1.89	0.962	OI				6.24
12.167	2.07	1.92	0.963	OI				6.24
12.250	2.11	1.95	0.964	OI				6.25
12.333	2.13	1.97	0.965	OI				6.25
12.417	2.16	2.00	0.966	OI				6.26
12.500	2.18	2.03	0.967	O				6.26
12.583	2.20	2.06	0.968	O				6.26
12.667	2.23	2.09	0.969	O				6.27
12.750	2.25	2.11	0.970	O				6.27
12.833	2.28	2.14	0.971	O				6.28
12.917	2.30	2.16	0.972	O				6.28
13.000	2.33	2.19	0.973	O				6.28
13.083	2.36	2.22	0.974	O				6.29
13.167	2.39	2.24	0.975	O				6.29
13.250	2.42	2.27	0.976	O				6.30
13.333	2.45	2.30	0.977	O				6.30
13.417	2.49	2.33	0.978	O				6.31
13.500	2.52	2.36	0.979	O				6.31
13.583	2.56	2.39	0.980	O				6.31
13.667	2.59	2.42	0.982	O				6.32
13.750	2.64	2.45	0.983	O				6.32
13.833	2.68	2.49	0.984	O				6.33
13.917	2.72	2.52	0.985	O				6.34
14.000	2.77	2.56	0.987	O				6.34
14.083	2.82	2.60	0.988	O				6.35
14.167	2.87	2.64	0.990	O				6.35
14.250	2.93	2.68	0.991	O				6.36
14.333	2.99	2.73	0.993	O				6.37
14.417	3.05	2.78	0.995	OI				6.37
14.500	3.12	2.83	0.997	OI				6.38
14.583	3.19	2.88	0.999	OI				6.39
14.667	3.27	2.94	1.001	OI				6.40
14.750	3.35	3.00	1.003	OI				6.41
14.833	3.44	3.07	1.006	O				6.42
14.917	3.54	3.14	1.008	O				6.43
15.000	3.65	3.22	1.011	O				6.44
15.083	3.77	3.30	1.014	O				6.45
15.167	3.91	3.39	1.018	O				6.47
15.250	4.06	3.49	1.022	OI				6.48
15.333	4.23	3.60	1.026	OI				6.50
15.417	4.36	3.72	1.030	OI				6.52
15.500	4.24	3.82	1.034	OI				6.53
15.583	4.01	3.87	1.036	O				6.54
15.667	4.12	3.90	1.037	OI				6.55
15.750	4.47	3.97	1.039	OI				6.56
15.833	5.03	4.10	1.044	OI				6.58
15.917	5.95	4.34	1.053	OI				6.61
16.000	8.01	4.78	1.070	O I				6.68
16.083	14.13	5.80	1.110	O	I			6.76
16.167	27.92	8.26	1.206	O		I		6.94
16.250	32.12	11.08	1.346	O			I	7.37
16.333	17.76	12.73	1.436	O	I			7.69

16.417	8.80	12.80	1.439	| I O |	|	|	7.71
16.500	5.60	12.13	1.403	| I | O |	|	|	7.58
16.583	5.08	11.32	1.359	| I | O |	|	|	7.42
16.667	4.30	10.54	1.316	| I | O |	|	|	7.26
16.750	3.98	9.78	1.275	| I |O |	|	|	7.12
16.833	3.72	9.04	1.237	| I |O |	|	|	6.99
16.917	3.50	8.16	1.202	| I O |	|	|	6.93
17.000	3.31	7.39	1.172	| I O|	|	|	6.87
17.083	3.16	6.72	1.146	| I O |	|	|	6.83
17.167	3.02	6.14	1.123	| I O |	|	|	6.79
17.250	2.90	5.63	1.103	| I O |	|	|	6.75
17.333	2.79	5.18	1.085	| I O |	|	|	6.72
17.417	2.70	4.78	1.070	| I O |	|	|	6.68
17.500	2.62	4.42	1.056	| I O |	|	|	6.62
17.583	2.54	4.11	1.045	| I O |	|	|	6.58
17.667	2.47	3.84	1.035	| IO |	|	|	6.54
17.750	2.40	3.60	1.026	| IO |	|	|	6.50
17.833	2.35	3.39	1.018	| IO |	|	|	6.47
17.917	2.29	3.21	1.011	| IO |	|	|	6.44
18.000	2.24	3.05	1.005	| IO |	|	|	6.42
18.083	2.19	2.91	1.000	| O |	|	|	6.39
18.167	2.13	2.78	0.995	| O |	|	|	6.38
18.250	2.08	2.67	0.991	| O |	|	|	6.36
18.333	2.03	2.57	0.987	| O |	|	|	6.34
18.417	1.99	2.47	0.983	|IO |	|	|	6.33
18.500	1.95	2.39	0.980	|IO |	|	|	6.31
18.583	1.92	2.31	0.977	|IO |	|	|	6.30
18.667	1.89	2.24	0.975	|IO |	|	|	6.29
18.750	1.86	2.18	0.973	|IO |	|	|	6.28
18.833	1.83	2.12	0.970	|IO |	|	|	6.27
18.917	1.80	2.07	0.969	|IO |	|	|	6.27
19.000	1.78	2.02	0.967	|IO |	|	|	6.26
19.083	1.75	1.98	0.965	|O |	|	|	6.25
19.167	1.73	1.94	0.964	|O |	|	|	6.25
19.250	1.70	1.90	0.962	|O |	|	|	6.24
19.333	1.68	1.87	0.961	|O |	|	|	6.24
19.417	1.66	1.83	0.960	|O |	|	|	6.23
19.500	1.64	1.80	0.959	|O |	|	|	6.23
19.583	1.62	1.77	0.957	|O |	|	|	6.22
19.667	1.60	1.75	0.956	|O |	|	|	6.22
19.750	1.59	1.72	0.955	|O |	|	|	6.21
19.833	1.57	1.70	0.955	|O |	|	|	6.21
19.917	1.55	1.67	0.954	|O |	|	|	6.21
20.000	1.53	1.65	0.953	|O |	|	|	6.20
20.083	1.52	1.63	0.952	|O |	|	|	6.20
20.167	1.50	1.61	0.951	|O |	|	|	6.20
20.250	1.49	1.59	0.951	|O |	|	|	6.19
20.333	1.47	1.57	0.950	|O |	|	|	6.19
20.417	1.46	1.55	0.949	|O |	|	|	6.19
20.500	1.45	1.54	0.949	|O |	|	|	6.19
20.583	1.43	1.52	0.948	|O |	|	|	6.18
20.667	1.42	1.50	0.947	|O |	|	|	6.18
20.750	1.41	1.49	0.947	|O |	|	|	6.18
20.833	1.40	1.47	0.946	|O |	|	|	6.18

20.917	1.38	1.46	0.946	|O	|	|	|	6.17
21.000	1.37	1.45	0.945	|O	|	|	|	6.17
21.083	1.36	1.43	0.945	|O	|	|	|	6.17
21.167	1.35	1.42	0.944	|O	|	|	|	6.17
21.250	1.34	1.41	0.944	|O	|	|	|	6.17
21.333	1.33	1.39	0.943	|O	|	|	|	6.16
21.417	1.32	1.38	0.943	|O	|	|	|	6.16
21.500	1.31	1.37	0.942	|O	|	|	|	6.16
21.583	1.30	1.36	0.942	|O	|	|	|	6.16
21.667	1.29	1.35	0.942	|O	|	|	|	6.16
21.750	1.28	1.34	0.941	|O	|	|	|	6.16
21.833	1.27	1.33	0.941	|O	|	|	|	6.15
21.917	1.26	1.32	0.940	|O	|	|	|	6.15
22.000	1.25	1.31	0.940	|O	|	|	|	6.15
22.083	1.25	1.30	0.940	|O	|	|	|	6.15
22.167	1.24	1.29	0.939	|O	|	|	|	6.15
22.250	1.23	1.28	0.939	|O	|	|	|	6.15
22.333	1.22	1.27	0.939	|O	|	|	|	6.14
22.417	1.21	1.26	0.938	|O	|	|	|	6.14
22.500	1.21	1.25	0.938	|O	|	|	|	6.14
22.583	1.20	1.24	0.938	|O	|	|	|	6.14
22.667	1.19	1.24	0.937	|O	|	|	|	6.14
22.750	1.18	1.23	0.937	|O	|	|	|	6.14
22.833	1.18	1.22	0.937	|O	|	|	|	6.14
22.917	1.17	1.21	0.936	|O	|	|	|	6.14
23.000	1.16	1.20	0.936	|O	|	|	|	6.13
23.083	1.16	1.20	0.936	|O	|	|	|	6.13
23.167	1.15	1.19	0.936	|O	|	|	|	6.13
23.250	1.14	1.18	0.935	|O	|	|	|	6.13
23.333	1.14	1.17	0.935	|O	|	|	|	6.13
23.417	1.13	1.17	0.935	|O	|	|	|	6.13
23.500	1.12	1.16	0.935	|O	|	|	|	6.13
23.583	1.12	1.15	0.934	|O	|	|	|	6.13
23.667	1.11	1.15	0.934	|O	|	|	|	6.13
23.750	1.11	1.14	0.934	|O	|	|	|	6.13
23.833	1.10	1.13	0.934	|O	|	|	|	6.12
23.917	1.09	1.13	0.933	|O	|	|	|	6.12
24.000	1.09	1.12	0.933	|O	|	|	|	6.12
24.083	1.03	1.11	0.933	|O	|	|	|	6.12
24.167	0.72	1.07	0.931	IO	|	|	|	6.11
24.250	0.28	0.97	0.928	O	|	|	|	6.10
24.333	0.08	0.84	0.923	O	|	|	|	6.08
24.417	0.02	0.71	0.918	O	|	|	|	6.06
24.500	0.01	0.59	0.913	O	|	|	|	6.04
24.583	0.00	0.49	0.910	O	|	|	|	6.03
24.667	0.00	0.41	0.906	O	|	|	|	6.01
24.750	0.00	0.34	0.904	O	|	|	|	6.00
24.833	0.00	0.32	0.902	O	|	|	|	5.99
24.917	0.00	0.32	0.899	O	|	|	|	5.98
25.000	0.00	0.32	0.897	O	|	|	|	5.97
25.083	0.00	0.32	0.895	O	|	|	|	5.96
25.167	0.00	0.32	0.893	O	|	|	|	5.96
25.250	0.00	0.32	0.891	O	|	|	|	5.95
25.333	0.00	0.32	0.889	O	|	|	|	5.94

25.417	0.00	0.32	0.886	O	|	|	|	5.93
25.500	0.00	0.32	0.884	O	|	|	|	5.92
25.583	0.00	0.32	0.882	O	|	|	|	5.91
25.667	0.00	0.31	0.880	O	|	|	|	5.90
25.750	0.00	0.31	0.878	O	|	|	|	5.89
25.833	0.00	0.31	0.876	O	|	|	|	5.88
25.917	0.00	0.31	0.873	O	|	|	|	5.87
26.000	0.00	0.31	0.871	O	|	|	|	5.86
26.083	0.00	0.31	0.869	O	|	|	|	5.85
26.167	0.00	0.31	0.867	O	|	|	|	5.84
26.250	0.00	0.31	0.865	O	|	|	|	5.83
26.333	0.00	0.31	0.863	O	|	|	|	5.82
26.417	0.00	0.31	0.860	O	|	|	|	5.81
26.500	0.00	0.31	0.858	O	|	|	|	5.80
26.583	0.00	0.31	0.856	O	|	|	|	5.79
26.667	0.00	0.31	0.854	O	|	|	|	5.78
26.750	0.00	0.31	0.852	O	|	|	|	5.77
26.833	0.00	0.31	0.850	O	|	|	|	5.76
26.917	0.00	0.31	0.847	O	|	|	|	5.75
27.000	0.00	0.31	0.845	O	|	|	|	5.74
27.083	0.00	0.31	0.843	O	|	|	|	5.73
27.167	0.00	0.31	0.841	O	|	|	|	5.72
27.250	0.00	0.31	0.839	O	|	|	|	5.71
27.333	0.00	0.31	0.837	O	|	|	|	5.71
27.417	0.00	0.31	0.834	O	|	|	|	5.70
27.500	0.00	0.31	0.832	O	|	|	|	5.69
27.583	0.00	0.31	0.830	O	|	|	|	5.68
27.667	0.00	0.31	0.828	O	|	|	|	5.67
27.750	0.00	0.31	0.826	O	|	|	|	5.66
27.833	0.00	0.31	0.824	O	|	|	|	5.65
27.917	0.00	0.31	0.822	O	|	|	|	5.64
28.000	0.00	0.31	0.819	O	|	|	|	5.63
28.083	0.00	0.31	0.817	O	|	|	|	5.62
28.167	0.00	0.31	0.815	O	|	|	|	5.61
28.250	0.00	0.31	0.813	O	|	|	|	5.60
28.333	0.00	0.31	0.811	O	|	|	|	5.59
28.417	0.00	0.31	0.809	O	|	|	|	5.58
28.500	0.00	0.31	0.807	O	|	|	|	5.57
28.583	0.00	0.31	0.804	O	|	|	|	5.56
28.667	0.00	0.31	0.802	O	|	|	|	5.55
28.750	0.00	0.31	0.800	O	|	|	|	5.54
28.833	0.00	0.31	0.798	O	|	|	|	5.53
28.917	0.00	0.31	0.796	O	|	|	|	5.52
29.000	0.00	0.31	0.794	O	|	|	|	5.51
29.083	0.00	0.31	0.792	O	|	|	|	5.50
29.167	0.00	0.31	0.789	O	|	|	|	5.49
29.250	0.00	0.31	0.787	O	|	|	|	5.49
29.333	0.00	0.31	0.785	O	|	|	|	5.48
29.417	0.00	0.31	0.783	O	|	|	|	5.47
29.500	0.00	0.31	0.781	O	|	|	|	5.46
29.583	0.00	0.31	0.779	O	|	|	|	5.45
29.667	0.00	0.31	0.777	O	|	|	|	5.44
29.750	0.00	0.31	0.774	O	|	|	|	5.43
29.833	0.00	0.31	0.772	O	|	|	|	5.42

29.917	0.00	0.31	0.770	O	|	|	|	5.41
30.000	0.00	0.31	0.768	O	|	|	|	5.40
30.083	0.00	0.31	0.766	O	|	|	|	5.39
30.167	0.00	0.31	0.764	O	|	|	|	5.38
30.250	0.00	0.31	0.762	O	|	|	|	5.37
30.333	0.00	0.31	0.759	O	|	|	|	5.36
30.417	0.00	0.31	0.757	O	|	|	|	5.35
30.500	0.00	0.31	0.755	O	|	|	|	5.34
30.583	0.00	0.31	0.753	O	|	|	|	5.33
30.667	0.00	0.31	0.751	O	|	|	|	5.32
30.750	0.00	0.31	0.749	O	|	|	|	5.31
30.833	0.00	0.31	0.747	O	|	|	|	5.31
30.917	0.00	0.31	0.745	O	|	|	|	5.30
31.000	0.00	0.31	0.742	O	|	|	|	5.29
31.083	0.00	0.31	0.740	O	|	|	|	5.28
31.167	0.00	0.31	0.738	O	|	|	|	5.27
31.250	0.00	0.31	0.736	O	|	|	|	5.26
31.333	0.00	0.31	0.734	O	|	|	|	5.25
31.417	0.00	0.31	0.732	O	|	|	|	5.24
31.500	0.00	0.31	0.730	O	|	|	|	5.23
31.583	0.00	0.31	0.728	O	|	|	|	5.22
31.667	0.00	0.31	0.725	O	|	|	|	5.21
31.750	0.00	0.31	0.723	O	|	|	|	5.20
31.833	0.00	0.31	0.721	O	|	|	|	5.19
31.917	0.00	0.31	0.719	O	|	|	|	5.18
32.000	0.00	0.31	0.717	O	|	|	|	5.17
32.083	0.00	0.31	0.715	O	|	|	|	5.16
32.167	0.00	0.31	0.713	O	|	|	|	5.15
32.250	0.00	0.31	0.711	O	|	|	|	5.14
32.333	0.00	0.31	0.708	O	|	|	|	5.14
32.417	0.00	0.31	0.706	O	|	|	|	5.13
32.500	0.00	0.31	0.704	O	|	|	|	5.12
32.583	0.00	0.31	0.702	O	|	|	|	5.11
32.667	0.00	0.31	0.700	O	|	|	|	5.10
32.750	0.00	0.31	0.698	O	|	|	|	5.09
32.833	0.00	0.31	0.696	O	|	|	|	5.08
32.917	0.00	0.31	0.694	O	|	|	|	5.07
33.000	0.00	0.31	0.692	O	|	|	|	5.06
33.083	0.00	0.31	0.689	O	|	|	|	5.05
33.167	0.00	0.31	0.687	O	|	|	|	5.04
33.250	0.00	0.31	0.685	O	|	|	|	5.03
33.333	0.00	0.31	0.683	O	|	|	|	5.02
33.417	0.00	0.31	0.681	O	|	|	|	5.01
33.500	0.00	0.31	0.679	O	|	|	|	5.00
33.583	0.00	0.31	0.677	O	|	|	|	4.99
33.667	0.00	0.31	0.675	O	|	|	|	4.98
33.750	0.00	0.31	0.673	O	|	|	|	4.97
33.833	0.00	0.31	0.670	O	|	|	|	4.96
33.917	0.00	0.31	0.668	O	|	|	|	4.95
34.000	0.00	0.31	0.666	O	|	|	|	4.94
34.083	0.00	0.31	0.664	O	|	|	|	4.93
34.167	0.00	0.31	0.662	O	|	|	|	4.92
34.250	0.00	0.31	0.660	O	|	|	|	4.91
34.333	0.00	0.30	0.658	O	|	|	|	4.90

34.417	0.00	0.30	0.656	O	|	|	|	4.89
34.500	0.00	0.30	0.654	O	|	|	|	4.88
34.583	0.00	0.30	0.652	O	|	|	|	4.87
34.667	0.00	0.30	0.649	O	|	|	|	4.86
34.750	0.00	0.30	0.647	O	|	|	|	4.85
34.833	0.00	0.30	0.645	O	|	|	|	4.84
34.917	0.00	0.30	0.643	O	|	|	|	4.83
35.000	0.00	0.30	0.641	O	|	|	|	4.81
35.083	0.00	0.30	0.639	O	|	|	|	4.80
35.167	0.00	0.30	0.637	O	|	|	|	4.79
35.250	0.00	0.30	0.635	O	|	|	|	4.78
35.333	0.00	0.30	0.633	O	|	|	|	4.77
35.417	0.00	0.30	0.631	O	|	|	|	4.76
35.500	0.00	0.30	0.629	O	|	|	|	4.75
35.583	0.00	0.30	0.626	O	|	|	|	4.74
35.667	0.00	0.30	0.624	O	|	|	|	4.73
35.750	0.00	0.30	0.622	O	|	|	|	4.72
35.833	0.00	0.30	0.620	O	|	|	|	4.71
35.917	0.00	0.30	0.618	O	|	|	|	4.70
36.000	0.00	0.30	0.616	O	|	|	|	4.69
36.083	0.00	0.30	0.614	O	|	|	|	4.68
36.167	0.00	0.30	0.612	O	|	|	|	4.67
36.250	0.00	0.30	0.610	O	|	|	|	4.66
36.333	0.00	0.30	0.608	O	|	|	|	4.65
36.417	0.00	0.30	0.606	O	|	|	|	4.64
36.500	0.00	0.30	0.604	O	|	|	|	4.63
36.583	0.00	0.30	0.601	O	|	|	|	4.62
36.667	0.00	0.30	0.599	O	|	|	|	4.60
36.750	0.00	0.30	0.597	O	|	|	|	4.59
36.833	0.00	0.30	0.595	O	|	|	|	4.58
36.917	0.00	0.30	0.593	O	|	|	|	4.57
37.000	0.00	0.30	0.591	O	|	|	|	4.56
37.083	0.00	0.30	0.589	O	|	|	|	4.55
37.167	0.00	0.30	0.587	O	|	|	|	4.54
37.250	0.00	0.30	0.585	O	|	|	|	4.53
37.333	0.00	0.30	0.583	O	|	|	|	4.52
37.417	0.00	0.30	0.581	O	|	|	|	4.51
37.500	0.00	0.30	0.579	O	|	|	|	4.50
37.583	0.00	0.30	0.577	O	|	|	|	4.49
37.667	0.00	0.30	0.575	O	|	|	|	4.48
37.750	0.00	0.30	0.572	O	|	|	|	4.47
37.833	0.00	0.30	0.570	O	|	|	|	4.46
37.917	0.00	0.30	0.568	O	|	|	|	4.45
38.000	0.00	0.30	0.566	O	|	|	|	4.44
38.083	0.00	0.30	0.564	O	|	|	|	4.43
38.167	0.00	0.30	0.562	O	|	|	|	4.42
38.250	0.00	0.30	0.560	O	|	|	|	4.41
38.333	0.00	0.30	0.558	O	|	|	|	4.40
38.417	0.00	0.30	0.556	O	|	|	|	4.39
38.500	0.00	0.30	0.554	O	|	|	|	4.38
38.583	0.00	0.30	0.552	O	|	|	|	4.37
38.667	0.00	0.30	0.550	O	|	|	|	4.36
38.750	0.00	0.30	0.548	O	|	|	|	4.35
38.833	0.00	0.30	0.546	O	|	|	|	4.33

38.917	0.00	0.30	0.544	O	|	|	|	4.32
39.000	0.00	0.30	0.542	O	|	|	|	4.31
39.083	0.00	0.30	0.539	O	|	|	|	4.30
39.167	0.00	0.30	0.537	O	|	|	|	4.29
39.250	0.00	0.30	0.535	O	|	|	|	4.28
39.333	0.00	0.30	0.533	O	|	|	|	4.27
39.417	0.00	0.30	0.531	O	|	|	|	4.26
39.500	0.00	0.30	0.529	O	|	|	|	4.25
39.583	0.00	0.30	0.527	O	|	|	|	4.24
39.667	0.00	0.30	0.525	O	|	|	|	4.23
39.750	0.00	0.30	0.523	O	|	|	|	4.22
39.833	0.00	0.30	0.521	O	|	|	|	4.21
39.917	0.00	0.30	0.519	O	|	|	|	4.20
40.000	0.00	0.30	0.517	O	|	|	|	4.19
40.083	0.00	0.30	0.515	O	|	|	|	4.18
40.167	0.00	0.30	0.513	O	|	|	|	4.17
40.250	0.00	0.30	0.511	O	|	|	|	4.16
40.333	0.00	0.30	0.509	O	|	|	|	4.15
40.417	0.00	0.30	0.507	O	|	|	|	4.14
40.500	0.00	0.30	0.505	O	|	|	|	4.13
40.583	0.00	0.30	0.503	O	|	|	|	4.12
40.667	0.00	0.30	0.501	O	|	|	|	4.11
40.750	0.00	0.30	0.499	O	|	|	|	4.10
40.833	0.00	0.30	0.496	O	|	|	|	4.09
40.917	0.00	0.30	0.494	O	|	|	|	4.08
41.000	0.00	0.30	0.492	O	|	|	|	4.07
41.083	0.00	0.30	0.490	O	|	|	|	4.06
41.167	0.00	0.30	0.488	O	|	|	|	4.05
41.250	0.00	0.30	0.486	O	|	|	|	4.04
41.333	0.00	0.30	0.484	O	|	|	|	4.03
41.417	0.00	0.30	0.482	O	|	|	|	4.02
41.500	0.00	0.30	0.480	O	|	|	|	4.01
41.583	0.00	0.29	0.478	O	|	|	|	4.00
41.667	0.00	0.29	0.476	O	|	|	|	3.98
41.750	0.00	0.29	0.474	O	|	|	|	3.97
41.833	0.00	0.29	0.472	O	|	|	|	3.96
41.917	0.00	0.29	0.470	O	|	|	|	3.95
42.000	0.00	0.29	0.468	O	|	|	|	3.94
42.083	0.00	0.29	0.466	O	|	|	|	3.92
42.167	0.00	0.29	0.464	O	|	|	|	3.91
42.250	0.00	0.29	0.462	O	|	|	|	3.90
42.333	0.00	0.29	0.460	O	|	|	|	3.89
42.417	0.00	0.29	0.458	O	|	|	|	3.88
42.500	0.00	0.29	0.456	O	|	|	|	3.87
42.583	0.00	0.29	0.454	O	|	|	|	3.85
42.667	0.00	0.29	0.452	O	|	|	|	3.84
42.750	0.00	0.29	0.450	O	|	|	|	3.83
42.833	0.00	0.29	0.448	O	|	|	|	3.82
42.917	0.00	0.29	0.446	O	|	|	|	3.81
43.000	0.00	0.29	0.444	O	|	|	|	3.80
43.083	0.00	0.29	0.442	O	|	|	|	3.78
43.167	0.00	0.29	0.440	O	|	|	|	3.77
43.250	0.00	0.29	0.438	O	|	|	|	3.76
43.333	0.00	0.29	0.436	O	|	|	|	3.75

43.417	0.00	0.29	0.434	O	|	|	|	3.74
43.500	0.00	0.29	0.432	O	|	|	|	3.72
43.583	0.00	0.29	0.430	O	|	|	|	3.71
43.667	0.00	0.29	0.428	O	|	|	|	3.70
43.750	0.00	0.29	0.426	O	|	|	|	3.69
43.833	0.00	0.29	0.424	O	|	|	|	3.68
43.917	0.00	0.29	0.422	O	|	|	|	3.67
44.000	0.00	0.29	0.420	O	|	|	|	3.65
44.083	0.00	0.29	0.418	O	|	|	|	3.64
44.167	0.00	0.29	0.416	O	|	|	|	3.63
44.250	0.00	0.29	0.414	O	|	|	|	3.62
44.333	0.00	0.29	0.412	O	|	|	|	3.61
44.417	0.00	0.29	0.410	O	|	|	|	3.60
44.500	0.00	0.29	0.408	O	|	|	|	3.59
44.583	0.00	0.29	0.406	O	|	|	|	3.57
44.667	0.00	0.29	0.404	O	|	|	|	3.56
44.750	0.00	0.29	0.402	O	|	|	|	3.55
44.833	0.00	0.29	0.400	O	|	|	|	3.54
44.917	0.00	0.29	0.398	O	|	|	|	3.53
45.000	0.00	0.29	0.396	O	|	|	|	3.52
45.083	0.00	0.29	0.394	O	|	|	|	3.50
45.167	0.00	0.29	0.392	O	|	|	|	3.49
45.250	0.00	0.29	0.390	O	|	|	|	3.48
45.333	0.00	0.29	0.388	O	|	|	|	3.47
45.417	0.00	0.29	0.386	O	|	|	|	3.46
45.500	0.00	0.29	0.384	O	|	|	|	3.45
45.583	0.00	0.29	0.382	O	|	|	|	3.43
45.667	0.00	0.29	0.380	O	|	|	|	3.42
45.750	0.00	0.29	0.378	O	|	|	|	3.41
45.833	0.00	0.29	0.376	O	|	|	|	3.40
45.917	0.00	0.29	0.374	O	|	|	|	3.39
46.000	0.00	0.29	0.372	O	|	|	|	3.38
46.083	0.00	0.29	0.370	O	|	|	|	3.36
46.167	0.00	0.29	0.368	O	|	|	|	3.35
46.250	0.00	0.29	0.366	O	|	|	|	3.34
46.333	0.00	0.29	0.364	O	|	|	|	3.33
46.417	0.00	0.29	0.362	O	|	|	|	3.32
46.500	0.00	0.29	0.360	O	|	|	|	3.31
46.583	0.00	0.29	0.358	O	|	|	|	3.30
46.667	0.00	0.29	0.356	O	|	|	|	3.28
46.750	0.00	0.29	0.354	O	|	|	|	3.27
46.833	0.00	0.29	0.352	O	|	|	|	3.26
46.917	0.00	0.29	0.350	O	|	|	|	3.25
47.000	0.00	0.29	0.348	O	|	|	|	3.24
47.083	0.00	0.29	0.346	O	|	|	|	3.23
47.167	0.00	0.29	0.344	O	|	|	|	3.22
47.250	0.00	0.29	0.342	O	|	|	|	3.20
47.333	0.00	0.29	0.340	O	|	|	|	3.19
47.417	0.00	0.29	0.338	O	|	|	|	3.18
47.500	0.00	0.29	0.336	O	|	|	|	3.17
47.583	0.00	0.29	0.334	O	|	|	|	3.16
47.667	0.00	0.29	0.332	O	|	|	|	3.15
47.750	0.00	0.29	0.330	O	|	|	|	3.14
47.833	0.00	0.29	0.328	O	|	|	|	3.12

47.917	0.00	0.29	0.326	O	|	|	|	3.11
48.000	0.00	0.29	0.324	O	|	|	|	3.10
48.083	0.00	0.28	0.322	O	|	|	|	3.09
48.167	0.00	0.28	0.320	O	|	|	|	3.08
48.250	0.00	0.28	0.318	O	|	|	|	3.07
48.333	0.00	0.28	0.317	O	|	|	|	3.06
48.417	0.00	0.28	0.315	O	|	|	|	3.04
48.500	0.00	0.28	0.313	O	|	|	|	3.03
48.583	0.00	0.28	0.311	O	|	|	|	3.02
48.667	0.00	0.28	0.309	O	|	|	|	3.01
48.750	0.00	0.28	0.307	O	|	|	|	3.00
48.833	0.00	0.28	0.305	O	|	|	|	2.98
48.917	0.00	0.28	0.303	O	|	|	|	2.97
49.000	0.00	0.28	0.301	O	|	|	|	2.96
49.083	0.00	0.28	0.299	O	|	|	|	2.94
49.167	0.00	0.28	0.297	O	|	|	|	2.93
49.250	0.00	0.28	0.295	O	|	|	|	2.92
49.333	0.00	0.28	0.293	O	|	|	|	2.90
49.417	0.00	0.28	0.291	O	|	|	|	2.89
49.500	0.00	0.28	0.289	O	|	|	|	2.88
49.583	0.00	0.28	0.287	O	|	|	|	2.86
49.667	0.00	0.28	0.285	O	|	|	|	2.85
49.750	0.00	0.28	0.283	O	|	|	|	2.84
49.833	0.00	0.28	0.281	O	|	|	|	2.82
49.917	0.00	0.28	0.279	O	|	|	|	2.81
50.000	0.00	0.28	0.278	O	|	|	|	2.80
50.083	0.00	0.28	0.276	O	|	|	|	2.78
50.167	0.00	0.28	0.274	O	|	|	|	2.77
50.250	0.00	0.28	0.272	O	|	|	|	2.76
50.333	0.00	0.28	0.270	O	|	|	|	2.74
50.417	0.00	0.28	0.268	O	|	|	|	2.73
50.500	0.00	0.28	0.266	O	|	|	|	2.72
50.583	0.00	0.28	0.264	O	|	|	|	2.70
50.667	0.00	0.28	0.262	O	|	|	|	2.69
50.750	0.00	0.28	0.260	O	|	|	|	2.68
50.833	0.00	0.28	0.258	O	|	|	|	2.66
50.917	0.00	0.28	0.256	O	|	|	|	2.65
51.000	0.00	0.28	0.254	O	|	|	|	2.64
51.083	0.00	0.28	0.252	O	|	|	|	2.62
51.167	0.00	0.28	0.250	O	|	|	|	2.61
51.250	0.00	0.28	0.249	O	|	|	|	2.60
51.333	0.00	0.28	0.247	O	|	|	|	2.58
51.417	0.00	0.28	0.245	O	|	|	|	2.57
51.500	0.00	0.28	0.243	O	|	|	|	2.56
51.583	0.00	0.28	0.241	O	|	|	|	2.54
51.667	0.00	0.28	0.239	O	|	|	|	2.53
51.750	0.00	0.28	0.237	O	|	|	|	2.52
51.833	0.00	0.28	0.235	O	|	|	|	2.50
51.917	0.00	0.28	0.233	O	|	|	|	2.49
52.000	0.00	0.28	0.231	O	|	|	|	2.48
52.083	0.00	0.28	0.229	O	|	|	|	2.46
52.167	0.00	0.28	0.227	O	|	|	|	2.45
52.250	0.00	0.28	0.225	O	|	|	|	2.44
52.333	0.00	0.28	0.224	O	|	|	|	2.42

52.417	0.00	0.28	0.222	O	|	|	|	2.41
52.500	0.00	0.28	0.220	O	|	|	|	2.40
52.583	0.00	0.28	0.218	O	|	|	|	2.39
52.667	0.00	0.28	0.216	O	|	|	|	2.37
52.750	0.00	0.28	0.214	O	|	|	|	2.36
52.833	0.00	0.28	0.212	O	|	|	|	2.35
52.917	0.00	0.28	0.210	O	|	|	|	2.33
53.000	0.00	0.28	0.208	O	|	|	|	2.32
53.083	0.00	0.28	0.206	O	|	|	|	2.31
53.167	0.00	0.28	0.205	O	|	|	|	2.29
53.250	0.00	0.28	0.203	O	|	|	|	2.28
53.333	0.00	0.28	0.201	O	|	|	|	2.27
53.417	0.00	0.28	0.199	O	|	|	|	2.25
53.500	0.00	0.28	0.197	O	|	|	|	2.24
53.583	0.00	0.28	0.195	O	|	|	|	2.23
53.667	0.00	0.28	0.193	O	|	|	|	2.21
53.750	0.00	0.28	0.191	O	|	|	|	2.20
53.833	0.00	0.28	0.189	O	|	|	|	2.19
53.917	0.00	0.27	0.187	O	|	|	|	2.18
54.000	0.00	0.27	0.186	O	|	|	|	2.16
54.083	0.00	0.27	0.184	O	|	|	|	2.15
54.167	0.00	0.27	0.182	O	|	|	|	2.14
54.250	0.00	0.27	0.180	O	|	|	|	2.12
54.333	0.00	0.27	0.178	O	|	|	|	2.11
54.417	0.00	0.27	0.176	O	|	|	|	2.10
54.500	0.00	0.27	0.174	O	|	|	|	2.08
54.583	0.00	0.27	0.172	O	|	|	|	2.07
54.667	0.00	0.27	0.170	O	|	|	|	2.06
54.750	0.00	0.27	0.169	O	|	|	|	2.05
54.833	0.00	0.27	0.167	O	|	|	|	2.03
54.917	0.00	0.27	0.165	O	|	|	|	2.02
55.000	0.00	0.27	0.163	O	|	|	|	2.01
55.083	0.00	0.27	0.161	O	|	|	|	1.99
55.167	0.00	0.27	0.159	O	|	|	|	1.98
55.250	0.00	0.27	0.157	O	|	|	|	1.96
55.333	0.00	0.27	0.155	O	|	|	|	1.94
55.417	0.00	0.27	0.154	O	|	|	|	1.93
55.500	0.00	0.27	0.152	O	|	|	|	1.91
55.583	0.00	0.27	0.150	O	|	|	|	1.90
55.667	0.00	0.27	0.148	O	|	|	|	1.88
55.750	0.00	0.27	0.146	O	|	|	|	1.86
55.833	0.00	0.27	0.144	O	|	|	|	1.85
55.917	0.00	0.27	0.142	O	|	|	|	1.83
56.000	0.00	0.27	0.140	O	|	|	|	1.82
56.083	0.00	0.27	0.139	O	|	|	|	1.80
56.167	0.00	0.27	0.137	O	|	|	|	1.78
56.250	0.00	0.27	0.135	O	|	|	|	1.77
56.333	0.00	0.27	0.133	O	|	|	|	1.75
56.417	0.00	0.27	0.131	O	|	|	|	1.74
56.500	0.00	0.27	0.129	O	|	|	|	1.72
56.583	0.00	0.27	0.127	O	|	|	|	1.70
56.667	0.00	0.27	0.126	O	|	|	|	1.69
56.750	0.00	0.27	0.124	O	|	|	|	1.67
56.833	0.00	0.27	0.122	O	|	|	|	1.66

56.917	0.00	0.27	0.120	O	|	|	|	1.64
57.000	0.00	0.27	0.118	O	|	|	|	1.63
57.083	0.00	0.27	0.116	O	|	|	|	1.61
57.167	0.00	0.27	0.114	O	|	|	|	1.59
57.250	0.00	0.27	0.113	O	|	|	|	1.58
57.333	0.00	0.27	0.111	O	|	|	|	1.56
57.417	0.00	0.27	0.109	O	|	|	|	1.55
57.500	0.00	0.27	0.107	O	|	|	|	1.53
57.583	0.00	0.27	0.105	O	|	|	|	1.51
57.667	0.00	0.27	0.103	O	|	|	|	1.50
57.750	0.00	0.27	0.102	O	|	|	|	1.48
57.833	0.00	0.27	0.100	O	|	|	|	1.47
57.917	0.00	0.27	0.098	O	|	|	|	1.45
58.000	0.00	0.27	0.096	O	|	|	|	1.44
58.083	0.00	0.27	0.094	O	|	|	|	1.42
58.167	0.00	0.27	0.092	O	|	|	|	1.40
58.250	0.00	0.27	0.091	O	|	|	|	1.39
58.333	0.00	0.27	0.089	O	|	|	|	1.37
58.417	0.00	0.27	0.087	O	|	|	|	1.36
58.500	0.00	0.27	0.085	O	|	|	|	1.34
58.583	0.00	0.26	0.083	O	|	|	|	1.33
58.667	0.00	0.26	0.081	O	|	|	|	1.31
58.750	0.00	0.26	0.080	O	|	|	|	1.30
58.833	0.00	0.26	0.078	O	|	|	|	1.28
58.917	0.00	0.26	0.076	O	|	|	|	1.26
59.000	0.00	0.26	0.074	O	|	|	|	1.25
59.083	0.00	0.26	0.072	O	|	|	|	1.23
59.167	0.00	0.26	0.070	O	|	|	|	1.22
59.250	0.00	0.26	0.069	O	|	|	|	1.20
59.333	0.00	0.26	0.067	O	|	|	|	1.19
59.417	0.00	0.26	0.065	O	|	|	|	1.17
59.500	0.00	0.26	0.063	O	|	|	|	1.16
59.583	0.00	0.26	0.061	O	|	|	|	1.14
59.667	0.00	0.26	0.060	O	|	|	|	1.13
59.750	0.00	0.26	0.058	O	|	|	|	1.11
59.833	0.00	0.26	0.056	O	|	|	|	1.09
59.917	0.00	0.26	0.054	O	|	|	|	1.08
60.000	0.00	0.26	0.052	O	|	|	|	1.06
60.083	0.00	0.26	0.051	O	|	|	|	1.05
60.167	0.00	0.26	0.049	O	|	|	|	1.03
60.250	0.00	0.26	0.047	O	|	|	|	1.02
60.333	0.00	0.26	0.045	O	|	|	|	1.00
60.417	0.00	0.25	0.043	O	|	|	|	0.97
60.500	0.00	0.24	0.042	O	|	|	|	0.93
60.583	0.00	0.23	0.040	O	|	|	|	0.89
60.667	0.00	0.22	0.039	O	|	|	|	0.86
60.750	0.00	0.21	0.037	O	|	|	|	0.82
60.833	0.00	0.21	0.036	O	|	|	|	0.79
60.917	0.00	0.20	0.034	O	|	|	|	0.76
61.000	0.00	0.19	0.033	O	|	|	|	0.73
61.083	0.00	0.18	0.032	O	|	|	|	0.70
61.167	0.00	0.18	0.030	O	|	|	|	0.67
61.250	0.00	0.17	0.029	O	|	|	|	0.65
61.333	0.00	0.16	0.028	O	|	|	|	0.62

61.417	0.00	0.16	0.027	O	|	|	|	0.60
61.500	0.00	0.15	0.026	O	|	|	|	0.57
61.583	0.00	0.14	0.025	O	|	|	|	0.55
61.667	0.00	0.14	0.024	O	|	|	|	0.53
61.750	0.00	0.13	0.023	O	|	|	|	0.51
61.833	0.00	0.13	0.022	O	|	|	|	0.49
61.917	0.00	0.12	0.021	O	|	|	|	0.47
62.000	0.00	0.12	0.020	O	|	|	|	0.45
62.083	0.00	0.11	0.020	O	|	|	|	0.43
62.167	0.00	0.11	0.019	O	|	|	|	0.42
62.250	0.00	0.10	0.018	O	|	|	|	0.40
62.333	0.00	0.10	0.017	O	|	|	|	0.39
62.417	0.00	0.10	0.017	O	|	|	|	0.37

Remaining water in basin = 0.02 (Ac.Ft)

**********HYDROGRAPH DATA**********

Number of intervals = 749
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 12.795 (CFS)
Total volume = 4.236 (Ac.Ft)

Status of hydrographs being held in storage

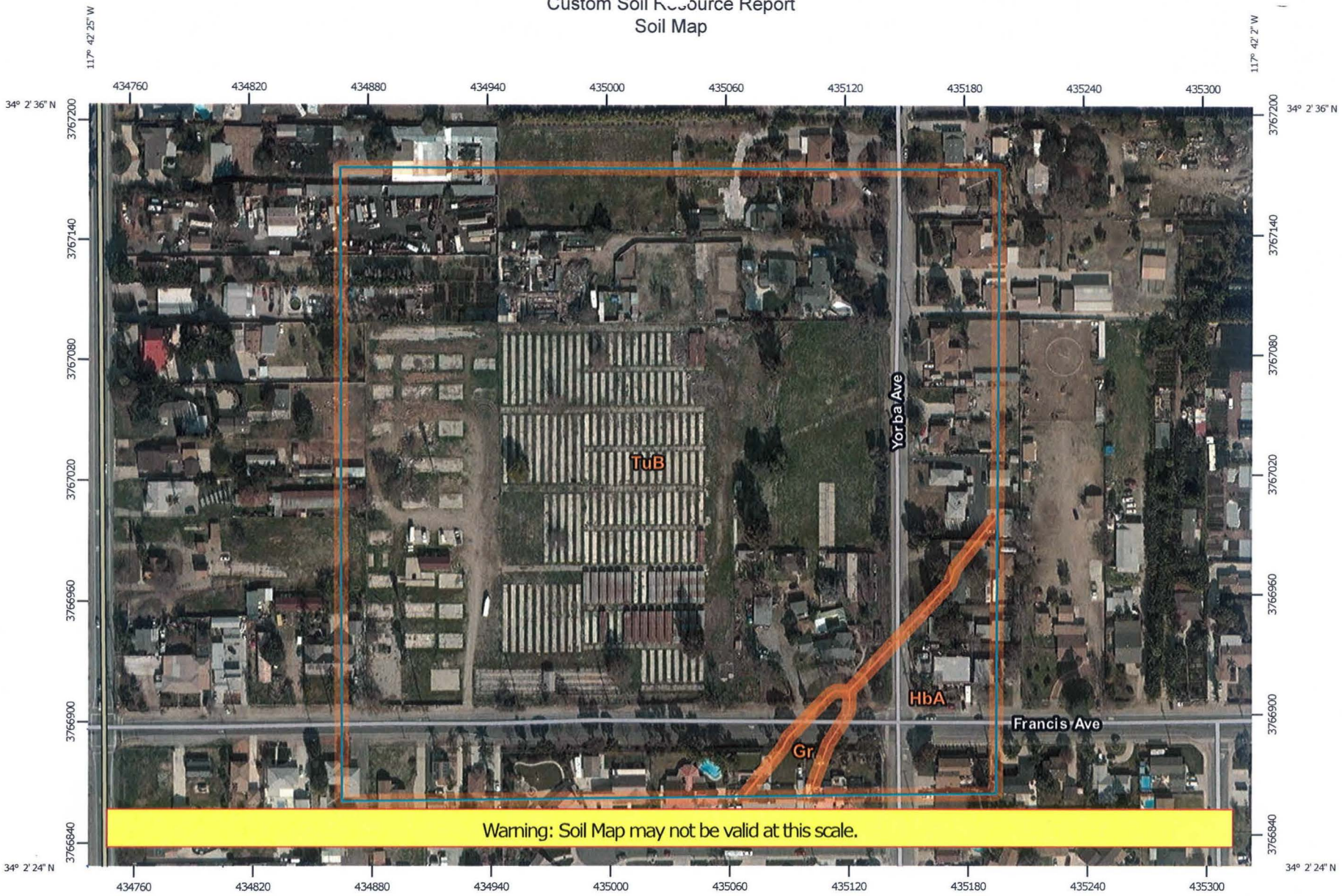
	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

****

E

E. Hydrologic Soils Group Map

- Precipitation
- Geotechnical Investigation
- Hydrology Maps


117° 42' 25" W
117° 42' 2" W
34° 2' 36" N
34° 2' 24" N
434760
434820
434880
434940
435000
435060
435120
435180
435240
435300
3767200
3767140
3767080
3767020
3766960
3766900
3766840
TuB
HbA
Gr
Yorba Ave
Francis Ave
Warning: Soil Map may not be valid at this scale.
Map Scale: 1:2,680 if printed on A landscape (11" x 8.5") sheet.
N
Meters
0 35 70 140 210
Feet
0 100 200 400 600
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

Available water storage in profile: Very high (about 20.3 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 3c
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Greenfield, sandy loam

Percent of map unit: 5 percent
Hydric soil rating: No

Hanford, steeper slopes

Percent of map unit: 5 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 5 percent
Hydric soil rating: No

TuB—Tujunga loamy sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: hcl1
Elevation: 10 to 2,500 feet
Mean annual precipitation: 10 to 25 inches
Mean annual air temperature: 59 to 64 degrees F
Frost-free period: 250 to 350 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Tujunga, loamy sand, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tujunga, Loamy Sand

Setting

Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

A - 0 to 6 inches: loamy sand
C1 - 6 to 18 inches: loamy sand
C2 - 18 to 60 inches: loamy sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Available water storage in profile: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Tujunga, gravelly loamy sand

Percent of map unit: 10 percent
Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Hanford, sandy loam

Percent of map unit: 5 percent
Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

MDS Consulting
Phone (949) 251-8821

17320 Redhill Avenue, Suite 350
Fax (949) 251-0516

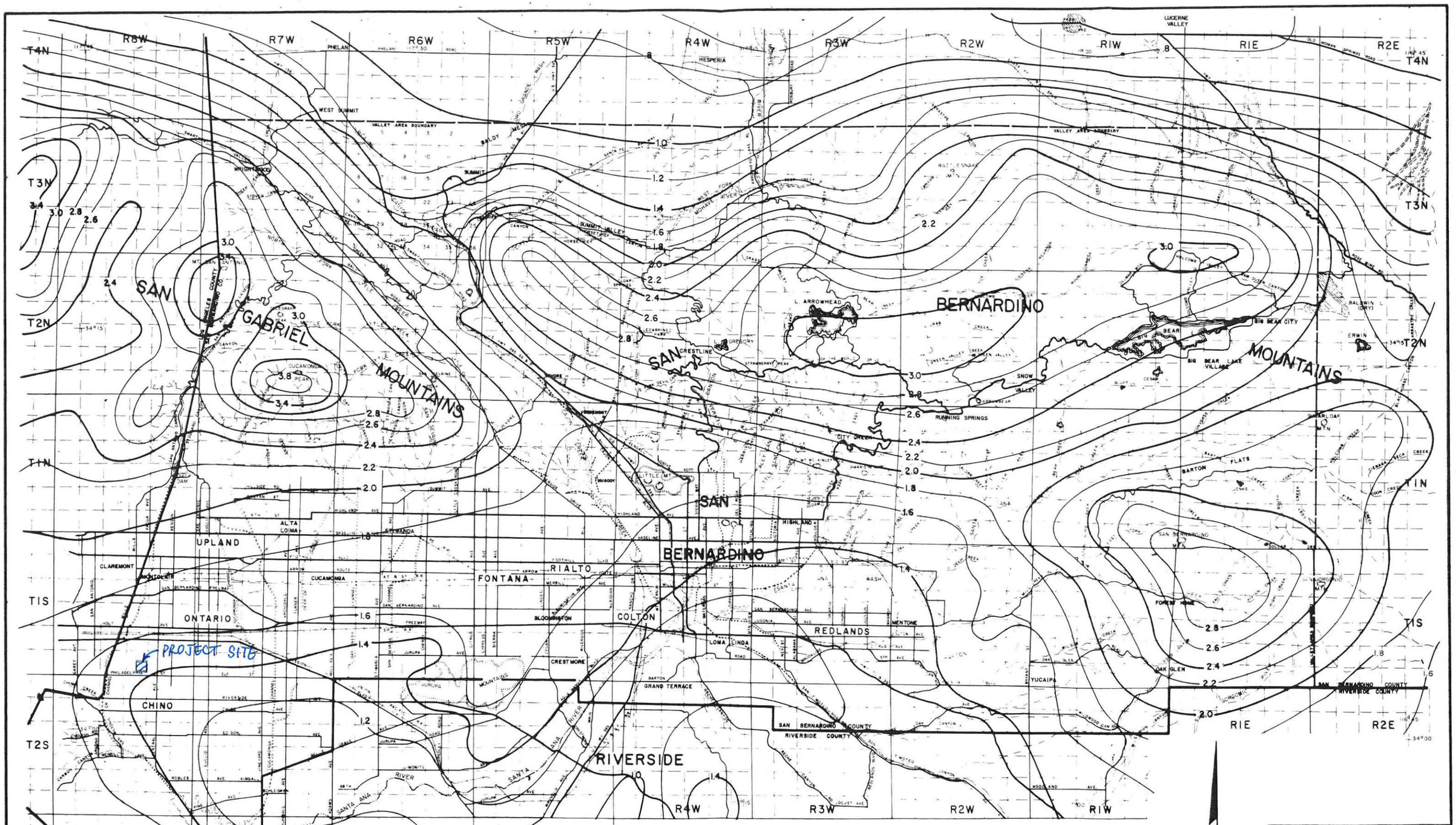
Irvine, CA 92614
Email:mdsirvine@mdsconsulting.net

Precipitation:

Storm Frequency.	Time Periods					
Year			1 (hr)		6 (hr)	24 (hr)
2			0.60		1.45	2.50
10			0.90			
100			1.30		3.40	7.05

Legend

1.30	Reading from Precipitation Chart
1.30	Calculated Precipitation (inches)



SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

REDUCED DRAWING
SCALE 1" = 4 MILES

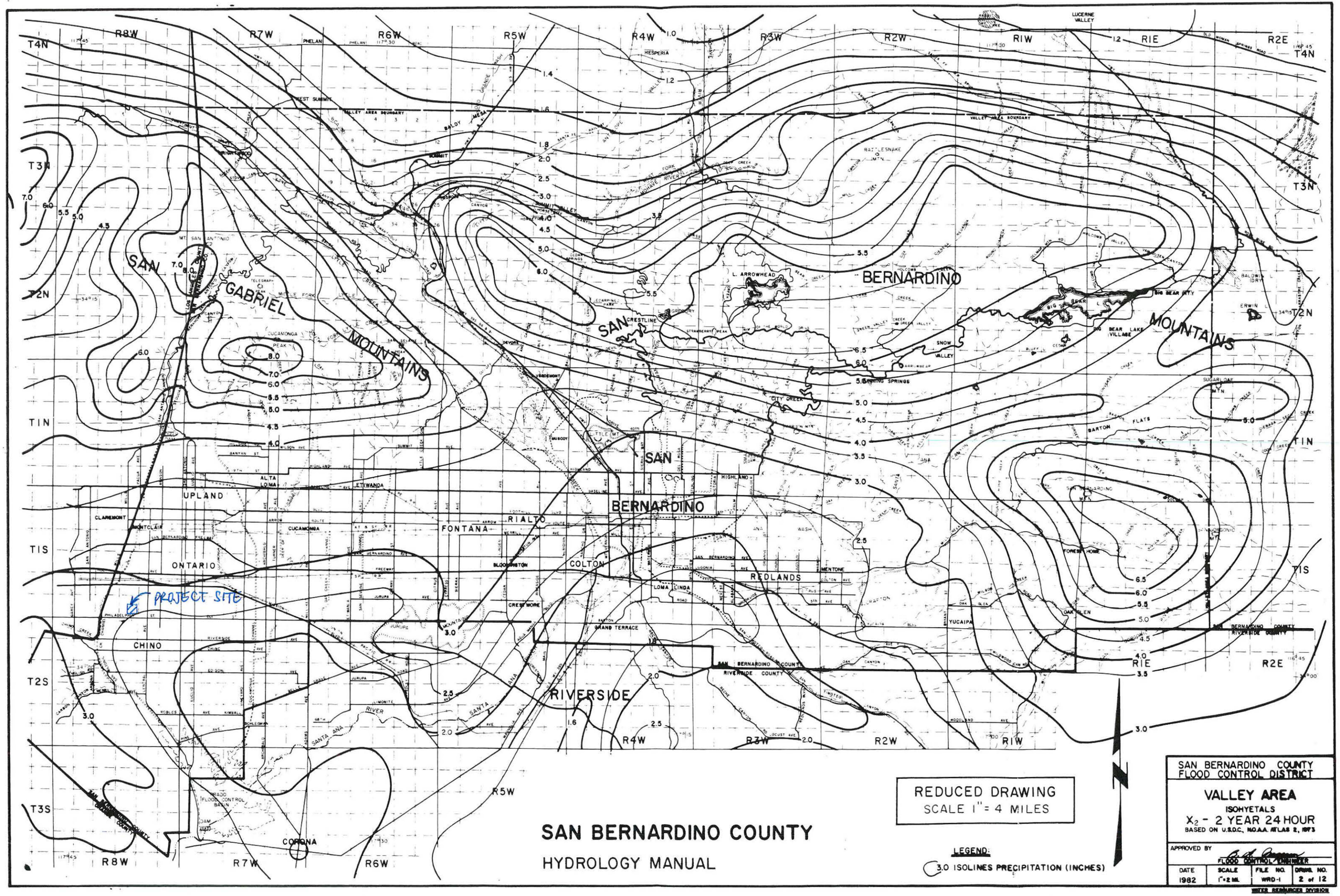
LEGEND:
2.0 ISOLINES PRECIPITATION (INCHES)

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.	DRAWG. NO.
1982	1"=2 MI.	WRD-1	1 of 12

FIGURE B-1



REDUCED DRAWING
SCALE 1" = 4 MILES

LEGEND:
3.0 ISOLINES PRECIPITATION (INCHES)

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT

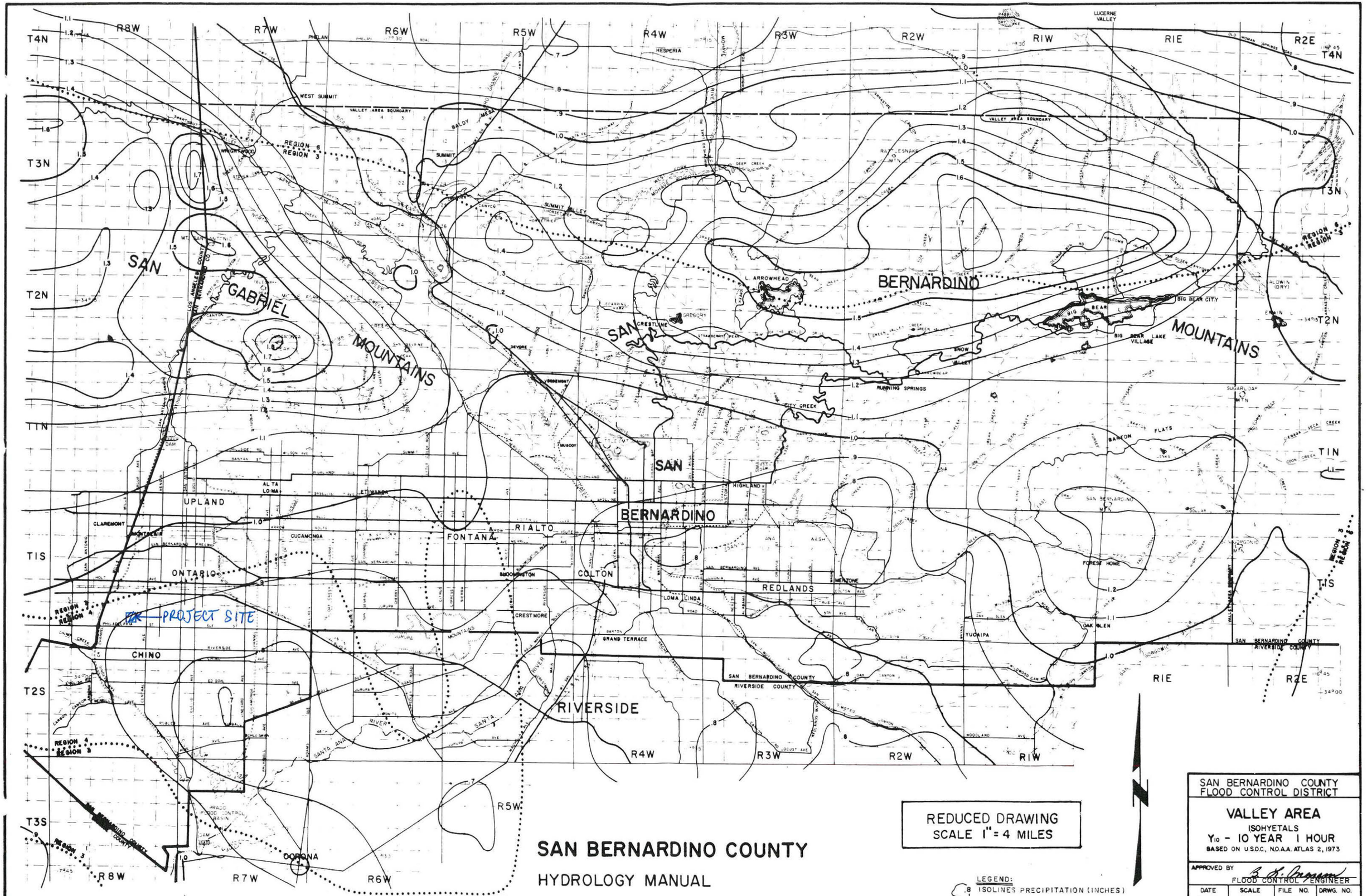
VALLEY AREA
ISOHYETALS
X_2 - 2 YEAR 24 HOUR
BASED ON U.S.D.C., N.O.A.A. ATLAS 2, 1973

APPROVED BY _____ FLOOD CONTROL ENGINEER

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

WATER RESOURCES DIVISION

FIGURE B-2


T4N
T3N
T2N
T1N
T1S
T2S
T3S
R8W
R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E
SAN GABRIEL MOUNTAINS
SAN BERNARDINO MOUNTAINS
SAN BERNARDINO
RIVERSIDE
WEST SUMMIT
VALLEY AREA BOUNDARY
REGION 6
REGION 3
REGION 4
REGION 2
REGION 1
SUMMIT
SUMMIT VALLEY
L. ARROWHEAD
BIG BEAR CITY
BIG BEAR LAKE
BIG BEAR VILLAGE
RUNNING SPRINGS
CRESTLINE
SAN BERNARDINO
HIGHLAND
REDLANDS
YUCAIPA
LOMA LINDA
COLTON
RIALTO
FONTANA
UPLAND
ONTARIO
CHINO
CLAREMONT
CUCAMONGA
ALTA LOMA
GRAND TERRACE
CRESTMORE
MENTONE
OAK GLEN
FOREST HOME
BARTON FLATS
SUGARLOAF MTN
SAN BERNARDINO COUNTY
RIVERSIDE COUNTY
PR PROJECT SITE
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
Y10 - 10 YEAR 1 HOUR
BASED ON U.S.D.C., N.O.A.A. ATLAS 2, 1973
APPROVED BY
FLOOD CONTROL ENGINEER
DATE 1982
SCALE 1"=2 Mi.
FILE NO. WRD-1
DRWG. NO. 3 of 12

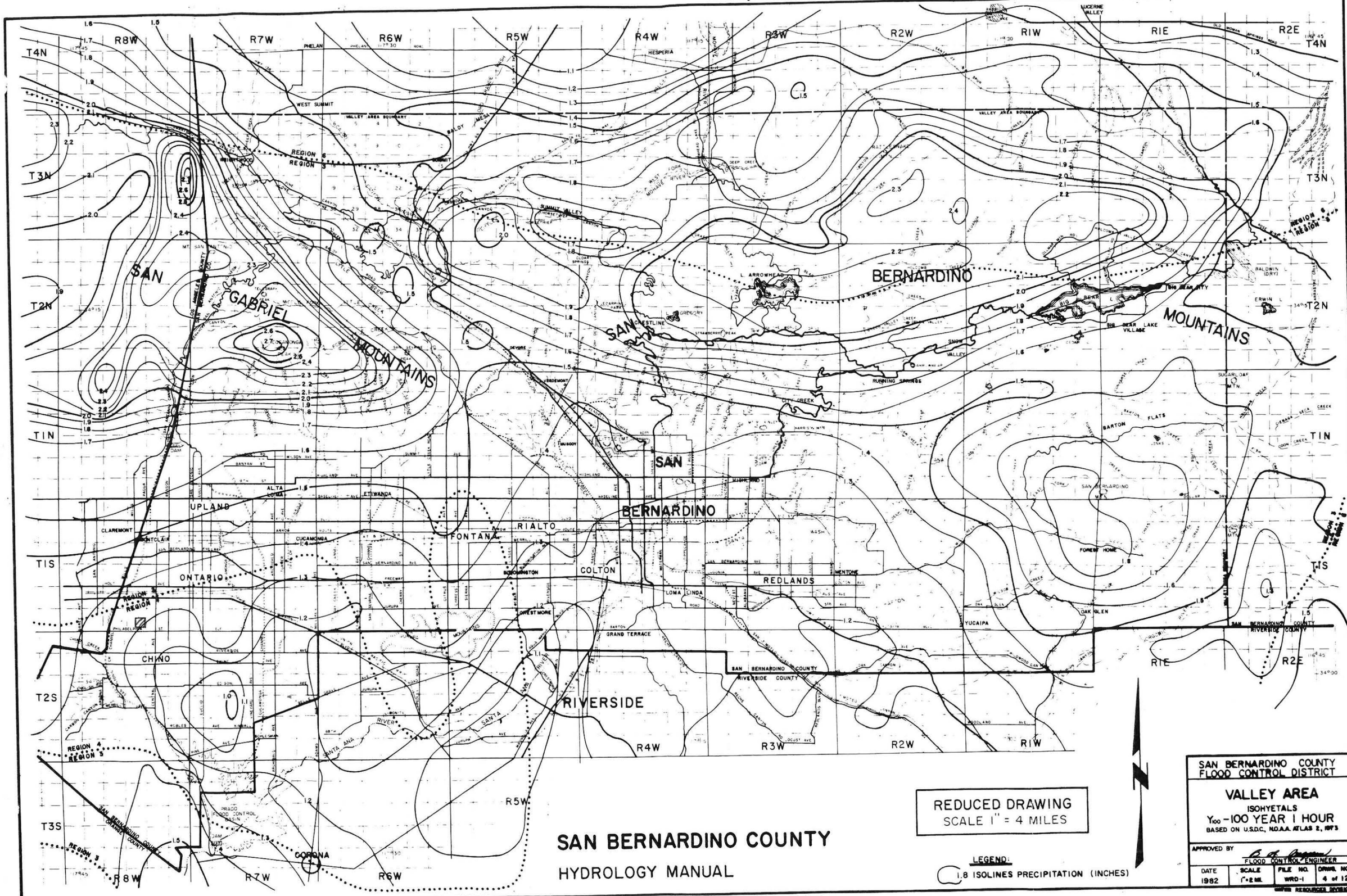
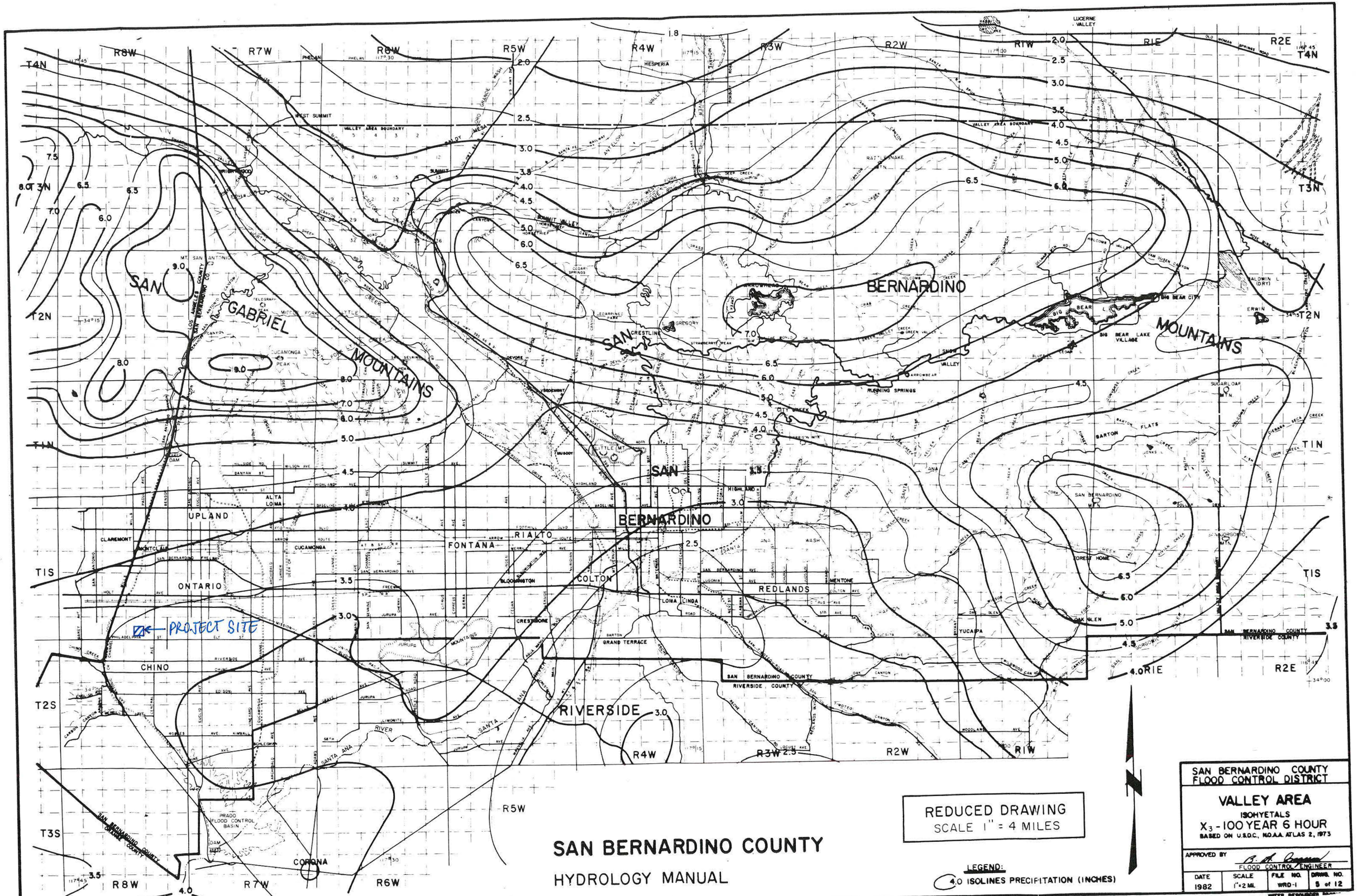
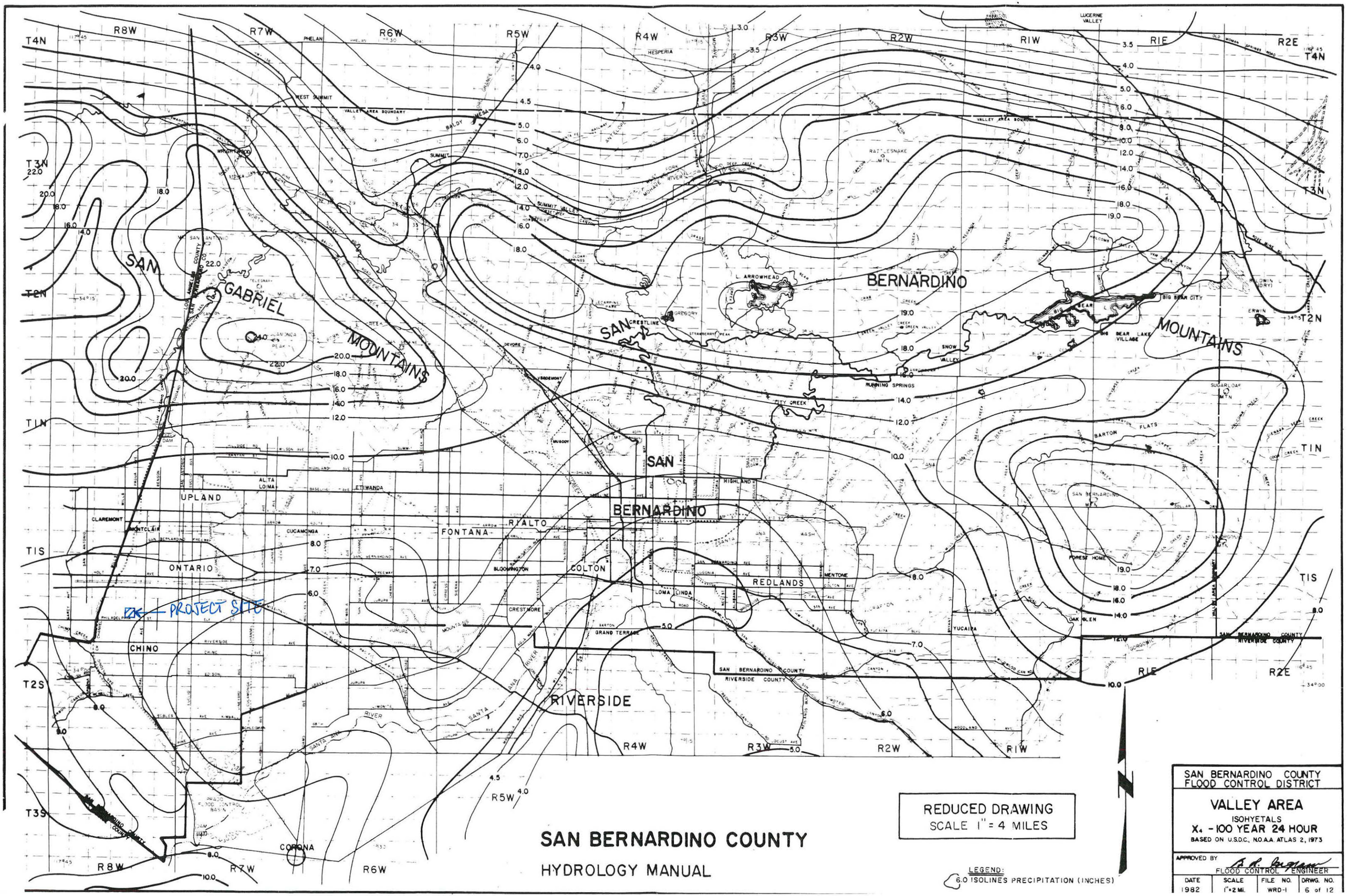

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL
REDUCED DRAWING
SCALE 1" = 4 MILES
LEGEND:
1.8 ISOLINES PRECIPITATION (INCHES)
SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT
VALLEY AREA
ISOHYETALS
Y100 - 100 YEAR 1 HOUR
BASED ON U.S.D.C., N.O.A.A. ATLAS 2, 1973
APPROVED BY
FLOOD CONTROL ENGINEER
DATE 1982
SCALE 1"=2 MI.
FILE NO. WRD-1
DRWG. NO. 4 of 12
WATER RESOURCES DIVISION
SAN BERNARDINO
RIVERSIDE
MOUNTAINS
VALLEY AREA BOUNDARY
REGION 6
REGION 5
REGION 4
REGION 3
T4N
T3N
T2N
T1N
T1S
T2S
T3S
R8W
R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E
UPLAND
ONTARIO
CHINO
FONTANA
RIALTO
COLTON
REDLANDS
YUCAIPA
CLAREMONT
CUCAMONGA
RIVERSIDE
CORONA
HESPERIA
WEST SUMMIT
SUMMIT VALLEY
BALDY MESA
L. ARROWHEAD
GREGORY
SAN BERNARDINO
GRAND TERRACE
LOMA LINDA
BIG BEAR LAKE
BIG BEAR CITY
RUNNING SPRINGS
SNOW VALLEY
BARTON FLATS
SUGARLOAF MTN.
FOREST HOME
OAK GLEN
BALDWIN (DRY)
ERWIN L.
PRADO FLOOD CONTROL BASIN
SAN BERNARDINO COUNTY
RIVERSIDE COUNTY

FIGURE B-4


SAN BERNARDINO COUNTY
HYDROLOGY MANUAL
REDUCED DRAWING
SCALE 1" = 4 MILES
LEGEND:
4.0 ISOLINES PRECIPITATION (INCHES)
PROJECT SITE
SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT
VALLEY AREA
ISOHYETALS
X3 - 100 YEAR 6 HOUR
BASED ON U.S.D.C., N.O.A.A. ATLAS 2, 1973
APPROVED BY
FLOOD CONTROL ENGINEER
DATE 1982
SCALE 1"=2 MI.
FILE NO. WRD-1
DRWG. NO. 5 of 12
SAN GABRIEL MOUNTAINS
SAN BERNARDINO MOUNTAINS
BERNARDINO
UPLAND
ONTARIO
CHINO
FONTANA
RIALTO
COLTON
REDLANDS
RIVERSIDE
CORONA
CLAREMONT
ALTA LOMA
GRAND TERRACE
LOMA LINDA
CRESTMORE
YUCAIPA
CRESTLINE
RUNNING SPRINGS
BIG BEAR LAKE
BIG BEAR CITY
HESPERIA
LUCERNE VALLEY
SAN BERNARDINO COUNTY
RIVERSIDE COUNTY
PRADO FLOOD CONTROL BASIN
T4N
T3N
T2N
T1N
T1S
T2S
T3S
R8W
R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E


R8W
R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E
T4N
T3N
T2N
T1N
T1S
T2S
T3S
SAN GABRIEL MOUNTAINS
SAN BERNARDINO MOUNTAINS
SAN BERNARDINO
BERNARDINO
RIVERSIDE
UPLAND
ONTARIO
CHINO
CLAREMONT
MONTCLAIR
ALTA LOMA
ETIWANDA
RANCHO CUCAMONGA
FONTANA
RIALTO
COLTON
REDLANDS
LOMA LINDA
CRESTMORE
GRAND TERRACE
BLOOMINGTON
CRESTLINE
LAKE ARROWHEAD
RUNNING SPRINGS
SNOW VALLEY
BIG BEAR LAKE
BIG BEAR CITY
FOREST HOME
SUGARLOAF MTN
BARTON FLATS
OAK GLEN
YUCAIPA
CORONA
HESPERIA
PHELAN
WRIGHTWOOD
SUMMIT VALLEY
DEVORE
SAN ANTONIO MTN
SAN BERNARDINO MTN
RATTLESNAKE MTN
PK — PROJECT SITE
VALLEY AREA BOUNDARY
SAN BERNARDINO COUNTY
RIVERSIDE COUNTY
LOS ANGELES COUNTY
SAN BERNARDINO COUNTY
REDUCED DRAWING
SCALE 1" = 4 MILES
LEGEND:
6.0 ISOLINES PRECIPITATION (INCHES)
SAN BERNARDINO COUNTY
HYDROLOGY MANUAL
SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT
VALLEY AREA
ISOHYETALS
X4 - 100 YEAR 24 HOUR
BASED ON U.S.D.C., N.O.A.A. ATLAS 2, 1973
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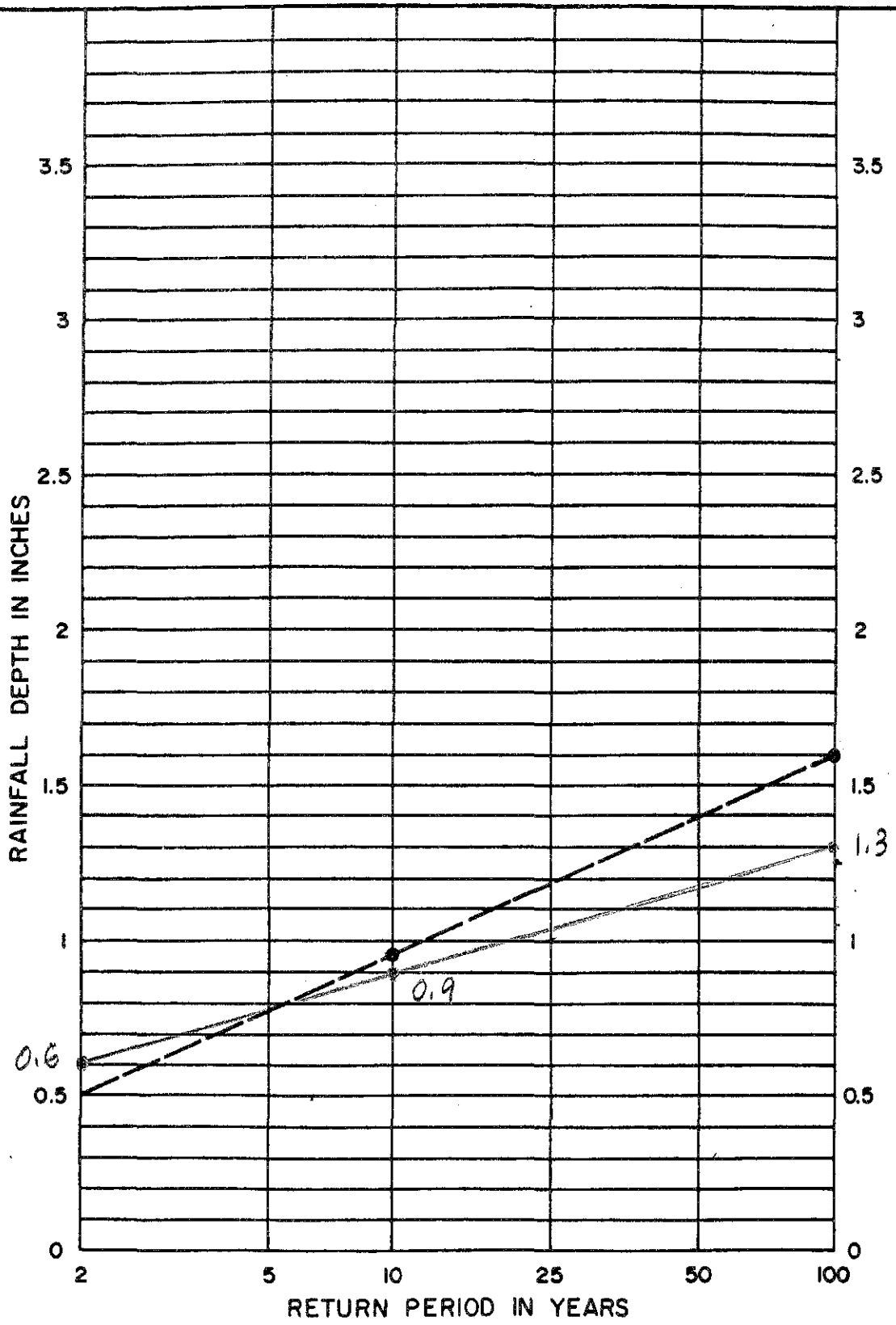
DATE 1982
SCALE 1"=2 Mi.
FILE NO. WRD-1
DRWG. NO. 6 of 12



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 III - CAL., 1973

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

RAINFALL DEPTH VERSUS RETURN PERIOD FOR PARTIAL DURATION SERIES

FIGURE D-2

July 26, 2021

Project No. 10557.006

Yorba Villas, LLC.
c/o Borstein Enterprises
11766 Wilshire Boulevard, Suite 280
Los Angeles, California 90025

Attention: Mr. Erik Pfahler
Senior Vice President

Subject: Geotechnical Update Report of Infiltration Testing
Proposed Infiltration Basin, Lot A
Yorba Villas Residential Development, Tract 20394
Northwest of Francis Avenue and Yorba Avenue
Chino Area of Unincorporated San Bernardino County, California

In accordance with your request and authorization, Leighton and Associates, Inc. (Leighton) has conducted infiltration testing in the area of the proposed infiltration basin, to be located near the southeast corner of the proposed Yorba Villas (formerly Chino Francis Estates) residential development. The development is located northwest of Francis Avenue and Yorba Avenue in unincorporated San Bernardino County, just north of the City of Chino, California. Leighton previously performed a geotechnical investigation for the proposed residential development which included infiltrating testing at several locations throughout the site.

Infiltration tests for the proposed basin were performed at depths of 15 feet and 35 feet below the existing ground surface (bgs). Although test results indicated relatively low infiltration rates, deeper infiltration systems are considered feasible within the proposed basin area based soil profiles observed in our borings, which extended to depths reaching

approximately 51 feet bgs. This report summarizes our field exploration and testing and presents our conclusions and recommendations.

I N T R O D U C T I O N

Project Description

Based on correspondence with you and the *Site Plan*, *Vesting Tentative Tract No. 20397*, prepared by MDS Consulting and dated March 31, 2021, which you provided, we understand that a retention/water quality basin is proposed within the 16,385-square-foot Lot "A", located at the southeast corner of the Yorba Villas residential development. The basin is proposed to be graded with 4:1 (H:V) side slopes with a bottom elevation of 829 feet above mean sea level (approximately 10 feet below the existing grade). A storm drain outlet and access ramp will be located at the northwest corner of the basin and a "pocket park" will be located directly east of the proposed basin.

Scope of Work

The scope of our study has included the following tasks:

- Background Review: We reviewed available, relevant geotechnical geologic maps, reports, and aerial photographs available in our in-house library.

- Utility Coordination: We contacted Underground Services Alert (USA) at least 48 hours prior to drilling the borings to locate major utilities, underground services, and easements.

- Field Exploration: We excavated, logged, and sampled three (3) hollow-stem auger borings (LB-1 to LB-3) to a maximum depth of 51 feet below the existing ground surface. The borings were drilled using a subcontracted truck-mounted drill rig, logged, and sampled by a member of our technical staff under supervision of a licensed Civil Engineer. Relatively undisturbed soil samples were obtained at selected intervals within the borings using a Modified California split-barrel sampler lined with rings. Representative bulk samples of near-surface soils were also collected.

  All excavations were backfilled with onsite soil cuttings. Logs of the geotechnical borings are attached in Appendix A. Approximate boring and well permeameter test locations are shown on Figure 1 - *Exploration Location Map*.

- Infiltration Testing: We conducted well permeameter tests within two of our borings (LB-1 and LB-3) to evaluate infiltration rates of the subsurface soils at the depths and

locations tested. The well permeameter tests were conducted based on the USBR 7300-89 method and in general accordance with San Bernardino County guidelines. The tests were conducted at depths of approximately 15 and 35 feet (bgs) to estimate infiltration rates, in borings LB-1 and LB-3, respectively. Water was provided by the drilling subcontractor by filling several Leighton-supplied 55-gallon drums with water. Infiltration test logs are included in Appendix B.

- Engineering Analysis: Data obtained from our testing was evaluated and analyzed to provide the recommendations presented in this report.

- Report Preparation: Results of our infiltration study and design recommendations have been summarized in this report.

F I N D I N G S

Site Description

The Yorba Villas residential development consists of approximately 12 acres of land that was previously utilized as grazing land for a goat farm. The site of the proposed basin is in the southeastern corner of the residential development site. Our previous geotechnical investigation (Leighton, 2019) described a residence, a pool, and other structures in the eastern portion of the residential development site. These previous structures and the pool have since been demolished. The site of the proposed basin is currently vacant, with scattered trees, and drains gently to the south.

Previous Studies

Leighton previously provided a geotechnical investigation report for the Yorba Villas residential project (Leighton, 2016) that included a subsurface investigation and provided conclusions and recommendations for grading and construction, and updated that report in 2019. Our previous geotechnical investigation included drilling of 5 exploratory borings to depths ranging from 21½ to 51½ feet bgs. Well permeameter tests were conducted at each of the 5 boring locations to depths ranging from 5 to 6 feet bgs to estimate the infiltration rate considering shallow infiltration trenches proposed at that time. Results of our previous infiltration testing indicated small-scale infiltration rates ranging from approximately 0.3 to 13 inches per hour (no factor of safety or correction factor applied).

Subsurface Soil Conditions

Our 2019 geotechnical investigation report (Leighton, 2019) described the overall subsurface conditions of the Yorba Villas residential development site as underlain by

alluvial soil deposits mantled in some areas by minor amounts of goat manure. The manure, where encountered, was generally less than one inch thick. The alluvial soil encountered within our previous excavations generally consisted of combinations of sand and silt, with some gravel. The soil was generally moist and medium dense. In-situ moisture content within the upper approximately 15 feet generally ranged from 1 to 10 percent.

The soils encountered within our borings for the current exploration for the proposed basin generally consisted of slightly moist, stiff silt in the upper 10 feet bgs, followed by an approximate 5-foot-thick layer of slightly moist medium dense silty sand to 15 feet bgs, followed by moist, stiff silt to 30 feet. Soils generally appeared more granular below 35 feet with variation in fine-grained material and were observed to be coarser below 45 feet bgs. The soils encountered below 35 feet bgs generally consisted of moist, dense to very dense silty sands with gravels, and soils encountered below 45 feet bgs generally consisted of moist, medium dense sands with gravel. More detailed descriptions of the subsurface conditions are presented on the boring logs (Appendix A).

Groundwater

Groundwater was not encountered in our borings excavated to a maximum depth of 51.5 feet below the existing ground surface (bgs). Historical groundwater mapping indicates that groundwater was approximately 150 feet bgs in 1933 (CDWR, 1970).

Regional data for water wells located within a 1½-mile radius of the site was reviewed to evaluate historical ground water levels. The shallowest historical groundwater levels encountered were on the order of 235 feet bgs in 1985 for a well maintained by the Chino Basin Watermaster (Local Well ID CHINO-1002741) located 1.2 miles southeast of the site. Most recent water levels indicate groundwater is on the order of 258 feet bgs (CDWR, 2021). Shallow groundwater is not anticipated to impact the site.

Infiltration Testing

Two well permeameter tests (LB-1 and LB-3) were conducted to estimate the infiltration rate at the proposed detention and water quality basin within Lot “A” at the southeast corner of the overall Yorba Villas Residential Development. The well permeameter tests were conducted inside the drilled borings at depths of 15 feet and 35 feet below ground surface (approximate test bottom depths).

A well permeameter test is useful for field measurements of soil infiltration rates and is suited for testing when the design depth of the basin or chamber is deeper than current

existing grades. Our testing was a clean-water, small-scale test, and correction factors need to be applied. Both falling- and constant-head tests were performed. The constant-head tests consisted of excavating a boring to the depth of the test (or deeper if it is partially backfilled with soil and a bentonite plug with a thin soil covering is placed just below the design test elevation). A layer of clean sand was placed in the boring bottom to support temporary perforated well casing pipe and a float valve. In addition, clean sand was poured around the outside of the well casing within the test zone to prevent the boring from caving/collapsing or eroding when water was added.

For the constant-head tests, a float valve, lowered into the boring, inside the casing, added water to the borings as water infiltrated into the soil, while maintaining a relatively constant water head in the boring. The falling-head tests consisted of adding water to a specified level and measured at specified time intervals as the water level drops, and then refilled; the process was repeated until a relatively stabilized rate of drop was achieved. The incremental infiltration rate as measured during intervals of the test was defined as the incremental flow rate of water infiltrated (volume divided by time), divided by the surface area of the infiltration interface, with resulting units of inches per hour. Well permeameter tests were conducted based on the USBR 7300-89 method.

Results of the infiltration testing are provided in Appendix B and are summarized below.

Boring	Test Depth (ft)	Soil Classification	Raw Infiltration Rate (in./hr)	Corrected Infiltration Rate (in./hr)
LB-1	15	Silty Sand	2.5	0.4
LB-3	35	Sand to Silty Sand with Gravel	2.2	1.1

INFILTRATION RECOMMENDATIONS

Based on our onsite observations, laboratory testing, and the infiltration tests performed, infiltration within the upper 30 feet may be slow. Soils in the range of approximately 10 to 12 feet are anticipated to have a corrected infiltration rate 0.4, which includes a higher correction factor because of the underlying silt at a depth of 15 feet or less. We have included the reduction factor, since monitoring of actual facility performance has shown that actual infiltration rates are lower than for small-scale tests, based on the *San Bernardino County Stormwater Program Technical Guidance Document for Water Quality Management Plans (WQMP)* for basin design aspects.

Although infiltration testing with a bottom depth of 15 feet bgs produced moderate rates for the test itself, impermeable silts were observed in our borings to be located above and below the tested layer (silt at a depth of 15 feet or shallower), and it is likely that water infiltrated at depths of approximately 10 to 12 feet bgs will tend to migrate laterally rather than vertically. Actual infiltration rates would be anticipated to decrease as the adjacent soils saturate.

Due to the presence of finer-grained soils in the upper 30 to 35 feet, we recommend that infiltration consist of dry wells extending to a minimum depth of 45 feet below the existing ground surface (bgs), to an approximate elevation of 795 feet msl. Actual infiltration rates for dry wells are anticipated to be much higher than the small scale tests, as the dry wells take advantage of deep soil layers, including highly permeable sands and gravels, and the driving head is much higher. For dry wells that extend to a depth of 45 feet bgs, we recommend using a design rate of 10 inches per hour for soils in the depth zone of 35 to 45 feet bgs, and an average of 0.5 inch per hour for soils above 35 feet. After the first dry well is constructed, it should be tested for infiltration. If the tested infiltration rates are sufficient to reduce the number of dry wells at that location, some or all of the remaining planned dry wells may be omitted, as appropriate, based on review of the test data.

Additional Review and Evaluation:

Infiltration rates are anticipated to vary significantly at this site based on location and depth. Infiltration concepts should be discussed with Leighton as infiltration plans are being developed. Leighton should review infiltration plans, including specific locations and depths of proposed facilities. Further testing may be recommended based on the infiltration facility design, particularly considering their type, depth and location.

General Design Considerations:

The periodic flow of water carrying sediments in the dry well, plus the introduction of wind-blown sediments and sediments from erosion, can eventually cause the bottom of the chamber to accumulate a layer of silt, which has the potential of significantly reducing the overall infiltration rate of the dry well. Therefore, we recommend that significant amounts of silt/sediment not be allowed to flow into the facility within storm water, especially during construction of the project and prior to achieving a mature landscape on site. As it is typically very difficult to remove silt from buried infiltration facilities, we recommend that an easily maintained, robust silt/sediment removal system be installed to pretreat storm water before it enters the infiltration facility. We suggest the drywells be placed such that a low flow trench receive runoff and mostly fill with water before draining into the drywell. This is intended to limit the amount of silt getting into the dry well and preserve its infiltration capabilities.

Infiltration facilities should not be constructed adjacent to or under buildings. Infiltration facilities should have a setback of at least 15 feet from buildings, but preferably more.

In general, the rate of infiltration reduces as the head of water in the infiltration facility reduces, and it also reduces with prolonged periods of infiltration. As such, water typically infiltrates much faster near the beginning of and/or immediately after storm events than at times well after a storm when the water level in the facility has receded, since the infiltration rate is then slower due to both lower head and longer overall duration of infiltration.

Estimating infiltration rates, especially based on small-scale testing, is inexact and indefinite, and often involves known and unknown soil complexities, potentially resulting in a condition where actual infiltration rates of the completed facility are significantly less than design rates.

Construction Considerations:

We recommend that Leighton evaluate the infiltration facility excavations, to confirm that granular, undisturbed alluvium is exposed in the bottoms and sides. Additional excavation or evaluation may be required if silty or clayey soils are exposed.

Maintenance Considerations:

The infiltration facilities should be routinely monitored, especially before and during the rainy season, and corrective measures should be implemented as/when needed. Things to check for include proper upkeep, proper infiltration, absence of accumulated silt, and that de-silting filters/features are clean and functioning. Pretreatment desilting features should be cleaned and maintained per manufacturers' recommendations. Even with measures to prevent silt from flowing into the infiltration facility, accumulated silt may need to be removed occasionally as part of maintenance.

L I M I T A T I O N S

This report was based in part on data obtained from a limited number of observations, site visits, soil excavations, samples, and tests. Such information is, by necessity, incomplete. The nature of many sites is such that differing soil or geologic conditions can be present within small distances and under varying climatic conditions. Changes in subsurface conditions can and do occur over time. Therefore, our findings, conclusions, and recommendations presented in this report are based on the assumption that Leighton and Associates, Inc. will provide geotechnical observation and testing during construction

This report was prepared for the sole use of Yorba Villas, LLC, for application to the design of the proposed residential development in accordance with generally accepted geotechnical engineering practices at this time in California.

C L O S I N G

We appreciate the opportunity to work with you on the development of this project. If you have any questions regarding this report, please call us at your convenience.

Respectfully submitted,
LEIGHTON AND ASSOCIATES, INC.

Luis Perez-Milicua, PE 89389
Project Engineer

Jose A. Tapia, PE 91630
Project Engineer

Jason D. Hertzberg, GE 2711
Principal Engineer

JAT/LP/SGO/JDH

Attachments: References
Figure 1 - Exploration Location Map
Appendix A - Borings Logs
Appendix B - Infiltration Logs
Appendix C - Laboratory Test Results

Distribution: (1) Addressee

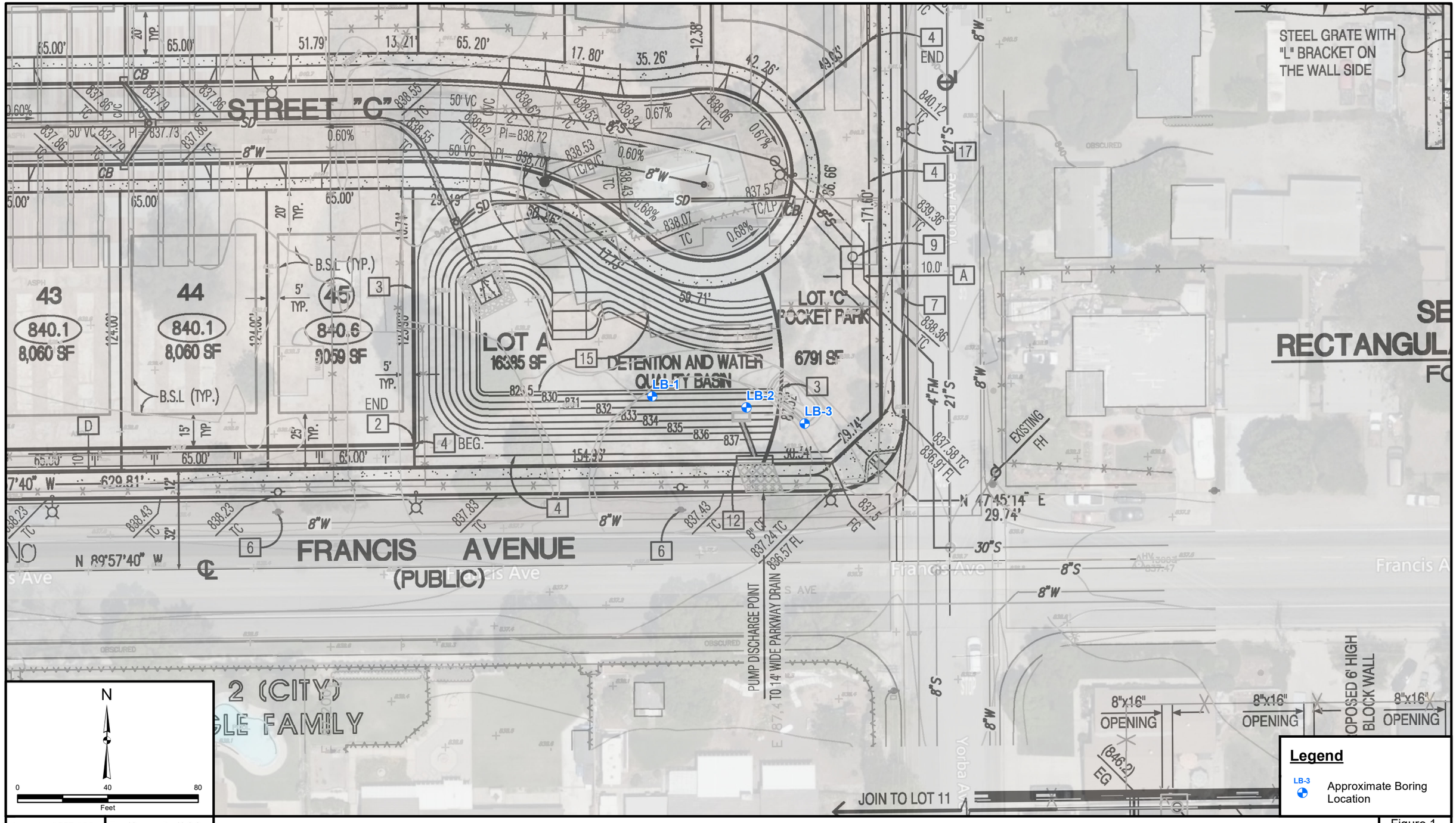
REFERENCES

California Department of Water Resources (CDWR) of California, 1970, Meeting Water Demands in Chino-Riverside Area, Bulletin No. 104-3, September 1970.

_____, 2021, Sustainable Groundwater Management Act Data Viewer (SGMA), http://www.water.ca.gov/waterdatalibrary/, accessed June 15, 2021.

Leighton and Associates, Inc., 2016, Geotechnical Investigation, Proposed Residential Development, APN's 1013-211-21 and 1013-211-22 Northwest of Francis Avenue and Yorba Avenue, City of Chino, California, Project Number 10557.004, dated August 26, 2016.

_____2019, Geotechnical Investigation Proposed Residential Development, APN's 1013-211-21 and 1013-211-22 Northwest of Francis Avenue and Yorba Avenue, City of Chino, California, Project Number 10557.004, dated July 16, 2019.



N

0 40 80

Feet

Legend

LB-3 Approximate Boring Location

Project: 10557.006	Eng/Geol: JDH/SGO
Scale: 1 " = 40 '	Date: June 2021
Base Map: ESRI ArcGIS Online 2021	
Author: KVM (kmanchikanti)	

EXPLORATION LOCATION MAP

Yorba Villas Infiltration Testing
Northwest of Yorba Avenue and Francis Avenue
Chino, California

Figure 1

Leighton

Map Saved as V:\Drafting\10557\006\Maps\10557-006_Fig2_ELM_2021-06-18.mxd on 6/18/2021 3:10:55 PM

APPENDIX A

BORING LOGS

GEOTECHNICAL BORING LOG LB-1

Project No.	10557.006	**Date Drilled**	6-10-21
Project	Yorba Villas	**Logged By**	JP
Drilling Co.	2R	**Hole Diameter**	10"
Drilling Method	Hollow Stem Auger - 150lb - Autohammer - 30" Drop	**Ground Elevation**	840'
Location	See Figure 2 - Boring Location Map	**Sampled By**	JP

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0							ML	@Surface: SANDY SILT (ML), stiff, light brown, slightly moist, fine sand, non-plastic, organics	
835	5								@5': Moist	
830	10							SM	@10': SILTY SAND (SM), medium dense, light gray, slightly moist, fine sand, 10-15% fines	
				R-1	7 13 16			SM	@13.5': SILTY SAND (SM), medium dense, light gray, moist, fine sand, trace organics, 85% sand, 15% fines	SA
825	15								**TOTAL DEPTH = 15 FEET** **NO GROUNDWATER ENCOUNTERED** **CONVERTED TO INFILTRATION BORING FOR TESTING** **BACKFILLED TO SURFACE WITH SOIL CUTTINGS ON 6/11/21**	
820	20									
815	25									
810	30									

Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

GEOTECHNICAL BORING LOG LB-2

Project No.	10557.006	**Date Drilled**	6-10-21
Project	Yorba Villas	**Logged By**	JP
Drilling Co.	2R	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 150lb - Autohammer - 30" Drop	**Ground Elevation**	839'
Location	See Figure 2 - Boring Location Map	**Sampled By**	JP

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0			B-1				ML	@Surface: SANDY SILT (ML), stiff, light brown, slightly moist, fine sand, non-plastic, organics	
835	5			R-1	6 7 9				@5': As above, stiff, light brown	
				R-2	5 6 8				@7': As above, stiff, light brown, rootlets, pores	
830	10			R-3	6 10 20			SM	@10': SILTY SAND with gravel (SM), medium dense, light gray, slightly moist, fine sand, fine to coarse gravel, sub-angular, 10-15% fines	
				R-4	6 10 12	101	3	SP	@12': Poorly-graded SAND (SP), medium dense, light gray, slightly moist, fine sand	
825	15			R-5	5 6 12	95	18	ML	@15': SILT (ML), stiff, variegated light gray and orange brown, moist, fine-grained, non-plastic, slight cementation	
				R-6	5 6 13	96	20		@17': As above, variegated light gray, orange brown, and dark brown, trace clay	
820	20			R-7	5 9 14				@20': CLAYEY SILT (ML), stiff, light gray, trace orange, moist, fine, low-plasticity, trace rootlets, organic specs	
815	25			R-8	10 12 14				@25': SILT (ML), stiff, light gray to light brown, moist, 1-inch sand layer in sampler, light brown, fine-medium sand	
810	30									

SAMPLE TYPES:

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- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

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GEOTECHNICAL BORING LOG LB-2

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Project	Yorba Villas	**Logged By**	JP
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Drilling Method	Hollow Stem Auger - 150lb - Autohammer - 30" Drop	**Ground Elevation**	839'
Location	See Figure 2 - Boring Location Map	**Sampled By**	JP

Elevation Feet	Depth Feet	Graphic Log (N–S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	30			R-9	10 13 18	123	12	SM	@30': SILTY SAND (SM), medium dense, variegated, light gray, orange brown, and dark brown, fine sand, trace medium, trace gravel up to 1/2-inch, subangular, iron-oxidized clasts, 36% fines	-200
805	35			R-10	37 50/5.5	117	4	SM-SP	@35': Poorly-graded SAND to SILTY SAND with gravel (SP-SM), very dense, light brown to medium brown, fine to medium sand, moist, trace coarse, 32% gravel, 60% sand, 8% fines	SA
800	40			R-11	20 15 21	102	10	SM	@40': SILTY SAND (SM), dense, medium brown, moist, fine sand, trace coarse, bottom grades to: SANDY SILT (ML), stiff, moist, orange brown, fine sand, non-plastic, 33% fines	-200
795	45				50/4			SP	@45': No recovery, rig chatter on gravel	
790	50			R-12	9 50/6				@50': Poorly-graded SAND (SP), dense, medium brown, fine to medium sand, trace gravel, sub-angular, poor recovery	
									TOTAL DEPTH= 51 FEET **NO GROUNDWATER ENCOUNTERED** **BACKFILLED WITH SOIL CUTTINGS ON 6/10/21**	
785	55									
780	60									

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

SAMPLE TYPES:
- B BULK SAMPLE
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- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
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- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

GEOTECHNICAL BORING LOG LB-3

Project No.	10557.006	**Date Drilled**	6-10-21
Project	Yorba Villas	**Logged By**	JP
Drilling Co.	2R	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 150lb - Autohammer - 30" Drop	**Ground Elevation**	839'
Location	See Figure 2 - Boring Location Map	**Sampled By**	JP

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0							ML	@Surface: SANDY SILT (ML), stiff, light brown, slightly moist, fine sand, non-plastic, organics	
835	5								@5': As above, stiff, light brown	
830	10							SM	@10': SILTY SAND with gravel (SM), medium dense, light gray, slightly moist, fine sand, fine to coarse gravel, sub-angular, 10-15% fines	
825	15							ML	@15': SILT (ML), stiff, variegated light gray and orange brown, moist, fine-grained, non-plastic	
820	20								@20': As above	
815	25									
810	30									

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

GEOTECHNICAL BORING LOG LB-3

Project No.	10557.006	**Date Drilled**	6-10-21
Project	Yorba Villas	**Logged By**	JP
Drilling Co.	2R	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 150lb - Autohammer - 30" Drop	**Ground Elevation**	839'
Location	See Figure 2 - Boring Location Map	**Sampled By**	JP

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	30							SM	@30': SILTY SAND (SM), medium dense, variegated, light gray, orange brown, and dark brown, fine sand, trace medium, trace gravel up to 1/2-inch, subangular, iron-oxidized clasts	
805	35							SP-SM	@35': Poorly-graded SAND to SILTY SAND with gravel (SP-SM), very dense, light brown to medium brown, fine to medium sand, moist, trace coarse	
800	40							SM	@40': SILTY SAND (SM), dense, medium brown, moist, fine sand, trace coarse, bottom grades to: SANDY SILT (ML), stiff, moist, orange brown, fine sand, non-plastic	
795	45							SP-SM	@45': Rig chatter on gravel, cuttings show Poorly-graded SAND to SILTY SAND with gravel (SP-SM), medium brown, moist, fine to medium sand, gravel up to 2 inches	
790	50								**TOTAL DEPTH= 50 FEET** **NO GROUNDWATER ENCOUNTERED** **BACKFILLED TO 35.2 FEET AND CONVERTED TO INFILTRATION BORING FOR TESTING** **BACKFILLED TO SURFACE WITH SOIL CUTTINGS ON 6/11/21**	
785	55									
780	60									

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

APPENDIX B

INFILTRATION LOGS

Results of Well Permeameter, from USBR 7300-89 Method.

Leighton

Project: 10557

Exploration #/Location: LB-1

Depth Boring drilled to (ft): 15.15

Tested by: JAT

USCS Soil Type in test zone: SM

Weather (start to finish): Sunny

Liquid Used/pH: H2O

Measured boring diameter: 10 in. 5 in. Well Radius

Approx Depth to GW below GS: 100 ft

Well Prep: Drilled to 15' bgs with 10" auger, placed #3 sand and 4" pipe with sand around test zone.

Initial estimated Depth to Water Surface (in.): 159

Average depth of water in well, "h" (in.): 24

approx. h/r: 4.7

Tu (Fig. 8) (ft): 86.8

Tu>3h?: yes, OK

Cross-sectional area for vol calcs (in.^2): 78.5

	ft	in.	Total (in.)
Depth to Bot of well (or top of soil over Bentonite)	15.2 ft		182
Pilot Tube stickup (+ is above ground)		5. in.	5
Depth to top of sand outside of casing from top of pilot tube			
Depth to top of float assembly from top of pilot tube	10. ft	8. in.	128 123 Depth below GS (in.)
Float Assembly ID		A	
Float assembly Extension length (in.)		24	

Flow Meter:

Meter ID: 3242

Meter Color: Black

Meter Units: Gallons

DL ID: * Used meter with water from barrels.

0.05 gallons/pulse

Field Data | **Calculations**

Date	Time	Data from Flow Meter		Depth to WL in Boring (measured from top of pilot tube)		Water Temp (deg F)	Comments	Δt (min)	Total Elapsed Time (min.)	Depth to WL in well (in.)	h, Height of Water in Well (in.)	Δh (in.)	Avg. h	Vol Change (in.^3)			Flow (in^3/ min)	q, Flow (in^3/ hr)	V (Fig 9)	K20, Coef. Of Perme-ability at 20 deg C (in./hr)	Infiltration Rate [flow/surf area] (in./hr) (FS=1)
		Reading (cu-ft or gal)	Interval Pulse Count											from supply	from Δh	Total					
Start Date	Start time:	Gallons		ft	in.																
6/11/21	8:45																				
6/11/21	8:45	7414		12.61					0	146.3	36.1										
6/11/21	8:50	7416.5		12.59				5	5	146.1	36.3	0.24	36	578	-19	559	112	6704	0.9	1.35	**5.08**
6/11/21	8:55	7419.4		12.61				5	10	146.3	36.1	-0.24	36	670	19	689	138	8265	0.9	1.68	**6.27**
6/11/21	9:00	7422.9		12.6				5	15	146.2	36.2	0.12	36	809	-9	799	160	9589	0.921	1.94	**7.28**
6/11/21	9:05	7424.7		12.59				5	20	146.1	36.3	0.12	36	416	-9	406	81	4877	0.9	0.98	**3.69**
6/11/21	9:10	7427.3		12.6				5	25	146.2	36.2	-0.12	36	601	9	610	122	7320	0.9	1.48	**5.54**
6/11/21	9:15	7429.8		12.6				5	30	146.2	36.2	0	36	578	0	578	116	6930	0.9	1.40	**5.25**
6/11/21	9:20	7432.5		12.59				5	35	146.1	36.3	0.12	36	624	-9	614	123	7371	0.9	1.48	**5.58**
6/11/21	9:25	7434.5		12.6				5	40	146.2	36.2	-0.12	36	462	9	471	94	5657	0.9	1.14	**4.28**
6/11/21																					
6/11/21	9:30	7435.1		13.5					45	157.0	25.4										
6/11/21	10:00	7436.1		14			Adjustment	30	75	163.0	19.4	-6	22	231	471	702	23	1404	0.9	0.77	**1.65**

template updated: 8/14/19

Results of Well Permeameter, from USBR 7300-89 Method.

Leighton

Project:	10557	
Exploration #/Location:	*LB-1*	
Depth Boring drilled to (ft):	15.15	
Tested by:	JAT	
USCS Soil Type in test zone:	SM	
Weather (start to finish):	Sunny	
Liquid Used/pH:	H_2O	
Measured boring diameter:	10	in. 5 in. Well Radius
Approx Depth to GW below GS:	100	ft
Well Prep:	Drilled to 15' bgs with 10" auger, placed #3 sand and 4" pipe with sand around test zone.	

Initial estimated Depth to Water Surface (in.):	154
Average depth of water in well, "h" (in.):	29
approx. h/r:	5.8
Tu (Fig. 8) (ft):	87.2
Tu>3h?:	yes, OK
Cross-sectional area for vol calcs (in.^2):	78.5

	ft	in.	Total (in.)	
Depth to Bot of well (or top of soil over Bentonite)	15.2 ft		182	
Pilot Tube stickup (+ is above ground)		5. in.	5	
Depth to top of sand outside of casing from top of pilot tube				
Depth to top of float assembly from top of pilot tube	9. ft	0. in.	108	103 Depth below GS (in.)
Float Assembly ID		A		
Float assembly Extension length (in.)		0		

Flow Meter:

Meter ID	
Meter Col	Black
Meter Unit	Gallons
DL ID	

0.05 gallons/pulse

Field Data | **Calculations**

Date	Time	Data from Flow Meter		Depth to WL in Boring (measured from top of pilot tube)		Water Temp (deg F)	Comments	Δt (min)	Total Elapsed Time (min.)	Depth to WL in well (in.)	h, Height of Water in Well (in.)	Δh (in.)	Avg. h	Vol Change (in.^3)			Flow (in^3/ min)	q, Flow (in^3/ hr)	V (Fig 9)	K20, Coef. Of Perme-ability at 20 deg C (in./hr)	Infiltration Rate [flow/surf area] (in./hr) (FS=1)
Start Date	Start time:	Reading (cu-ft or gal)	Interval Pulse Count											from supply	from Δh	Total					
6/11/2021	8:45	Gallons		ft	in.																
-																					
6/11/21	10:20	7447.5		11.8					95	136.6	45.8										
6/11/21	10:25	7451.3		11.85				5	100	137.2	45.2	-0.6	46	878	47	925	185	11099	0.9	1.60	**6.79**
6/11/21	10:30	7455		11.9				5	105	137.8	44.6	-0.6	45	855	47	902	180	10822	0.9	1.59	**6.70**
6/11/21	10:35	7458.6		11.9				5	110	137.8	44.6	0	45	832	0	832	166	9979	0.921	1.47	**6.22**
6/11/21							Switch Barrel														
6/11/21	10:40	7459.5		12.8					115	148.6	33.8										
6/11/21	10:45	7459.6		13.4				5	120	155.8	26.6	-7.2	30	23	565	588	118	7060	0.9	2.42	**6.34**
6/11/21																					
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Results of Falling Head Infiltration Test

Leighton

Project:	10557
Exploration #/Location:	*LB-1*
Depth Boring drilled to (ft):	15.15
Tested by:	JAT
USCS Soil Type in test zone:	SM
Weather (start to finish):	Sunny
Liquid Used/pH:	H2O
Measured boring diameter:	10 in.
Approx Depth to GW below GS:	100 ft
Well Prep:	Drilled to 15' bgs with 10" auger, placed #3 sand and 4" pipe with sand around test zone.

5 in. Well Radius

Initial estimated Depth to Water Surface (in.): 150
Average depth of water in well, "h" (in.): 32
approx. h/r: 6.4
Tu (Fig. 8) (ft): 87.5
Tu>3h?: yes, OK

Cross-sectional area for vol calcs (in.^2): 37.4

	ft	in.	Total (in.)
Depth to Bot of well (or top of soil over Bentor	15.2 ft		182
Pilot Tube stickup (+ is above ground)		5. in.	5
Depth to top of sand outside of casing from top of pilot tube			

Field Data **Calculations**

Date	Time	Depth to WL in Boring (measured from top of pilot tube)		Water Temp (deg F)	Comments	Δt (min)	Total Elapsed Time (min.)	Depth to WL in well (in.)	h, Height of Water in Well (in.)	Δh (in.)	Avg. h	Vol Change (in.^3)			Flow (in^3/ min)	q, Flow (in^3/ hr)	Average Infiltration Surface Area, (in^2)	V (Fig 9)	Infiltration Rate [flow/surf area] (in./hr) (FS=1)
Start Date	Start time:	ft	in.									from supply	from Δh	Total					
6/11/2021	9:35																		
6/11/21	11:12	9.4		65			97	107.8	74.6										
6/11/21	11:17	12.3				5	102	142.6	39.8	-34.8	57	0	1302	1302	260	15625	1875	1.0	**8.51**
6/11/21	11:22	13.4				5	107	155.8	26.6	-13.2	33	0	494	494	99	5927	1121	1.0	**5.40**
6/11/21	11:27	14				5	112	163.0	19.4	-7.2	23	0	269	269	54	3233	801	1.0	**4.12**
6/11/21					refill														
6/11/21	11:32	9.5					117	109.0	73.4										
6/11/21	11:37	12.4				5	122	143.8	38.6	-34.8	56	0	1302	1302	260	15625	1837	1.0	**8.69**
6/11/21	11:42	13.1				5	127	152.2	30.2	-8.4	34	0	314	314	63	3771	1159	1.0	**3.32**
6/11/21	11:47	13.8				5	132	160.6	21.8	-8.4	26	0	314	314	63	3771	895	1.0	**4.30**
6/11/21					refill														
6/11/21	11:53	9.81					138	112.7	69.7										
6/11/21	11:58	12.23				5	143	141.8	40.6	-29.04	55	0	1087	1087	217	13038	1811	1.0	**7.36**
6/11/21	12:03	13.21				5	148	153.5	28.9	-11.76	35	0	440	440	88	5280	1170	1.0	**4.61**
6/11/21	12:08	14.05				5	153	163.6	18.8	-10.08	24	0	377	377	75	4526	827	1.0	**5.59**
6/11/21					refill														
6/11/21	12:15	10.71					160	123.5	58.9										
6/11/21	12:20	12.59				5	165	146.1	36.3	-22.56	48	0	844	844	169	10129	1573	1.0	**6.58**
6/11/21	12:25	13.43				5	170	156.2	26.2	-10.08	31	0	377	377	75	4526	1061	1.0	**4.36**
6/11/21	12:30	14.06				5	175	163.7	18.7	-7.56	22	0	283	283	57	3394	784	1.0	**4.42**
6/11/21					refill														
6/11/21	12:37	10.21					182	117.5	64.9										
6/11/21	12:42	12.76				5	187	148.1	34.3	-30.6	50	0	1145	1145	229	13739	1635	1.0	**8.58**
6/11/21	12:47	13.34				5	192	155.1	27.3	-6.96	31	0	260	260	52	3125	1046	1.0	**3.05**
6/11/21	12:52	13.91				5	197	161.9	20.5	-6.84	24	0	256	256	51	3071	829	1.0	**3.78**
6/11/21	12:57	14.27				5	202	166.2	16.2	-4.32	18	0	162	162	32	1940	654	1.0	**3.03**
6/11/21					refill														
6/11/21	1:05	10.31					0	118.7	63.7										
6/11/21	1:10	12.42				5	0	144.0	38.4	-25.32	51	0	947	947	189	11368	1681	1.0	**6.91**
6/11/21	1:15	13.32				5	0	154.8	27.6	-10.8	33	0	404	404	81	4849	1113	1.0	**4.45**
6/11/21	1:20	13.81				5	0	160.7	21.7	-5.88	25	0	220	220	44	2640	852	1.0	**3.17**
6/11/21	1:25	14.06				5	0	163.7	18.7	-3	20	0	112	112	22	1347	712	1.0	**1.93**
6/11/21																			
6/11/21	13:29	9.75					234	112.0	70.4										
6/11/21	13:34	12.11				5	239	140.3	42.1	-28.32	56	0	1060	1060	212	12715	1844	1.0	**7.04**
6/11/21	13:39	13.15				5	244	152.8	29.6	-12.48	36	0	467	467	93	5603	1204	1.0	**4.75**
6/11/21	13:44	13.64				5	249	158.7	23.7	-5.88	27	0	220	220	44	2640	916	1.0	**2.95**
6/11/21	13:49	14.06				5	254	163.7	18.7	-5.04	21	0	189	189	38	2263	744	1.0	**3.11**
6/11/21	13:54	14.35				5	259	167.2	15.2	-3.48	17	0	130	130	26	1562	610	1.0	**2.61**

template updated: 6/30/2020

Results of Falling Head Infiltration Test

Leighton

Project:	10557
Exploration #/Location:	*LB-3*
Depth Boring drilled to (ft):	35.3
Tested by:	JAT
USCS Soil Type in test zone:	SP-SM
Weather (start to finish):	Sunny
Liquid Used/pH:	H2O
Measured boring diameter:	8 in.
Approx Depth to GW below GS:	100 ft
Well Prep:	Drilled to 50', backfilled to 35.2', silt plug at bottom, placed #3 sand, placed 4" pipe (no pilot tube)

4 in. Well Radius

Initial estimated Depth to Water Surface (in.): 391
Average depth of water in well, "h" (in.): 33
approx. h/r: 8.2
Tu (Fig. 8) (ft): 67.4
Tu>3h?: yes, OK

Cross-sectional area for vol calcs (in.^2): 26.1

	ft	in.	Total (in.)
Depth to Bot of well (or top of soil over Bentor	35.3 ft		424
Pilot Tube stickup (+ is above ground)	0. ft		0
Depth to top of sand outside of casing from top of pilot tube			

Field Data **Calculations**

Date	Time	Depth to WL in Boring (measured from top of pilot tube)		Water Temp (deg F)	Comments	Δt (min)	Total Elapsed Time (min.)	Depth to WL in well (in.)	h, Height of Water in Well (in.)	Δh (in.)	Avg. h	Vol Change (in.^3)			Flow (in^3/ min)	q, Flow (in^3/ hr)	Average Infiltration Surface Area, (in^2)	V (Fig 9)	Infiltration Rate [flow/surf area] (in./hr) (FS=1)
Start Date	Start time:	ft	in.									from supply	from Δh	Total					
6/11/2021	9:35																		
6/11/21	9:55	27.6		65			20	331.2	92.4										
6/11/21	10:00	28.56				5	25	342.7	80.9	-11.52	87	0	301	301	60	3610	2176	1.0	**1.69**
6/11/21	10:05	30.57				5	30	366.8	56.8	-24.12	69	0	630	630	126	7558	1729	1.0	**4.47**
6/11/21	10:10	33.59				5	35	403.1	20.5	-36.24	39	0	946	946	189	11355	971	1.0	**11.95**
6/11/21					refill														
6/11/21	10:12	27.42					37	329.0	94.6										
6/11/21	10:17	32.01				5	42	384.1	39.5	-55.08	67	0	1438	1438	288	17258	1684	1.0	**10.47**
6/11/21	10:22	33.98				5	47	407.8	15.8	-23.64	28	0	617	617	123	7407	695	1.0	**10.89**
6/11/21	10:27	35.2				5	52	422.4	1.2	-14.64	9	0	382	382	76	4587	214	1.0	**21.89**
6/11/21					refill														
6/11/21	10:29	27.51					54	330.1	93.5										
6/11/21	10:34	32.02				5	59	384.2	39.4	-54.12	66	0	1413	1413	283	16958	1668	1.0	**10.38**
6/11/21	10:39	32.09				5	64	385.1	38.5	-0.84	39	0	22	22	4	263	978	1.0	**0.27**
6/11/21	10:44	32.23				5	69	386.8	36.8	-1.68	38	0	44	44	9	526	947	1.0	**0.57**
6/11/21	10:49	32.34				5	74	388.1	35.5	-1.32	36	0	34	34	7	414	909	1.0	**0.46**
6/11/21	10:54	33.59				5	79	403.1	20.5	-15	28	0	392	392	78	4700	704	1.0	**6.82**
6/11/21	10:59	34.05				5	84	408.6	15.0	-5.52	18	0	144	144	29	1730	446	1.0	**3.96**
6/11/21	11:04	34.51				5	89	414.1	9.5	-5.52	12	0	144	144	29	1730	307	1.0	**5.75**
6/11/21					refill														
6/11/21	11:07	29.81					92	357.7	65.9										
6/11/21	11:12	31.29				5	97	375.5	48.1	-17.76	57	0	464	464	93	5565	1432	1.0	**3.97**
6/11/21	11:17	31.78				5	102	381.4	42.2	-5.88	45	0	154	154	31	1842	1135	1.0	**1.66**
6/11/21	11:24	32.5				7	109	390.0	33.6	-8.64	38	0	226	226	32	1934	953	1.0	**2.07**
6/11/21	11:29	32.95				5	114	395.4	28.2	-5.4	31	0	141	141	28	1692	776	1.0	**2.23**
6/11/21	11:34	33.49				5	119	401.9	21.7	-6.48	25	0	169	169	34	2030	627	1.0	**3.31**
6/11/21	11:39	33.82				5	124	405.8	17.8	-3.96	20	0	103	103	21	1241	496	1.0	**2.56**
6/11/21	11:44	34.6				5	129	415.2	8.4	-9.36	13	0	244	244	49	2933	329	1.0	**9.12**
6/11/21					refill														
6/11/21	11:48	29.42					133	353.0	70.6										
6/11/21	11:53	30.92				5	138	371.0	52.6	-18	62	0	470	470	94	5640	1546	1.0	**3.73**
6/11/21	11:58	31.61				5	143	379.3	44.3	-8.28	48	0	216	216	43	2594	1216	1.0	**2.18**
6/11/21	12:03	32.11				5	148	385.3	38.3	-6	41	0	157	157	31	1880	1037	1.0	**1.85**
6/11/21	12:08	32.45				5	153	389.4	34.2	-4.08	36	0	107	107	21	1278	910	1.0	**1.43**
6/11/21	12:13	33.62				5	158	403.4	20.2	-14.04	27	0	367	367	73	4399	683	1.0	**6.58**
6/11/21	12:18	33.98				5	163	407.8	15.8	-4.32	18	0	113	113	23	1354	452	1.0	**3.06**
6/11/21	12:23	34.24				5	168	410.9	12.7	-3.12	14	0	81	81	16	978	359	1.0	**2.78**
6/11/21					refill														

template updated: 6/30/2020

Results of Falling Head Infiltration Test

Leighton

Project:	10557	Initial estimated Depth to Water Surface (in.):	383
Exploration #/Location:	*LB-3*	Average depth of water in well, "h" (in.):	40
Depth Boring drilled to (ft):	35.3	approx. h/r:	10.1
Tested by:	JAT	Tu (Fig. 8) (ft):	68.1
USCS Soil Type in test zone:	SP-SM	Tu>3h?:	yes, OK
Weather (start to finish):	Sunny		
Liquid Used/pH:	H2O		
Measured boring diameter:	8 in.	4 in. Well Radius	Cross-sectional area for vol calcs (in.^2): 26.1
Approx Depth to GW below GS:	100 ft		
Well Prep:	Drilled to 50', backfilled to 35.2', silt plug at bottom, placed #3 sand, placed 4" pipe (no pilot tube)		

	ft	in.	Total (in.)
Depth to Bot of well (or top of soil over Bentor	35.3 ft		424
Pilot Tube stickup (+ is above ground)	0. ft		0
Depth to top of sand outside of casing from top of pilot tube			

Field Data **Calculations**

Date	Time	Depth to WL in Boring (measured from top of pilot tube)		Water Temp (deg F)	Comments	Δt (min)	Total Elapsed Time (min.)	Depth to WL in well (in.)	h, Height of Water in Well (in.)	Δh (in.)	Avg. h	Vol Change (in.^3)			Flow (in^3/ min)	q, Flow (in^3/ hr)	Average Infiltration Surface Area, (in^2)	V (Fig 9)	Infiltration Rate [flow/surf area] (in./hr) (FS=1)
Start Date	Start time:	ft	in.									from supply	from Δh	Total					
6/11/2021	9:35																		
6/11/21	12:26	29.61		65	Refilled		171	355.3	68.3										
6/11/21	12:31	31.63				5	176	379.6	44.0	-24.24	56	0	633	633	127	7595	1411	1.0	**5.50**
6/11/21	12:36	32.86				5	181	394.3	29.3	-14.76	37	0	385	385	77	4625	921	1.0	**5.13**
6/11/21	12:41	33.43				5	186	401.2	22.4	-6.84	26	0	179	179	36	2143	650	1.0	**3.37**
6/11/21	12:46	33.85				5	191	406.2	17.4	-5.04	20	0	132	132	26	1579	500	1.0	**3.22**
6/11/21	12:51	34.25				5	196	411.0	12.6	-4.8	15	0	125	125	25	1504	377	1.0	**4.08**
6/11/21																			
6/11/21	12:53	27.18			Refilled		198	326.2	97.4										
6/11/21	12:59	30.05				6	204	360.6	63.0	-34.44	80	0	899	899	150	8993	2015	1.0	**4.56**
6/11/21	13:04	31.76				5	209	381.1	42.5	-20.52	53	0	536	536	107	6430	1325	1.0	**4.96**
6/11/21	13:09	31.85				5	214	382.2	41.4	-1.08	42	0	28	28	6	338	1054	1.0	**0.33**
6/11/21	13:14	32.31				5	219	387.7	35.9	-5.52	39	0	144	144	29	1730	971	1.0	**1.82**
6/11/21	13:19	32.54				5	224	390.5	33.1	-2.76	34	0	72	72	14	865	867	1.0	**1.02**
6/11/21	13:24	32.6				5	229	391.2	32.4	-0.72	33	0	19	19	4	226	823	1.0	**0.28**
6/11/21	13:29	32.73				5	234	392.8	30.8	-1.56	32	0	41	41	8	489	794	1.0	**0.63**
6/11/21	13:34	33.39				5	239	400.7	22.9	-7.92	27	0	207	207	41	2482	675	1.0	**3.75**
6/11/21	13:39	33.61				5	244	403.3	20.3	-2.64	22	0	69	69	14	827	543	1.0	**1.56**
6/11/21	13:44	33.78				5	249	405.4	18.2	-2.04	19	0	53	53	11	639	484	1.0	**1.35**
6/11/21	13:49	34.05				5	254	408.6	15.0	-3.24	17	0	85	85	17	1015	417	1.0	**2.48**
6/11/21																			
6/11/21	13:55	28.51					260	342.1	81.5										
6/11/21	14:00	29.88				5	265	358.6	65.0	-16.44	73	0	429	429	86	5151	1840	1.0	**2.86**
6/11/21	14:05	30.93				5	270	371.2	52.4	-12.6	59	0	329	329	66	3948	1476	1.0	**2.73**
6/11/21	14:10	31.81				5	275	381.7	41.9	-10.56	47	0	276	276	55	3309	1185	1.0	**2.85**
6/11/21	14:15	32.51				5	280	390.1	33.5	-8.4	38	0	219	219	44	2632	947	1.0	**2.84**
6/11/21	14:20	32.72				5	285	392.6	31.0	-2.52	32	0	66	66	13	790	809	1.0	**1.00**
6/11/21	14:25	32.95				5	290	395.4	28.2	-2.76	30	0	72	72	14	865	743	1.0	**1.19**
6/11/21	14:30	33.22				5	295	398.6	25.0	-3.24	27	0	85	85	17	1015	668	1.0	**1.55**
6/11/21																			
6/11/21	14:35	25.01					300	300.1	123.5										
6/11/21	14:40	27.62				5	305	331.4	92.2	-31.32	108	0	818	818	164	9814	2708	1.0	**3.70**
6/11/21	14:45	29.85				5	310	358.2	65.4	-26.76	79	0	699	699	140	8385	1979	1.0	**4.33**
6/11/21	14:50	31.04				5	315	372.5	51.1	-14.28	58	0	373	373	75	4474	1463	1.0	**3.12**
6/11/21	14:55	31.82				5	320	381.8	41.8	-9.36	46	0	244	244	49	2933	1167	1.0	**2.57**
6/11/21	15:00	32.46				5	325	389.5	34.1	-7.68	38	0	201	201	40	2406	953	1.0	**2.58**
6/11/21	15:05	32.67				5	330	392.0	31.6	-2.52	33	0	66	66	13	790	824	1.0	**0.98**
6/11/21	15:10	32.69				5	335	392.3	31.3	-0.24	31	0	6	6	1	75	790	1.0	**0.10**
6/11/21	15:15	32.72				5	340	392.6	31.0	-0.36	31	0	9	9	2	113	782	1.0	**0.15**
6/11/21	15:20	32.74				5	345	392.9	30.7	-0.24	31	0	6	6	1	75	775	1.0	**0.10**

template updated: 6/30/2020

APPENDIX C

LABORATORY TEST RESULTS

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PARTICLE-SIZE DISTRIBUTION (GRADATION) of SOILS USING SIEVE ANALYSIS

ASTM D 6913

Project Name:	Yorba Villas Infiltration		Tested By:	S. Felter	Date: 06/22/21
Project No.:	10557.006		Checked By:	J. Ward	Date: 06/24/21
Boring No.:	LB-1		Depth (feet):	13.5	
Sample No.:	R-1				
Soil Identification:	Gray silty sand (SM)				

		Moisture Content of Total Air - Dry Soil	
Container No.:	923	Wt. of Air-Dry Soil + Cont. (g)	0.0
Wt. of Air-Dried Soil + Cont.(g)	836.6	Wt. of Dry Soil + Cont. (g)	0.0
Wt. of Container (g)	108.1	Wt. of Container No._____ (g)	1.0
Dry Wt. of Soil (g)	728.5	Moisture Content (%)	0.0

After Wet Sieve	Container No.	923
	Wt. of Dry Soil + Container (g)	760.2
	Wt. of Container (g)	108.1
	Dry Wt. of Soil Retained on # 200 Sieve (g)	652.1

U. S. Sieve Size (in.)	U. S. Sieve Size (mm.)	Cumulative Weight Dry Soil Retained (g)	Percent Passing (%)
1 1/2"	37.5		
1"	25.0		
3/4"	19.0		
1/2"	12.5		
3/8"	9.5		
#4	4.75		
#8	2.36	0.0	100.0
#16	1.18	2.2	99.7
#30	0.600	21.7	97.0
#50	0.300	153.1	79.0
#100	0.150	454.9	37.6
#200	0.075	617.1	15.3
PAN			

GRAVEL: **0 %**

SAND: **85 %**

FINES: **15 %**

GROUP SYMBOL: **SM**

Cu = D60/D10 = _____

Cc = $(D30)^2/(D60*D10)$ = _____

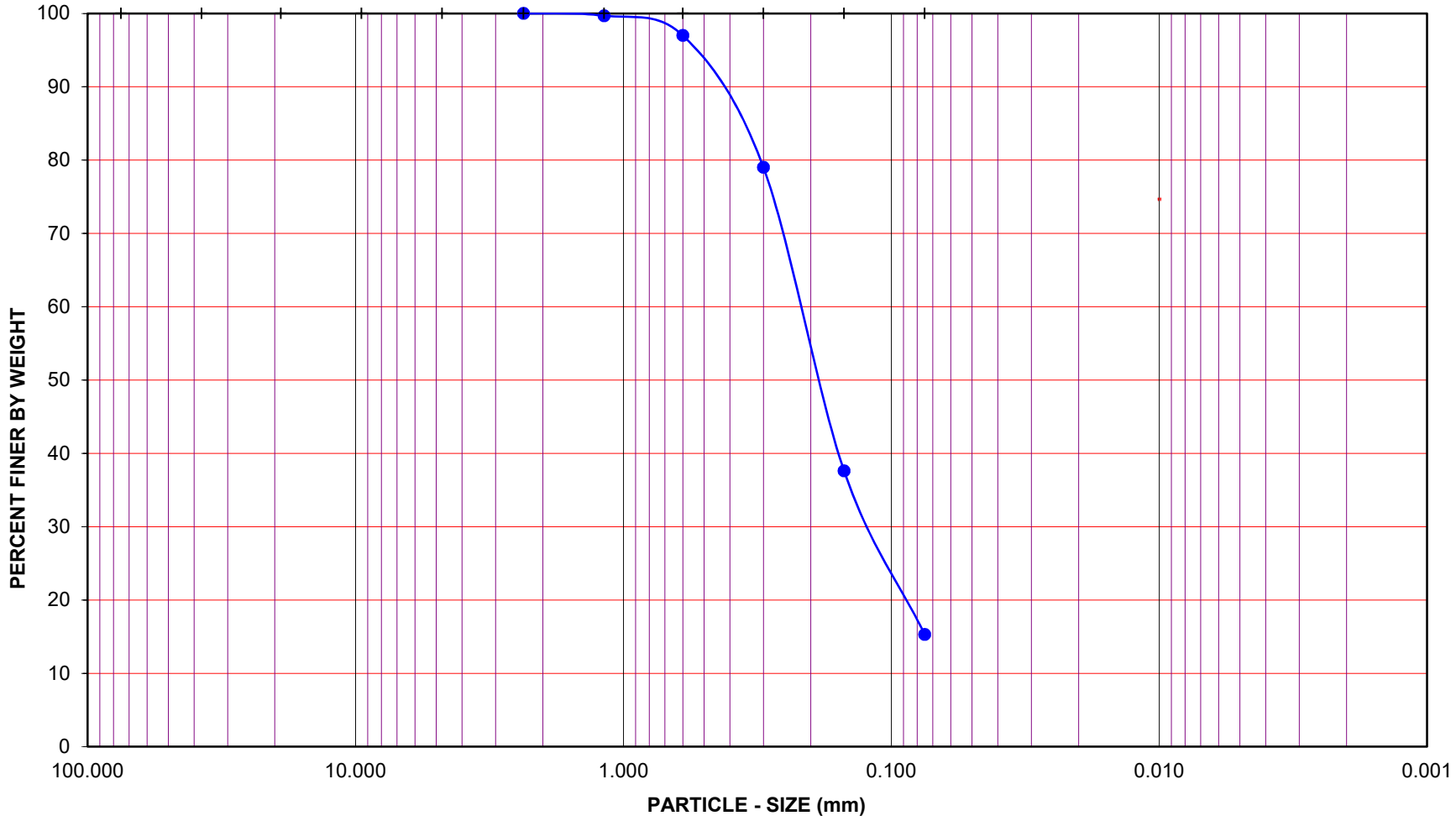
Remarks: _____

GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY

U.S. STANDARD SIEVE OPENING: 3.0" 1 1/2" 3/4" 3/8" #4

U.S. STANDARD SIEVE NUMBER: #8 #16 #30 #50 #100 #200

HYDROMETER



Project Name: Yorba Villas Infiltration

Project No.: 10557.006

Boring No.: LB-1 Sample No.: R-1

Depth (feet): 13.5 Soil Type : SM

Soil Identification: Gray silty sand (SM)

GR:SA:FI : (%) 0 : 85 : 15

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PARTICLE - SIZE DISTRIBUTION ASTM D 6913

Jun-21

SA LB-1, R-1 @ 13.5

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PARTICLE-SIZE DISTRIBUTION (GRADATION) of SOILS USING SIEVE ANALYSIS

ASTM D 6913

Project Name:	Yorba Villas Infiltration		Tested By:	S. Felter	Date: 06/22/21
Project No.:	10557.006		Checked By:	J. Ward	Date: 06/24/21
Boring No.:	LB-2		Depth (feet):	35.0	
Sample No.:	R-10				
Soil Identification:	Grayish brown poorly-graded sand with silt and gravel (SP-SM)g				

		Moisture Content of Total Air - Dry Soil	
Container No.:	9554	Wt. of Air-Dry Soil + Cont. (g)	0.0
Wt. of Air-Dried Soil + Cont.(g)	946.3	Wt. of Dry Soil + Cont. (g)	0.0
Wt. of Container (g)	108.1	Wt. of Container No._____ (g)	1.0
Dry Wt. of Soil (g)	838.2	Moisture Content (%)	0.0

After Wet Sieve	Container No.	9554
	Wt. of Dry Soil + Container (g)	889.2
	Wt. of Container (g)	108.1
	Dry Wt. of Soil Retained on # 200 Sieve (g)	781.1

U. S. Sieve Size (in.)	U. S. Sieve Size (mm.)	Cumulative Weight Dry Soil Retained (g)	Percent Passing (%)
1 1/2"	37.5	0.0	100.0
1"	25.0	57.8	93.1
3/4"	19.0	112.1	86.6
1/2"	12.5	160.8	80.8
3/8"	9.5	189.3	77.4
#4	4.75	266.5	68.2
#8	2.36	344.0	59.0
#16	1.18	434.3	48.2
#30	0.600	539.4	35.6
#50	0.300	649.8	22.5
#100	0.150	725.1	13.5
#200	0.075	768.4	8.3
PAN			

GRAVEL: **32 %**

SAND: **60 %**

FINES: **8 %**

GROUP SYMBOL: **(SP-SM)g**

Cu = D60/D10 = 26.60

Cc = $(D30)^2/(D60*D10)$ = 0.86

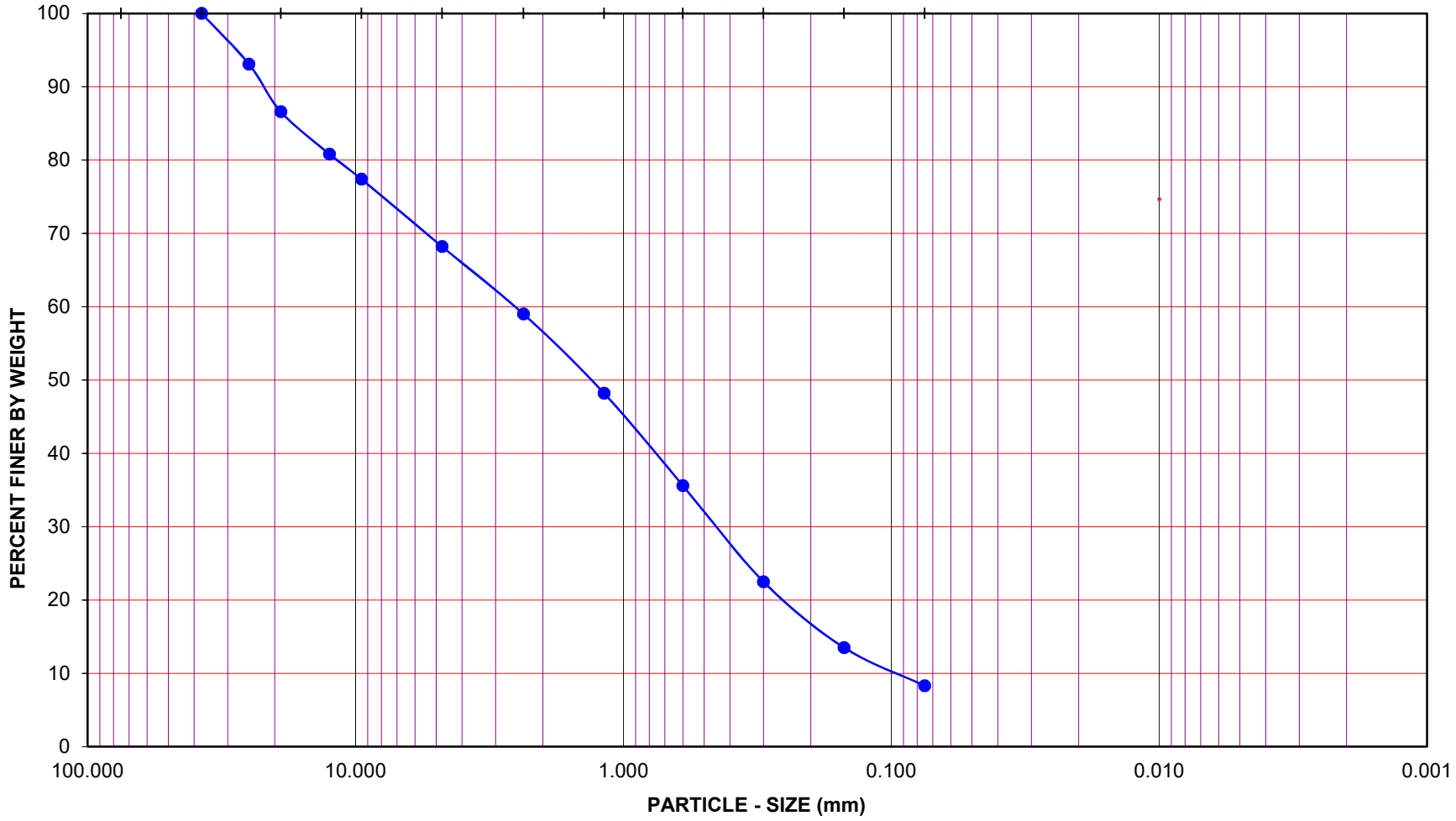
Remarks:

GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY

U.S. STANDARD SIEVE OPENING: 3.0" 1 1/2" 3/4" 3/8"

U.S. STANDARD SIEVE NUMBER: #4 #8 #16 #30 #50 #100 #200

HYDROMETER



Project Name: Yorba Villas Infiltration

Project No.: 10557.006

Boring No.: LB-2 Sample No.: R-10

Depth (feet): 35.0 Soil Type : (SP-SM)g

Soil Identification: Grayish brown poorly-graded sand with silt and gravel (SP-SM)g

GR:SA:FI : (%) 32 : 60 : 8

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PARTICLE - SIZE DISTRIBUTION ASTM D 6913

Jun-21

Boring No.	LB-2	LB-2						
Sample No.	R-9	R-11						
Depth (ft.)	30.0	40.0						
Sample Type	Ring	Ring						
Soil Identification	Brown silty sand (SM)	Brown silty sand (SM)						
Moisture Correction								
Wet Weight of Soil + Container (g)	0.0	0.0						
Dry Weight of Soil + Container (g)	0.0	0.0						
Weight of Container (g)	1.0	1.0						
Moisture Content (%)	0.0	0.0						
Sample Dry Weight Determination								
Weight of Sample + Container (g)	841.3	719.9						
Weight of Container (g)	106.4	107.3						
Weight of Dry Sample (g)	734.9	612.6						
Container No.:								
After Wash								
Method (A or B)	A	A						
Dry Weight of Sample + Cont. (g)	579.5	520.5						
Weight of Container (g)	106.4	107.3						
Dry Weight of Sample (g)	473.1	413.2						
% Passing No. 200 Sieve	**35.6**	**32.5**						
% Retained No. 200 Sieve	64.4	67.5						

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PERCENT PASSING
No. 200 SIEVE
ASTM D 1140

Project Name: Yorba Villas Infiltration

Project No.: 10557.006

Tested By: S. Felter Date: 06/22/21

GEOTECHNICAL INVESTIGATION, PROPOSED RESIDENTIAL DEVELOPMENT, APN'S 1013-211-21 AND 1013-211-22, NORTHWEST OF FRANCIS AVENUE AND YORBA AVENUE, CITY OF CHINO, CALIFORNIA

Prepared For:

COASTAL COMMERCIAL PROPERTIES

1020 Second Street, Suite C
Encinitas, California 92024

Project No. 10557.004

August 26, 2016

Leighton and Associates, Inc.

A LEIGHTON GROUP COMPANY

Leighton and Associates, Inc.
A LEIGHTON GROUP COMPANY

August 26, 2016

Project No. 10557.004

To: Coastal Commercial Properties
1020 Second Street, Suite C
Encinitas, California 92024

Attention: Mr. Brett Crowder

Subject: Geotechnical Investigation, Proposed Residential Development, APNs 1013-211-21 and 1013-211-22, Northwest of Francis Avenue and Yorba Avenue, City of Chino, California

In response to your request, Leighton and Associates, Inc. has conducted a geotechnical investigation for the proposed residential development to be located on APN 1013-211-21 and 1013-211-22, northwest of Francis Avenue and Yorba Avenue, in the City of Chino, California. This report updates our original geotechnical report for the subject property dated January 9, 2014.

Based on the results of our study, it is our professional opinion that the proposed development of the site is feasible from a geotechnical perspective, based on the current preliminary project plans. The accompanying geotechnical report presents a summary of our current investigation and provides geotechnical conclusions and recommendations.

10532 Acacia Street, Suite B-6 ▪ Rancho Cucamonga, CA 91730-5455
909.484.2205 ▪ 909.484.2170 Fax

We appreciate the opportunity to work with you on the development of this project. If you have any questions regarding this report, please call us at your convenience.

Respectfully submitted,

LEIGHTON AND ASSOCIATES, INC.

Jason D. Hertzberg, GE 2711
Principal Engineer

Philip A. Buchiarelli, CEG 1715
Principal Geologist

JDO/JDH/PB/rsm

Distribution: (2) Addressee

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TABLE OF CONTENTS

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TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 Site Location and Description

The subject property consists of approximately 12 acres and was recently utilized as grazing land for a neighboring goat farm. The property is roughly broken up into thirds, with the western third occupied by numerous small rectangular concrete pads (presumably residential structures all of which had been demolished by the mid-1990s) and one maintenance shed used for the storage of materials associated with the goats currently grazing the site. The middle third is occupied by numerous elongated concrete slabs and a few animals pens associated with a former rabbit farm (present between the 1960 and mid 1990s), bee hives, and an empty maintenance shed. The eastern third of the site is primarily vacant, with a residence containing several structures and a pool. The property slopes gently to the south.

1.2 Proposed Development

The preliminary plans that have been provided by you depict a residential development with 46 lots that we assume would be planed for single family residential homes, as well as drainage, utility, street, sidewalk, a small park, landscape and associated improvements. We would expect relatively shallow cuts and fills to achieve design grade (generally on the order of 5 feet or less).

1.3 Purpose of Investigation

This report presents the updated results of our geotechnical investigation for the subject site located northwest of Francis Avenue and Yorba Avenue in Chino, California (Figure 1). The purpose of this study has been to evaluate the general geotechnical conditions at the site with respect to the proposed development and provide preliminary geotechnical recommendations for design and construction.

Our geotechnical exploration included hollow-stem auger soil borings, laboratory testing and geotechnical analysis to evaluate the existing conditions and develop the recommendations contained in this report. We also conducted infiltration testing to evaluate general infiltration characteristics at the depths tested for water quality basin design.

1.4 Scope of Investigation

The scope of our study has included the following tasks:

- Background Review: We reviewed available, relevant geotechnical geologic maps and reports and aerial photographs available from our in-house library. This included a review of geotechnical reports previously prepared for the site.

- Utility Coordination: We contacted Underground Service Alert (USA) prior to excavating borings and test pits so that utility companies could mark utilities onsite. We also coordinated our work with you and the property representative.

- Field Exploration: Previous subsurface explorations have been performed on the site by Leighton in December of 2013. A total of 5 exploratory soil borings (LB-1 through LB-5) were logged and sampled onsite to evaluate subsurface conditions.

    - The borings were drilled to depths ranging from 21.5 to 51.5 feet below the existing ground surface (bgs) by a subcontracted drill rig operator. The borings were logged by our field representative during drilling. Relatively undisturbed soil samples were obtained at selected intervals within the borings using a California Ring Sampler. Standard Penetration Tests (SPT) were conducted at selected depths and samples were obtained. Representative bulk soil samples were also collected at shallow depths from the borings.

    - Well permeameter tests were conducted at the 5 boring locations on the site (LB-1 through LB-5) to evaluate general infiltration rates of the subsurface soils at the depths and locations tested. The well permeameter tests were conducted based on the USBR 7300-89 method. All tests were conducted at depths of about 5 to 6 feet bgs to estimate the infiltration rate for use of shallow infiltration trenches.

  All excavations were backfilled with the soil cuttings. Logs of the geotechnical borings and the well permeameter test results are presented in Appendix B. Approximate boring and well permeameter test locations are shown on the accompanying Test Location Map, Figure 2.

- Geotechnical Laboratory Testing: Geotechnical laboratory tests were conducted on selected relatively undisturbed and bulk soil samples obtained during our field investigation. This laboratory testing program was designed to evaluate engineering characteristics of site soils. Laboratory tests conducted during this investigation include:

    - In situ moisture content and dry density
    - Maximum dry density and optimum moisture content
    - Sieve analysis for grain-size distribution
    - Swell and collapse potential
    - Water-soluble sulfate concentration
    - Resistivity, chloride content and pH

    The in situ moisture content and dry density test results are shown on the boring logs, Appendix B. The other laboratory test results are presented in Appendix C.

- Engineering Analysis: Data obtained from our background review, previous field exploration and geotechnical laboratory testing was evaluated and analyzed to develop geotechnical conclusions and provide preliminary recommendations presented in this report.

- Report Preparation: Results of our preliminary geotechnical investigation have been summarized in this report, presenting our findings, conclusions and preliminary geotechnical recommendations for design and construction of the proposed residential development.

2.0 FINDINGS

2.1 Regional Geologic Conditions

The site is located within the Chino Basin in the northern portion of the Peninsular Range geomorphic province of California. Major structural features surround this region, including the Cucamonga fault and the San Gabriel Mountains to the north, the Chino fault and Puente/Chino Hills to the west, and the San Jacinto fault to the east. This is an area of large-scale crustal disturbance as the relatively northwestward-moving Peninsular Range Province collides with the Transverse Range Province (San Gabriel and San Bernardino Mountains) to the north. Several active or potentially active faults have been mapped in the region and are believed to accommodate compression associated with this collision. The site is underlain by younger alluvial soil deposits eroded from the mountains surrounding the basin and deposited in the site vicinity.

2.2 Subsurface Soil Conditions

Based upon our review of pertinent geotechnical literature and our subsurface exploration, the site is underlain by alluvial soil deposits mantled in areas of the site by minor amounts of goat manure. The manure was generally less than approximately one inch thick. The alluvial soil encountered within our excavations generally consisted of combinations of sand and silt, with some gravel interspersed. The soil was generally moist and medium dense. The in-situ moisture content within the upper approximately 15 feet generally ranged from 1 to 10 percent. More detailed descriptions of the subsurface soil are presented on the boring logs.

2.2.1 Compressible and Collapsible Soil

Soil compressibility refers to a soil's potential for settlement when subjected to increased loads as from a fill surcharge. Based on our investigation, the native soil encountered is generally considered slightly to moderately compressible. Partial removal and recompaction of this material under shallow foundations is recommended to reduce the potential for adverse total and differential settlement of the proposed improvements.

Collapse potential refers to the potential settlement of a soil under existing stresses upon being wetted. Test results indicate that the alluvial soil within the upper 10 feet onsite has a minor collapse potential.

2.2.2 Expansive Soils

Expansive soils contain significant amounts of clay particles that swell considerably when wetted and shrink when dried. Foundations constructed on these soils are subjected to large uplifting forces caused by the swelling. Without proper measures taken, heaving and cracking of both building foundations and slabs-on-grade could result.

The near surface soils consist of sands and silty sands. Based on our observations conditions and experience in the area, the near-surface soil is generally expected to have a very low expansion potential.

2.2.3 Sulfate Content

Water-soluble sulfates in soil can react adversely with concrete. However, concrete in contact with soil containing sulfate concentrations of less than 0.1 percent by weight is considered to have negligible sulfate exposure based on the American Concrete Institute (ACI) provisions, adopted by the 2010 CBC (CBC, 2010, Chapter 19, and ACI, 2005, Chapter 4).

A near-surface soil sample was tested during this investigation for soluble sulfate content. The results of this test indicate a sulfate content of less than 0.01 percent by weight, indicating negligible sulfate exposure. Recommendations for concrete in contact with the soil are provided in Section 3.11.

2.2.4 Resistivity, Chloride and pH

Soil corrosivity to ferrous metals can be estimated by the soil's electrical resistivity, chloride content and pH. In general, soil having a minimum resistivity less than 1,000 ohm-cm is considered severely corrosive. Soil with a chloride content of 500 parts-per-million (ppm) or more is considered corrosive to ferrous metals.

As a screening for potentially corrosive soil, representative soil samples were tested during this investigation to determine minimum resistivity, chloride content, and pH. The tests indicated a minimum resistivity of 8,100 ohm-cm, chloride content of 200 ppm, and pH of 6.9. Based on the chloride content, the onsite soil is considered moderately corrosive to ferrous metals.

2.3 Groundwater

Groundwater was not encountered in our borings excavated to a maximum depth of 51.5 feet below the existing ground surface (bgs). Historical groundwater mapping indicates that groundwater was approximately 150 feet bgs in 1933 (CDWR, 1970). Recent data from the California Department of Water Resources indicates groundwater levels no higher than 200 feet bgs in the area (CDWR, 2013). Based on this, groundwater has historically been deep, and shallow groundwater is not expected at the site.

2.4 Faulting and Seismicity

Our review of available in-house literature indicates that there are no known active faults traversing the site. The closest known active or potentially active fault is the Chino-Elsinore fault, located approximately 3 miles southwest of the site.

The principal seismic hazard that could affect the site is ground shaking resulting from an earthquake occurring along several major active or potentially active faults in southern California. The known regional active and potentially active faults that could produce the most significant ground shaking at the site include the Chino-Elsinore, San Jose, Cucamonga, Sierra Madre, Whittier, Elsinore-Glen Ivy, and Elysian Park Thrust faults.

The Peak Horizontal Ground Acceleration (PHGA) and hazard deaggregation were estimated using the United States Geological Survey's (USGS) 2008 Interactive Deaggregations utility. The results of this analysis indicate that the predominant modal earthquake has a PHGA of 0.76g with magnitude of approximately 6.6 (M_W) at a distance on the order of 7 kilometers for the Maximum Considered Earthquake (2% probability of exceedance in 50 years). Based on this, the corresponding PHGA for the design earthquake (2/3 of the MCE) is 0.51g.

We also estimated the design PHGA based on the 2013 California Building Code Section 1613. The calculated S_{DS} value at the site is 1.18g (see Section 3.4). Dividing this by a factor of 2.5 results in a design peak horizontal ground acceleration (PHGA) of 0.47g, per 2013 CBC, Section 1803.5.12(2).

Based on these results, we have selected a design PHGA of 0.51g for seismic analysis of the onsite soils (seismic settlement).

2.5 Secondary Seismic Hazards

In general, secondary seismic hazards for sites in the region could include soil liquefaction, earthquake-induced settlement, lateral displacement, landsliding, and earthquake-induced flooding. The potential for secondary seismic hazards at the site is discussed below.

2.5.1 Liquefaction Potential

Liquefaction is the loss of soil strength or stiffness due to a buildup of pore-water pressure during severe ground shaking. Liquefaction is associated primarily with loose (low density), saturated, fine-to-medium grained, cohesionless soils. As the shaking action of an earthquake progresses, the soil grains are rearranged and the soil densifies within a short period of time. Rapid densification of the soil results in a buildup of pore-water pressure. When the pore-water pressure approaches the total overburden pressure, the soil reduces greatly in strength and temporarily behaves similarly to a fluid. Effects of liquefaction can include sand boils, settlement, and bearing capacity failures below structural foundations.

The State of California has not prepared liquefaction hazard maps for this area. San Bernardino County (2010) does not show the site in a zone of susceptibility for liquefaction.

Based on our study, current groundwater levels are deeper than 51.5 feet bgs and historic high groundwater levels are deeper than 150 feet bgs. As such, the potential for liquefaction at the site is very low.

2.5.2 Seismically Induced Settlement

During a strong seismic event, seismically induced settlement can occur within loose to moderately dense, dry or saturated granular soil. Settlement caused by ground shaking is often nonuniformly distributed, which can result in differential settlement.

Considering our recommended overexcavation recommendations, the potential total settlement resulting from seismic loading is considered low (less than 1 inch) for this site. Differential settlement resulting from seismic loading is generally assumed to be one-half of the total seismically induced settlement over a distance of 40 feet. Seismic settlement analysis is provided in Appendix D.

2.5.3 Seismically Induced Landslides

The site is generally level without significant slopes. This site is not considered susceptible to static slope instability or seismically induced landslides.

3.0 CONCLUSIONS AND RECOMMENDATIONS

Based on this investigation, construction of the proposed residential development is feasible from a geotechnical standpoint. No severe geologic or soils related issues were identified that would preclude development of the site for the proposed improvements. The most significant geotechnical issues at the site are those related to the potential for strong seismic shaking and potentially compressible soils. Good planning and design of the project can limit the impact of these constraints. Remedial recommendations for these and other geotechnical issues are provided in the following sections.

The site is not expected to be prone to adverse effects of slope instability or adverse differential settlement from cut/fill transitions (significant cuts and fills are not proposed).

Although not identified during this investigation, abandoned septic tanks, seepage pits, or other buried structures, trash pits, or items related to past site uses may be present. If such items were encountered during grading, they would require further evaluation and special consideration.

3.1 General Earthwork and Grading

All grading should be performed in accordance with the General Earthwork and Grading Specifications presented in Appendix E, unless specifically revised or amended below or by future recommendations based on final development plans.

3.1.1 Site Preparation

Prior to construction, the site should be cleared of vegetation, trash and debris, which should be disposed of offsite. Any underground obstructions should be removed as should large tress and their root systems. Resulting cavities should be properly backfilled and compacted. Efforts should be made to locate existing utility lines. Those lines should be removed or rerouted if they interfere with the proposed construction, and the resulting cavities should be properly backfilled and compacted. Trees should be removed.

3.1.2 Removal of Manure, Organic-Rich Soil and Uncontrolled Artificial Fill

Prior to overexcavation and recompaction of the onsite alluvial soil, all manure should be cleared and removed from the site. Heavy concentrations of organic-rich soil (containing visible organic matter or containing an organic content of 2 percent by weight or more) should be removed.

Removal and disposal of manure and organic-rich soil should be observed by Leighton and Associates. Organic content testing should be performed during removal to guide disposal operations.

In addition to the above, prior to overexcavation and recompaction of the onsite alluvial soil, any clean uncontrolled artificial fill should be removed and may be used as compacted fill for the project.

If suitable open space areas are available without proposed structures, such as a park site, it may be possible to place organic-rich soil and minor amounts of manure as non-structural fill in those areas, provided this is acceptable to the local reviewing agency. If this is done, we suggest the manure and organic-rich soils be mixed with clean soil to reduce the overall organic content and a clean soil cap be provided above the organic-rich soil.

3.1.3 Overexcavation and Recompaction

To reduce the potential for adverse differential settlement of the proposed improvements, the underlying subgrade soil should be prepared in such a manner that a uniform response to the applied loads is achieved. For structures with shallow foundations, we recommend that onsite alluvial soils be overexcavated and recompacted to a minimum depth of 3 feet below the bottom of the proposed footings or 5 feet below existing grade, whichever is deeper. Overexcavation and recompaction should extend a minimum horizontal distance of 5 feet from perimeter edges of the proposed footings.

Local conditions may require that deeper overexcavation be performed; such areas should be evaluated by Leighton during grading.

Areas outside these overexcavation limits planned for asphalt or concrete pavement, flatwork, and site walls, and areas to receive fill should be overexcavated to a minimum depth of 24 inches below the existing ground surface or 12 inches below the proposed subgrade, whichever is deeper.

After completion of the overexcavation, and prior to fill placement, the exposed surfaces should be scarified to a minimum depth of 6 inches, moisture conditioned to or slightly above optimum moisture content, and recompacted to a minimum 90 percent relative compaction, relative to the ASTM D 1557 laboratory maximum density.

These recommendations should be reviewed once a grading plan is available.

3.1.4 Fill Placement and Compaction

Manure and organic-rich soil is considered unsuitable for support of the proposed improvements, and will require offsite disposal or placement in non-structural areas. All structural fill should be visibly free of organic matter or should have a total organic matter content of less than 2.0 percent.

Onsite soil to be used for compacted structural fill should also be free of debris and oversized material (greater than 8 inches in largest dimension). Any soil to be placed as fill, whether onsite or imported material, should be reviewed and possibly tested by Leighton.

All fill soil should be placed in thin, loose lifts, moisture conditioned, as necessary, and compacted to a minimum 90 percent relative compaction. Relative compaction should be determined in accordance with ASTM Test Method D1557. Aggregate base for pavement should be compacted to a minimum of 95 percent relative compaction.

3.1.5 Import Fill Soil

Import soil to be placed as fill should be geotechnically accepted by Leighton. Preferably at least 3 working days prior to proposed import to the site, the contractor should provide Leighton pertinent information of the proposed import soil, such as location of the soil, whether stockpiled or

native in place, and pertinent geotechnical reports if available. We recommend that a Leighton representative visit the proposed import site to observe the soil conditions and obtain representative soil samples. Potential issues may include soil that is more expansive than onsite soil, soil that is too wet, soil that is too rocky or too dissimilar to onsite soils, oversize material, organics, debris, etc.

3.1.6 Shrinkage and Subsidence

The change in volume of excavated and recompacted soil varies according to soil type and location. This volume change is represented as a percentage increase (bulking) or decrease (shrinkage) in volume of fill after removal and recompaction. Subsidence occurs as in-place soil (e.g., natural ground) is moisture-conditioned and densified to receive fill, such as in processing an overexcavation bottom. Subsidence is in addition to shrinkage due to recompaction of fill soil. Field and laboratory data used in our calculations included laboratory-measured maximum dry densities for soil types encountered at the subject site, the measured in-place densities of soils encountered and our experience. We preliminarily estimate the following earth volume changes will occur during grading:

Shrinkage	Approximately 15 +/- 5 percent
Subsidence (overexcavation bottom processing)	Approximately 0.15 feet

It should be noted that these values do not account for removal of manure and organic-rich soil.

The level of fill compaction, variations in the dry density of the existing soils and other factors influence the amount of volume change. Some adjustments to earthwork volume should be anticipated during grading of the site.

3.1.7 Rippability and Oversized Material

Oversized material (rock or rock fragments greater than 8 inches in dimension) was not observed during our investigation. Oversized material should not be used within structural fill areas.

3.2 Shallow Foundation Recommendations

Overexcavation and recompaction of the footing subgrade soil should be performed as detailed in Section 3.1. The following recommendations are based on the onsite soil conditions and soils with a very low expansion potential.

3.2.1 Minimum Embedment and Width

Based on our preliminary investigation, footings should have a minimum embedment of 18 inches, with a minimum width of 24 and 12 inches for isolated and continuous footings, respectively.

3.2.2 Allowable Bearing

An allowable bearing pressure of 1,800 pounds-per-square-foot (psf) may be used, based on the minimum embedment depth and width above. This allowable bearing value may be increased by 250 psf per foot increase in depth or width to a maximum allowable bearing pressure of 2,500 psf. If higher bearing pressures are required, this should be reviewed on a case-by-case basis. These allowable bearing pressures are for total dead load and sustained live loads. Footing reinforcement should be designed by the structural engineer.

3.2.3 Lateral Load Resistance

Soil resistance available to withstand lateral loads on a shallow foundation is a function of the frictional resistance along the base of the footing and the passive resistance that may develop as the face of the structure tends to move into the soil. The frictional resistance between the base of the foundation and the subgrade soil may be computed using a coefficient of friction of 0.30. The passive resistance may be computed using an allowable equivalent fluid pressure of 240 pounds per cubic foot (pcf), assuming there is constant contact between the footing and undisturbed soil. The coefficient of friction and passive resistance may be combined without further reduction.

3.2.4 Increase in Bearing and Friction - Short Duration Loads

The allowable bearing pressure and coefficient of friction values may be increased by one-third when considering loads of short duration, such as those imposed by wind and seismic forces.

3.3 Recommendations for Slabs-On-Grade

Concrete slabs-on-grade should be designed by the structural engineer in accordance with the current CBC for a soil with a very low expansion potential. Where conventional light floor loading conditions exist, the following minimum recommendations should be used. More stringent requirements may be required by local agencies, the structural engineer, the architect, or the CBC. Laboratory testing should be conducted at finish grade to evaluate the Expansion Index (EI) of near-surface subgrade soils. Slabs-on-grade should have the following minimum recommended components:

Subgrade Moisture Conditioning: The subgrade soil should be moisture conditioned to at least 2 percent above optimum moisture content to a minimum depth of 18 inches prior to placing steel or concrete.

- Moisture Vapor Retarder: A minimum of a 10-mil vapor retarder should be placed below slabs where moisture-sensitive floor coverings or equipment is planned. Since moisture will otherwise be transmitted up from the soil through the concrete, it is important that an intact vapor retarder be installed. We recommend that the vapor retarder meet the requirements of ASTM E1745 and be installed per ASTM E1643. The structural engineer should specify pertinent concrete design parameters and moisture migration prevention measures, such as whether a sand blotter layer should be placed over the vapor retarder. Gravel or other protruding objects that could puncture the moisture retarder should be removed from the subgrade prior to placing the vapor retarder, or a stronger vapor retarder intended for the specific conditions present can be used.

- Concrete Thickness: Slabs-on-grade should be at least 4 inches thick. Reinforcing steel should be designed by the structural engineer, but as a minimum should be No. 4 rebar placed at 18 inches on center, each direction, mid-depth in the slab.

Minor cracking of the concrete as it cures, due to drying and shrinkage is normal and should be expected. However, cracking is often aggravated by a high water/cement ratio, high concrete temperature at the time of placement, small nominal aggregate size, and rapid moisture loss due to hot, dry, and/or windy weather conditions during placement and curing. Cracking due to temperature and moisture fluctuations can also be expected. Low slump concrete can reduce the potential for shrinkage cracking. Additionally, our experience indicates that reinforcement in slabs and foundations can generally reduce the potential for concrete cracking. The structural engineer should consider these components in slab design and specifications.

Moisture retarders can reduce, but not eliminate moisture vapor rise from the underlying soils up through the slab. Floor covering manufacturers should be consulted for specific recommendations.

Leighton does not practice in the field of moisture vapor transmission evaluation, since this is not specifically a geotechnical issue. Therefore, we recommend that a qualified person, such as the flooring subcontractor and/or structural engineer, be consulted with to evaluate the general and specific moisture vapor transmission paths and any impact on the proposed construction. That person should provide recommendations for mitigation of potential adverse impact of moisture vapor transmission on various components of the structures as deemed appropriate.

3.4 Seismic Design Parameters

Seismic parameters presented in this report should be considered during project design. In order to reduce the effects of ground shaking produced by regional seismic events, seismic design should be performed in accordance with the most recent edition of the California Building Code (CBC). The following data should be considered for the seismic analysis of the subject site:

2013 CBC Categorization/Coefficient	Design Value
Site Longitude (decimal degrees)	-117.704
Site Latitude (decimal degrees)	34.042
Site Class Definition (ASCE 7 Table 20.3-1)	D
Mapped Spectral Response Acceleration at 0.2s Period, $\mathbf{S_s}$ (Figure 1613.3.1(1))	1.771 g
Mapped Spectral Response Acceleration at 1s Period, $\mathbf{S_1}$ (Figure 1613.3.1(2))	0.628 g
Short Period Site Coefficient at 0.2s Period, $\mathbf{F_a}$ (Table 1613.3.3(1))	1.0
Long Period Site Coefficient at 1s Period, $\mathbf{F_v}$ (Table 1613.3.3(2)	1.5
Adjusted Spectral Response Acceleration at 0.2s Period, $\mathbf{S_{MS}}$ (Eq. 16-37)	1.771 g
Adjusted Spectral Response Acceleration at 1s Period, $\mathbf{S_{M1}}$ (Eq. 16-38)	0.941 g
Design Spectral Response Acceleration at 0.2s Period, $\mathbf{S_{DS}}$ (Eq. 16-39)	1.181 g
Design Spectral Response Acceleration at 1s Period, $\mathbf{S_{D1}}$ (Eq. 16-40)	0.628 g

3.5 Retaining Walls

We recommend that retaining walls be backfilled with very low expansive soil and constructed with a backdrain in accordance with the recommendations provided on Figure 3 (rear of text). Using expansive soil as retaining wall backfill will result in higher lateral earth pressures exerted on the wall. Based on these recommendations, the following parameters may be used for the design of conventional retaining walls:

Static Equivalent Fluid Weight (pcf)	
Condition	Level Backfill
Active	35 pcf
At-Rest	55 pcf
Passive	240 pcf (allowable) (Maximum of 3,500 psf)

The above values do not contain an appreciable factor of safety unless noted, so the structural engineer should apply the applicable factors of safety and/or load factors during design, as specified by the California Building Code.

Cantilever walls that are designed to yield at least 0.001H, where H is equal to the wall height, may be designed using the active condition. Rigid walls and walls braced at the top should be designed using the at-rest condition.

Passive pressure is used to compute soil resistance to lateral structural movement. In addition, for sliding resistance, a frictional resistance coefficient of 0.3 may be used at the concrete and soil interface. The lateral passive resistance should be taken into account only if it is ensured that the soil providing passive resistance, embedded against the foundation elements, will remain intact with time.

In addition to the above lateral forces due to retained earth, surcharge due to improvements, such as an adjacent structure or traffic loading, should be considered in the design of the retaining wall. Loads applied within a 1:1 projection from the surcharging structure on the stem of the wall should be considered in the design.

A soil unit weight of 120 pcf may be assumed for calculating the actual weight of the soil over the wall footing.

3.6 Infiltration Design

Five well permeameter tests (LB-1 through LB-5) were conducted to estimate the infiltration rate in various parts of the site. The well permeameter tests were conducted at depths between 4 and 6 feet below ground surface.

Well permeameter tests are useful for field measurements of soil infiltration rates, and is suited for testing when the design depth of the basin is deeper than current existing grades. The test consists of excavating a boring to the depth of the test (or deeper if it is partially backfilled with soil and a bentonite plug with a thin soil covering is placed just below the design test elevation). A layer of clean sand is placed in the boring bottom to support a float mechanism and temporary perforated well casing pipe. In addition, sand is poured around the outside of the well casing within the test zone to prevent the boring from caving/collapsing or eroding when water is added. The float mechanism, placed inside the casing, adds water stored in barrels at the top of the hole to the boring as water infiltrates into the soil, while maintaining a constant water head in the boring. The test was conducted based on the USBR 7300-89 test method. The incremental infiltration rate as measured during intervals of the test is defined as the incremental flow rate of water infiltrated, divided by the surface area of the infiltration interface.

Small-scale infiltration rates were measured at the 5 well permeameter locations and ranged from approximately 0.3 to 13 inches per hour (no factor of safety

applied). Infiltration at three of the five locations was too rapid to measure for normal test procedures. One of these three locations was selected based on the boring geology as the probable fastest infiltration location, and a modified test procedure was used to test the infiltration rate using a lower water surface head. The result of this test indicated an infiltration rate of 13 inches per hour. Infiltration test results are provided in Appendix B. These are raw values, before applying an appropriate factor of safety or correction factor. Based on these results, the onsite silty soils or soils with a higher fines content are not considered feasible for infiltration. Sandy soils with a low fines content are anticipated to have higher infiltration rates; however, sandy soils underlain by finer-grained soils are not considered suitable. Specific infiltration design information should be made available so testing representative to the final design conditions can be conducted. The small-scale infiltration rate should be divided by a correction factor of at least 2 for buried chambers and at least 3 for open basins, but the correction/safety factor may be higher based on project-specific aspects, based on *San Bernardino County Stormwater Program Technical Guidance Document for Water Quality Management Plans (WQMP)*.

We recommend that further testing be conducted after a design has been selected for an infiltration facility, since infiltration rates varied significantly across the site.

The infiltration rates described herein are for a clean, unsilted infiltration surface in native, sandy alluvial soil. These values may be reduced over time as silting of the basin or chamber occurs. Furthermore, if the basin or chamber bottom is allowed to be compacted by heavy equipment, this value is expected to be significantly reduced. Infiltration of water through soil is highly dependent on such factors as grain size distribution of the soil particles, particle shape, fines content, clay content, and density. Small changes in soil conditions, including density, can cause large differences in observed infiltration rates. Infiltration is not suitable in compacted fill.

It should be noted that during periods of prolonged precipitation, the underlying soils tend to become saturated to greater and greater depths/extents. Therefore, infiltration rates tend to decrease with prolonged rainfall. It is difficult to extrapolate longer-term, full-scale infiltration rates from small-scale tests, and as such, this is a significant source of uncertainty in infiltration rates.

Additional Review and Evaluation:

Infiltration rates are anticipated to vary significantly based on the location and depth. Infiltration concepts should be discussed with Leighton as infiltration plans are being developed. Leighton should review all infiltration plans, including locations and depths of proposed facilities. Further testing should be conducted based on the design of infiltration facilities, particularly considering their type, depth and location.

General Design Considerations:

The periodic flow of water carrying sediments in the basin or chamber, plus the introduction of wind-blown sediments and sediments from erosion of the basin side walls, can eventually cause the bottom of the basin or chamber to accumulate a layer of silt, which has the potential of significantly reducing the overall infiltration rate of the basin or chamber. Therefore, we recommend that significant amounts of silt/sediment not be allowed to flow into the facility within storm water, especially during construction of the project and prior to achieving a mature landscape on site. We recommend that an easily maintained, robust silt/sediment removal system be installed to pretreat storm water before it enters the infiltration facility.

As infiltrating water can seep within the soil strata nearly horizontally for long distances, it is important to consider the impact that infiltration facilities can have on nearby subterranean structures, such as basement walls or open excavations, whether onsite or offsite, and whether existing or planned. Any such nearby features should be identified and evaluated as to whether infiltrating water can impact these. Such features should be brought to Leighton's attention as they are identified.

Infiltration facilities should not be constructed adjacent to or under buildings. Setbacks should be discussed with Leighton during the planning process.

Infiltration facilities should be constructed with spillways or other appropriate means that would cause overfilling to not be a concern to the facility or nearby improvements.

For buried chambers that allow interior standing water, control/access manhole covers should not contain holes or should be screened to prevent mosquitos from entering the cambers.

Additional Design Considerations (Particularly for Open Basins):

If open basins are planned, additional infiltration exploration and testing should be conducted, as the soils that will be exposed at the bottom of the basin are critical to the basin's success. Soils at the bottom of buried chambers are also important, but not as critical to their success, provided the infiltration chamber cuts through sufficiently granular soils.

In general, the rate of infiltration reduces as the head of water in the infiltration facility reduces, and it also reduces with prolonged periods of infiltration. As such, water typically infiltrates much faster near the beginning of and/or immediately after storm events than at times well after a storm when the water level in the facility has receded, since the infiltration rate is then slower due to both lower head and longer overall duration of infiltration. In open basins with compacted or silty bottoms, this could be problematic, in that, even if the basin had already infiltrated significant amounts of storm water, the lower several inches or feet of water could remain in the basin for an extended period of time, creating a prolonged open-water safety concern and potential for mosquitos. In a buried/covered infiltration chamber, these conditions would be of less concern.

Parks or play/recreation areas should not be constructed within basin bottoms or below the spillway level.

For open basins and swales, vegetation within the basin bottoms and sides is expected to help reduce erosion and help maintain infiltration rates.

Estimating infiltration rates, especially based on small-scale testing, is inexact and indefinite, and often involves known and unknown soil complexities, potentially resulting in a condition where actual infiltration rates of the completed facility are significantly less than design rates. In open infiltration basins, this could create nuisance water in the basin. As such, enhancements may be needed after completion of the basin if prolonged or frequent standing water is experienced. A potential basin enhancement, if needed, might be to install infiltration trenches or dry wells in the basin bottom to capture and infiltrate low flows and to help speed infiltration during/after storms; specific recommendations, such as minimum trench/dry well depth, would be developed based on conditions observed. Such a contingency should be anticipated for open basins.

Construction Considerations:

We recommend that Leighton evaluate the infiltration facility excavations, to confirm that granular, undisturbed alluvium is exposed in the bottoms and sides. Additional excavation or evaluation may be required if silty or clayey soils are exposed.

It is critical to infiltration that the basin or chamber bottom not be allowed to be compacted during construction or maintenance; rubber-tired equipment and vehicles should not be allowed to operate on the bottom. We recommend that at least the bottom 3 feet of the basins or chambers be excavated with an excavator or similar.

If fill material is needed to be placed in the basin, such as due to removal of uncontrolled artificial fill, the fill material should be select and free-draining sand, and should be observed and evaluated by Leighton.

Maintenance Considerations:

The infiltration facilities should be routinely monitored, especially before and during the rainy season, and corrective measures should be implemented as/when needed. Things to check for include proper upkeep, proper infiltration, absence of accumulated silt, and that de-silting filters/features are clean and functioning. Pretreatment desilting features should be cleaned and maintained per manufacturers' recommendations. Even with measures to prevent silt from flowing into the infiltration facility, accumulated silt may need to be removed occasionally as part of maintenance.

3.7 Pavement Design

Based on the design procedures outlined in the current Caltrans Highway Design Manual, and using an assumed design R-value of 50, flexible pavement sections may consist of the following for the Traffic Indices indicated. Final pavement design should be based on the Traffic Index determined by the project civil engineer and R-value testing provided near the end of grading.

Asphalt Pavement Section Thickness, Type I Subgrade Soil			
Traffic Index	Asphaltic Concrete (AC) Thickness (inches)	Class 2 Aggregate Base Thickness (inches)	Total Pavement Section Thickness (inches)
5 or less	3	4	7
6	3	4.5	7.5
7	4	4.5	8.5

All pavement construction should be performed in accordance with the Standard Specifications for Public Works Construction or Caltrans Specifications. Field observations and periodic testing, as needed during placement of the base course materials, should be undertaken to ensure that the requirements of the standard specifications are fulfilled.

Prior to placement of aggregate base, the subgrade soil should be processed to a minimum depth of 6 inches, moisture-conditioned, as necessary, and recompacted to a minimum of 90 percent relative compaction. Aggregate base should be moisture conditioned, as necessary, and compacted to a minimum of 95 percent relative compaction.

If the pavement is to be constructed prior to construction of the structures, we recommend that the full depth of the pavement section be placed in order to support heavy construction traffic.

3.8 Temporary Excavations

All temporary excavations, including utility trenches, retaining wall excavations and other excavations should be performed in accordance with project plans, specifications and all OSHA requirements.

No surcharge loads should be permitted within a horizontal distance equal to the height of cut or 5 feet, whichever is greater from the top of the slope, unless the cut is shored appropriately. Excavations that extend below an imaginary plane inclined at 45 degrees below the edge of any adjacent existing site foundation should be properly shored to maintain support of the adjacent structures.

Cantilever shoring should be designed based on an active equivalent fluid pressure of 35 pcf. If excavations are braced at the top and at specific design intervals, the active pressure may then be approximated by a rectangular soil pressure distribution with the pressure per foot of width equal to 25H, where H is equal to the depth of the excavation being shored.

During construction, the soil conditions should be regularly evaluated to verify that conditions are as anticipated. The contractor should be responsible for providing the "competent person" required by OSHA, standards to evaluate soil conditions. Close coordination between the competent person and the geotechnical engineer should be maintained to facilitate construction while providing safe excavations.

3.9 Trench Backfill

Utility-type trenches onsite can be backfilled with the onsite material, provided it is free of debris, significant organic material and oversized material. Prior to backfilling the trench, pipes should be bedded and shaded in a granular material that has a sand equivalent of 30 or greater. The sand should extend 12 inches above the top of the pipe. The bedding/shading sand should be densified in-place by mechanical means, or in accordance with Greenbook specifications. The native backfill should be placed in loose layers, moisture conditioned, as necessary, and mechanically compacted using a minimum standard of 90 percent relative compaction. The thickness of layers should be based on the compaction equipment used in accordance with the Standard Specifications for Public Works Construction (Greenbook, 2015).

3.10 Surface Drainage

Inadequate control of runoff water and/or poorly controlled irrigation can cause the onsite soils to expand and/or shrink, producing heaving and/or settlement of foundations, flatwork, walls, and other improvements. Maintaining adequate surface drainage, proper disposal of runoff water, and control of irrigation should help reduce the potential for future soil moisture problems.

Positive surface drainage should be designed to be directed away from foundations and toward approved drainage devices, such as gutters, paved drainage swales, or watertight area drains and collector pipes.

Surface drainage should be provided to prevent ponding of water adjacent to the structures. In general, the area around the buildings should slope away from the building. We recommend that unpaved landscaped areas adjacent to the buildings be avoided. Roof runoff should be carried to suitable drainage outlets by watertight drain pipes or over paved areas.

3.11 Sulfate Attack and Corrosion Protection

Based on the results of laboratory testing, concrete structures in contact with the onsite soil will have negligible exposure to water-soluble sulfates in the soil. Type II cement may be used for concrete construction. The concrete should be designed in accordance with Table 4.3.1 of the American Concrete Institute ACI 318-08 provisions (ACI, 2008).

Based on our laboratory testing, the onsite soil is considered severely corrosive to ferrous metals. Use of non-ferrous buried pipe may be prudent, or ferrous pipe can be protected by dielectric tape, polyethylene sleeves and/or other methods, with recommendations from a corrosion engineer. Corrosion information presented in this report should be provided to your underground utility subcontractors. Additional testing and evaluation by a corrosion engineer may be warranted if corrosion protection is considered critical to the project.

3.12 Additional Geotechnical Services

The preliminary geotechnical recommendations presented in this report are based on subsurface conditions as interpreted from limited subsurface explorations and limited laboratory testing. Our preliminary geotechnical recommendations provided in this report are based on information available at the time the report was prepared and may change as plans are developed. Additional geotechnical investigation and analysis may be required based on final improvement plans. Leighton should review the site and grading plans when available and comment further on the geotechnical aspects of the project. Geotechnical observation and testing should be conducted during excavation and all phases of grading operations. Our conclusions and preliminary recommendations should be reviewed and verified by Leighton during construction and revised accordingly if geotechnical conditions encountered vary from our preliminary findings and interpretations.

Geotechnical observation and testing should be provided:

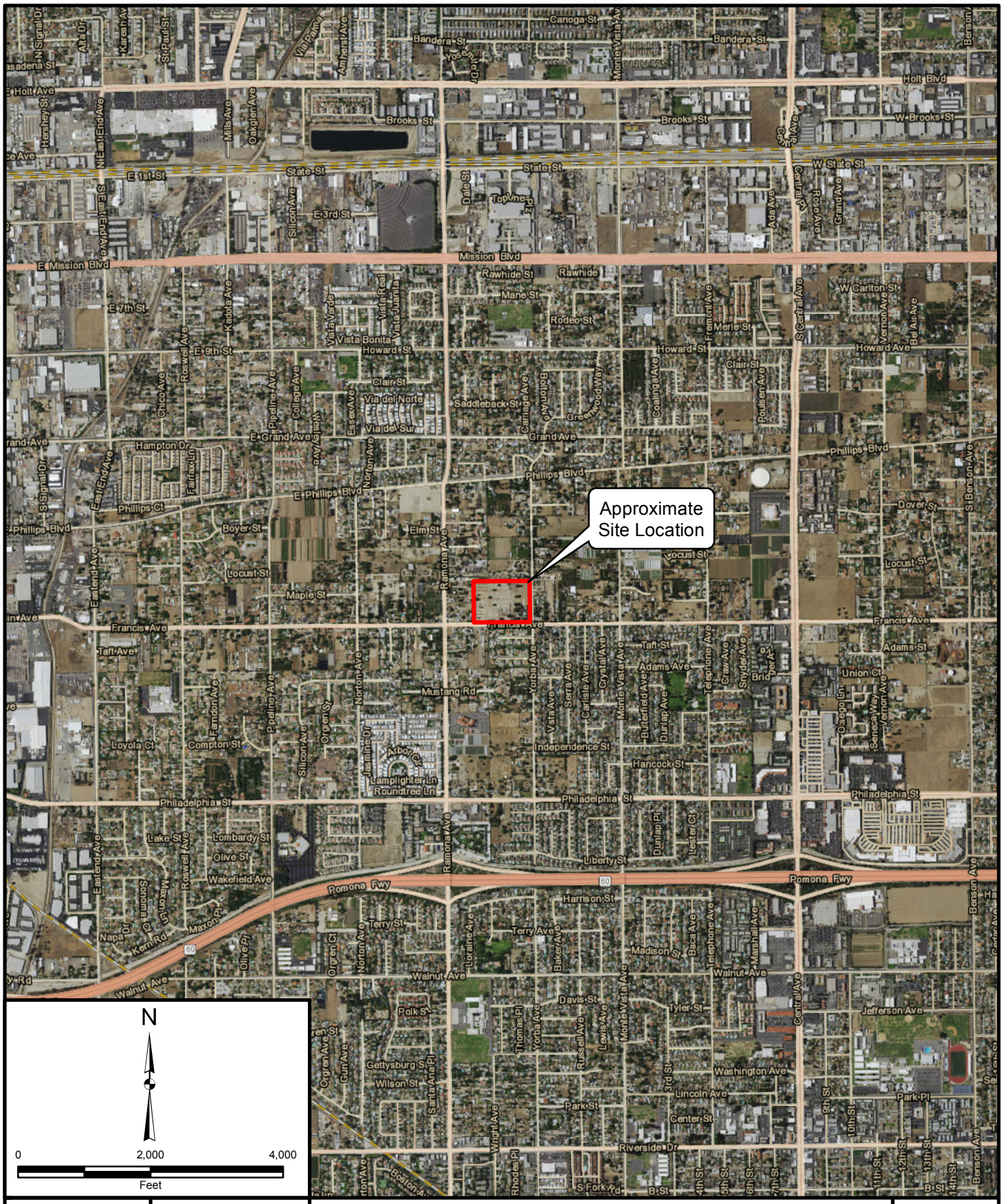
- After completion of site clearing.
- During overexcavation of compressible soil.
- During compaction of all fill materials.
- After excavation of all footings and prior to placement of concrete.
- During utility trench backfilling and compaction.
- During pavement subgrade and base preparation.
- When any unusual conditions are encountered.

4.0 LIMITATIONS

This report was based in part on data obtained from a limited number of observations, site visits, soil excavations, samples, and tests. Such information is, by necessity, incomplete. The nature of many sites is such that differing soil or geologic conditions can be present within small distances and under varying climatic conditions. Changes in subsurface conditions can and do occur over time. Therefore, our findings, conclusions, and recommendations presented in this report are based on the assumption that Leighton and Associates, Inc. will provide geotechnical observation and testing during construction.

This report was prepared for the sole use of Stratham Company for application to the design of the proposed residential development in accordance with generally accepted geotechnical engineering practices at this time in California.

See the GBA insert on the following page for important information about this geotechnical engineering report.



Project: 10557.004	Eng/Geol: JDH/PB
Scale: 1 " = 2,000 '	Date: August 2016

Base Map: ESRI ArcGIS Online 2016
Thematic Information: Leighton
Author: Leighton Geomatics (mmurphy)

SITE LOCATION MAP

Proposed Residential Development, Assessor Parcel Numbers 1013-211-21 and 1013-211-22, Northwest of Francis Avenue and Yorba Linda Avenue, City of Chino, California

Figure 1

Leighton

Map Saved as V:\Drafting\10557\004\Maps\10557-004_F01_SLM_2016-08-24.mxd on 8/24/2016 1:20:00 PM

Project: 10557.004	Eng/Geol: JDH/PB
Scale: 1 " = 150 '	Date: August 2016

Base Map: ESRI ArcGIS Online 2016
Thematic Information: Leighton
Author: Leighton Geomatics (mmurphy)

TEST LOCATION MAP

Proposed Residential Development, Assessor Parcel Numbers 1013-211-21 and 1013-211-22, Northwest of Francis Avenue and Yorba Linda Avenue, City of Chino, California

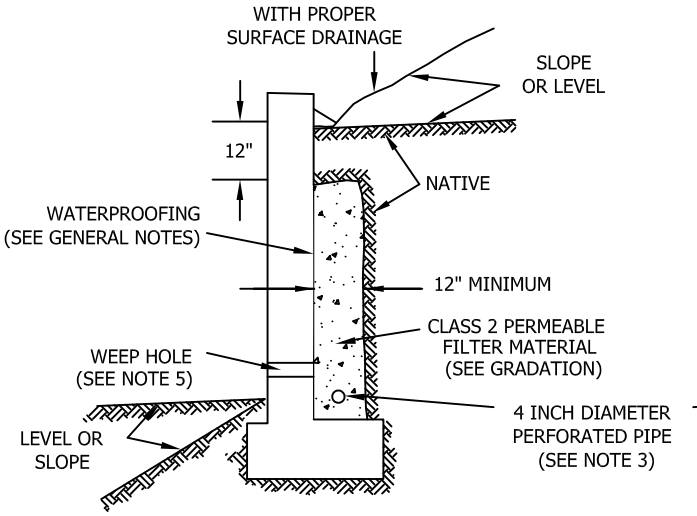
Figure 2

Leighton

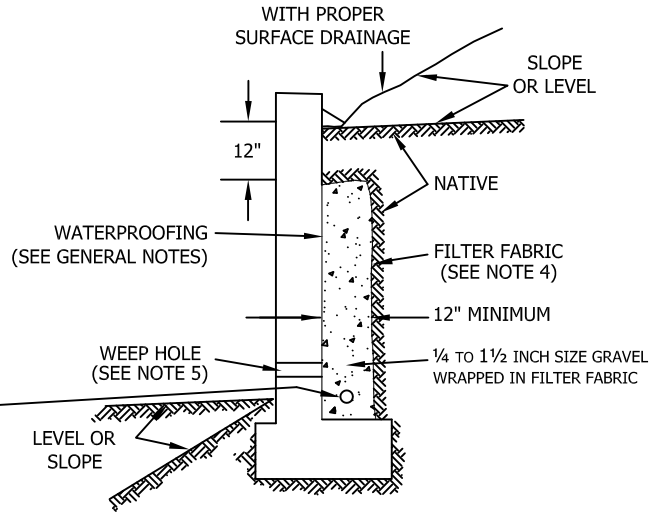
Map Saved as V:\Drafting\10557\004\Maps\10557-004_F02_TLM_2016-08-24.mxd on 8/24/2016 1:17:20 PM

SUBDRAIN OPTIONS AND BACKFILL WHEN NATIVE MATERIAL HAS EXPANSION INDEX OF ≤50

OPTION 1: PIPE SURROUNDED WITH CLASS 2 PERMEABLE MATERIAL



OPTION 2: GRAVEL WRAPPED IN FILTER FABRIC



Class 2 Filter Permeable Material Gradation
Per Caltrans Specifications

Sieve Size	Percent Passing
1"	100
3/4"	90-100
3/8"	40-100
No. 4	25-40
No. 8	18-33
No. 30	5-15
No. 50	0-7
No. 200	0-3

GENERAL NOTES:

* Waterproofing should be provided where moisture nuisance problem through the wall is undesirable.
* Water proofing of the walls is not under purview of the geotechnical engineer
* All drains should have a gradient of 1 percent minimum
*Outlet portion of the subdrain should have a 4-inch diameter solid pipe discharged into a suitable disposal area designed by the project engineer. The subdrain pipe should be accessible for maintenance (rodding)
*Other subdrain backfill options are subject to the review by the geotechnical engineer and modification of design parameters.

Notes:
1) Sand should have a sand equivalent of 30 or greater and may be densified by water jetting.
2) 1 Cu. ft. per ft. of 1/4- to 1 1/2-inch size gravel wrapped in filter fabric
3) Pipe type should be ASTM D1527 Acrylonitrile Butadiene Styrene (ABS) SDR35 or ASTM D1785 Polyvinyl Chloride plastic (PVC), Schedule 40, Armco A2000 PVC, or approved equivalent. Pipe should be installed with perforations down. Perforations should be 3/8 inch in diameter placed at the ends of a 120-degree arc in two rows at 3-inch on center (staggered)
4) Filter fabric should be Mirafi 140NC or approved equivalent.
5) Weephole should be 3-inch minimum diameter and provided at 10-foot maximum intervals. If exposure is permitted, weepholes should be located 12 inches above finished grade. If exposure is not permitted such as for a wall adjacent to a sidewalk/curb, a pipe under the sidewalk to be discharged through the curb face or equivalent should be provided. For a basement-type wall, a proper subdrain outlet system should be provided.
6) Retaining wall plans should be reviewed and approved by the geotechnical engineer.
7) Walls over six feet in height are subject to a special review by the geotechnical engineer and modifications to the above requirements.

RETAINING WALL BACKFILL AND SUBDRAIN DETAIL FOR WALLS 6 FEET OR LESS IN HEIGHT

WHEN NATIVE MATERIAL HAS EXPANSION INDEX OF ≤50

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Figure 3

P:\Drafting\templates\details\retain-wall-backfill-and subdrain.dwg (7/00)

APPENDIX A

REFERENCES

APPENDIX A

References

American Concrete Institute (ACI), 2008, Building Code Requirements for Structural Concrete (ACI 318-08) and Commentary (ACI 318R-08), an ACI Standard, 2008.

American Society of Civil Engineers (ASCE), ASCE Standard/SEI 7-10, an ASCE Standard, 2010.

Bryant, W.A., Hart, E.W., 2007, Fault Rupture Hazard Zones in California, Interim Revision 2007, CGS Special Publication 42, Interim Revision 2007

California Building Standards Commission, 2013, 2013 California Building Code, California Code of Regulations, Title 24, Part 2, Volume 2 of 2, Based on 2012 International Building Code, Effective January 1, 2014.

California Department of Water Resources (CDWR) of California, 1970, Meeting Water Demands in Chino-Riverside Area, Bulletin No. 104-3, September 1970.

_____, 2013, Water Data Library, <http://www.water.ca.gov/waterdatalibrary/>

California Geological Survey (formerly California Division of Mines and Geology), 2000, CD-ROM containing digital images of Official Maps of Alquist-Priolo Earthquake Fault Zones that affect the Southern Region, DMG CD 2000-003 2000.

CivilTech Software, 2008, LiquefyPro, Version 5.5j

Martin, G. R., and Lew, M., ed., 1999, “Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Liquefaction Hazards in California,” Southern California Earthquake Center, dated March 1999.

Public Works Standard, Inc., 2015, Greenbook, Standard Specifications for Public Works Construction: BNI Building News, Anaheim, California.

San Bernardino County, 2010, Geologic Hazard Overlays – FH27 C, Ontario, <http://www.sbcounty.gov/Uploads/lus/GeoHazMaps/FH27C_20100309.pdf>.

United States Geological Survey (USGS), 2011, Ground Motion Parameter Calculator, Seismic Hazard Curves and Uniform Hazard Response Spectrum, Java Application, Version 5.1.0, February 10, 2011, downloaded from http://earthquake.usgs.gov /hazards/designmaps/ javacalc.php

Youd, T.L., Idriss, I.M., Andrus, R.D., Arango, I., Castro, G., Christian, J.T., Dobry, R., Finn, L., Harder, L.F., Hynes, M.E., Ishihara, K., Koester, J.P., Liao, S.C., Marcuson, W.F. III, Martin, G.R., Mitchell, J.K., Moriwaki, Y., Power, M.S., Robertson, P.K., Seed, R.B., Stokoe, K.H. II, 2001, “Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshops on Evaluation of Liquefaction Resistance of Soils”, Journal of Geotechnical and Geoenvironmental Engineering, Vol. 127, No. 10, October 2001.

APPENDIX B

GEOTECHNICAL BORING LOGS

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GEOTECHNICAL BORING LOG LB-1

Project No.	10557.004	**Date Drilled**	12-13-13
Project	Coastal Commerce Chino	**Logged By**	JMD
Drilling Co.	2R Drilling	**Hole Diameter**	9.5"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	849'
Location	See Figure 2	**Sampled By**	JMD

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0			BULK					@Surface: dirt with some straw	
845				R-1	4 6 11	111	2	SM	@2.5' SILTY SAND, loose, light olive brown, dry to moist, fine sand, 30% fines (field estimate), trace rootlets, trace fine gravel	
	5			R-2	7 10 14	119	1	SP	@5' SAND, medium dense, light brown, dry, medium to coarse sand, trace fines, trace fine gravel, larger piece of gravel in ring sample	
840										
	10			R-3	10 15 21	121	2	SP	@10' SAND, medium dense, gray to brown, dry, medium sand, some gravel, 1.25" maximum gravel size	
835										
	15			R-4	7 12 17	108	10	ML	@15' SANDY SILT, very stiff, yellowish brown, dry to moist, homogenous	-200
830										
	20			S-5	6 8 10			ML SP	@20' SANDY SILT, very stiff, dark gray, dry to moist, fine sand @20.7' SAND, gray, dry to moist, fine to medium sand	
									Total depth of 21.5' No groundwater encountered Backfilled with soil cuttings	
825										
	25									
820										
	30									

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

GEOTECHNICAL BORING LOG LB-2

Project No.	10557.004	**Date Drilled**	12-13-13
Project	Coastal Commerce Chino	**Logged By**	JMD
Drilling Co.	2R Drilling	**Hole Diameter**	9.5"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	844'
Location	See Figure 2	**Sampled By**	JMD

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0			BULK					@Surface: dirt with some grass	
				R-1	3 5 7	106	2	SM	@2.5' SILTY SAND, loose, light gray brown, dry, fine sand, 30% fines (field estimate), trace fine gravel	
840	5			R-2	7 9 10			SP	@5' SAND, medium dense, reddish brown, dry, medium to coarse sand, trace fines, some gravel, 1.25" maximum gravel size	
835	10			R-3	20 24 25	126	2	SP	@10' SAND, medium dense, light gray brown, dry, medium to coarse sand, angular, broken rocks up to 2.25" in sample	
830	15			S-4	7 8 9			SP	@15' SAND, medium dense, gray, dry to moist, medium sand	
825	20			R-5	17 23 45	111	15	ML	@20' SANDY SILT, very dense, olive, moist, some FeO2 staining	
820	25			S-6	7 12 11			ML-CL	@25' SILT to CLAY, very stiff, gray, dry to moist, with FeO2 staining @25.4' SAND, dry, fine to medium sand @25.6' SILT, gray, moist @25.9' CLAY, gray, moist	
815	30									

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

GEOTECHNICAL BORING LOG LB-2

Project No.	10557.004	**Date Drilled**	12-13-13
Project	Coastal Commerce Chino	**Logged By**	JMD
Drilling Co.	2R Drilling	**Hole Diameter**	9.5"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	844'
Location	See Figure 2	**Sampled By**	JMD

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	30			S-7	8 16 21			ML	@30' SILT, hard, olive brown, dry to moist, FeO2 staining, with some clay @30.5' SILT, olive brown, dry to moist, FeO2 staining @31' SAND, dark reddish brown to light gray, dry, fine to medium sand	
810										
	35			S-8	18 24 21			SP	@35' SAND, light brown, dry to moist, with large amounts of FeO2 staining, trace fine gravel, a 1.25" piece of gravel in the sampler tip	
805										
	40			S-9	12 10 20			CL	@40' CLAY with gravel, hard, reddish brown to olive brown, gravel up to 2" large, with some silt, some FeO2 staining @41.3' SAND with gravel, dry to moist, medium to coarse sand, gravel up to 2" large	
800										
	45			S-10	15 35 24			SM	@45' SILTY SAND, very dense, reddish brown, moist, angular, 20% fines (field estimate), with some gravel, 1" maximum gravel size	
795										
	50			S-11	9 11 16			ML	@50' SILT, very stiff, olive brown, moist, with FeO2 staining, homogenous	
									Total depth of 51.5' No groundwater encountered Bakfilled with soil cuttings	
790										
	55									
785										
	60									

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

GEOTECHNICAL BORING LOG LB-3

Project No.	10557.004	**Date Drilled**	12-13-13
Project	Coastal Commerce Chino	**Logged By**	JMD
Drilling Co.	2R Drilling	**Hole Diameter**	9.5"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	852'
Location	See Figure 2	**Sampled By**	JMD

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0			BULK					@Surface: dry grass	
850				R-1	2 4 8	104	4	SM	@2.5' SILTY SAND, loose, light brown, dry, fine sand, 40% fines (field estimate), trace rootlets	
	5			R-2	8 11 14	111	5	SM	@5' SILTY SAND, medium dense, brown, moist, fine sand, 30% fines (field estimate)	
845										
	10			R-3	11 7 13	111	4	SM	@10' SILTY SAND, medium dense, light gray brown, moist, fine sand, 30% fines (field estimate), trace fine gravel	CO
840										
	15			R-4	11 17 19	93	9	ML	@15' SILT, very stiff, gray, moist, FeO2 staining, homongenous	AL
835										
	20			S-5	5 7 9			CL ML	@20' CLAY, very stiff, gray, moist, FeO2 staining @20.5' SILT, gray, moist, FeO2 staining	
830										
	25			S-6	5 5 11			ML		
825										
	30									

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

GEOTECHNICAL BORING LOG LB-3

Project No.	10557.004	**Date Drilled**	12-13-13
Project	Coastal Commerce Chino	**Logged By**	JMD
Drilling Co.	2R Drilling	**Hole Diameter**	9.5"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	852'
Location	See Figure 2	**Sampled By**	JMD

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	30			S-7	12 14 16			ML	@30' SANDY SILT, very stiff, gray, moist	
820								SM	@31.1' SILTY SAND, gray, dry, fine sand, 20% fines (field estimate),	
	35			S-8	17 13 8			SP	@35' SAND, medium dense, reddish brown, medium to coarse sand	
815								CL	@36.3' CLAY, olive brown, moist, large amount of FeO2 staining	
	40			S-9	9 14 26			ML	@40' SANDY SILT, hard, olive brown, moist, large amount of FeO2 staining	
810										
	45			S-10	6 8 9			ML	@45' SILT, very stiff, light brown, large amount of FeO2 staining, homogenous	
805										
	50			S-11	14 14 20			SP	@50' SAND, dense, light gray brown, dry to moist, fine sand, trace fines	
								ML	@51.2' SILT, light brown, large amount of FeO2 staining	
800									Total depth of 51.5' No groundwater encountered Backfilled with soil cuttings	
	55									
795										
	60									

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

GEOTECHNICAL BORING LOG LB-4

Project No.	10557.004	**Date Drilled**	12-13-13
Project	Coastal Commerce Chino	**Logged By**	JMD
Drilling Co.	2R Drilling	**Hole Diameter**	9.5"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	850'
Location	See Figure 2	**Sampled By**	JMD

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
850	0			BULK					@Surface: dirt	MD, CR
				R-1	5 8 8			SM	@2.5' SILTY SAND, loose, light brown to brown, dry, 20% fines (field estimate), with some gravel, 2" maximum gravel size	
845	5			R-2	6 11 10	121	2	SP-SM	@5' SAND to SILTY SAND, medium dense, light brown, dry to moist, 10% fines (field estimate), with some gravel, 1.25" maximum gravel size	-200
840	10			R-3	20 30 40			SP	@10' SAND, dense, gray, dry to moist, trace fines, some fine and medium sand, some gravel, 1.5" maximum gravel size	
835	15			S-4	6 7 7			SM	@15' SILTY SAND, medium dense, olive, moist, fine sand, 40% fines (field estimate), trace coarse sand	
830	20			R-5	10 19 26	100	19	CL	@20' CLAY, very stiff, olive, moist, with FeO2 staining. homogenous	
									Total depth of 21.5' No groundwater encountered Backfilled with soil cuttings	
825	25									
820	30									

Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

GEOTECHNICAL BORING LOG LB-5

Project No.	10557.004	**Date Drilled**	12-13-13
Project	Coastal Commerce Chino	**Logged By**	JMD
Drilling Co.	2R Drilling	**Hole Diameter**	10"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	848'
Location	See Figure 2	**Sampled By**	JMD

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0			BULK					@Surface: dirt	
845										
	5			R-2	12 28 34	117	3	SP	@5' SAND, dense, gray brown, moist, medium sand, with some gravel, 1" maximum gravel size	
840										
	10			R-3	12 16 18	106	3	SP	@10' SAND, medium dense, gray to reddish brown, moist, medium sand, trace gravel, 2" maximum gravel size	
835										
	15			R-4	17 14 17	105	2	SP	@15' SAND, medium dense, olive, moist, trace fines, trace fine gravel, trace FeO2 staining	
830										
	20			S-5	7 6 6			SM	@20' SILTY SAND, medium dense, olive, dry to moist, fine sand, 40% fines (field estimate), some FeO2 staining	
825									Total depth of 21.5' No groundwater encountered Backfilled with soil cuttings	
	25									
820										
	30									

Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

General Test Setup Data of Well Permeameter, from USBR 7300-89 Method.

	Project:		**Coastal Commercial Chino, Project No. 10557.004**																		
	Exploration #/Location:		***LB-1***				***LB-2***				***LB-3***				***LB-4***				***LB-5***			
	Approx. Test Depth (ft):		6				4				6				6				5			
	Date Tested, start/finish:		12/16/2013				12/16/2013				12/16/2013				12/16/2013				12/16/2013			
	Tested by:		JMD				JMD				JMD				JMD				JMD			
	USCS Soil Type:																					
	Weather (start to finish)		Warm, clear																			
	Liquid Used/pH:		water from garden hose																			
	Well Prep:		straight drill, tamp																			
a.	**Diameter of barrel (in.):**		22.5				22.5				22.5				22.5				22.5				22.5	
b.	**No. of Supply barrels:**		1				1				1				1				1				1	
c.	**Measured boring diameter**	inches	9.5				9.5				9.5				9.5				10				13	
d.	Approx Depth to groundwater below GS	feet	200				200				200				200				200				200	
	Depths from string line (or top of ex. pavement):																					
f.	to ground surface (=0 if no string line used)	**ft/in.**	0. ft				0. ft				0. ft				0. ft				0. ft					
g.	**to Bot of Boring** (or top of soil over Bentonite)	**ft/in.**	**6. ft**	**1. in.**			**4. ft**	**3. in.**			**5. ft**	**7. in.**			**5. ft**	**8. in.**			**4. ft**	**10. in.**				
i	to Top of Sand (bot of float assbly) (dry)	**ft/in.**	**5. ft**	**10. in.**			**4. ft**	**2. in.**			**5. ft**	**4.5 in.**			**5. ft**	**5. in.**			**4. ft**	**6. in.**				
k	to Top of casing after adding water (negative is above string line)	**ft/in.**	0. ft	-3. in.							0. ft	-0.75 in.							0. ft	-1. in.				
m	Top of Float assembly Rod, when pushed to bottom	**ft/in.**		34.75 in.								33.5 in.								14.88 in.				
n	**top of float assembly rod, floating, water level stable**	**ft/in.**		30.5 in.								25.13 in.								26.5 in.				
p	**Float Assembly (choose one)**		Long body								Long body								Long body					
q	Float Assembly extension (0=none)	inches	12								12								0					
s	free play in float assembly (water level stablized)	inches	2.5								1.25								2.5					
t	Length of float assembly (=lookup p)	inches	23				#N/A				23				#N/A				23				#N/A	
u	Length of float assembly plus extension (=q+t)	inches	35				#N/A				35				#N/A				23				#N/A	
v	**Ht from water surface to top of float rod (=lookup p)**	inches	16.75				#N/A				16.75				#N/A				16.75				#N/A	
w	range of float movement (=lookup p)	inches	6.75				#N/A				6.75				#N/A				6.75				#N/A	
x	Depth to Water Surface (=n+v)		47.3	in.			#N/A	in.			41.9	in.			#N/A	in.			43.3	in.			#N/A	in.
h	**Depth of water in Well, "h" (=g-x)**		**25.8 in=**	2.15 ft			**#N/A**	#N/A			**25.1 in=**	2.09 ft			**#N/A**	#N/A			**14.8 in=**	1.23 ft			**#N/A**	#N/A
y	Total Area of barrels (in.^2):		397				397				397				397				397				397	
r	**Well Radius, "r" (=c/2)**		**4.8**	in.			**4.8**	in.			**4.8**	in.			**4.8**	in.			**5.0**	in.			**6.5**	in.

Results of Well Permeameter Test, from USBR 7300-89 Method.

Project: **Coastal Commercial Chino, Project No. 10557.004**

Exploration #/Location: ***LB-1***

Initial Depth to top of float rod (in.) 30.5

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Field Data **Calculations**

Date (and comments)	Time	**Water Level in Supply Barrel (in.)**	Depth to top of float rod (when changed)		Water Temp in Barrel (deg F)	DL Interpre-tation? ("Y")	DL -- Head of Water in Barrel (in.)	h, Height of Water in Well (in.)	h/r	Total Elapsed Time (minutes)	Δt (min)	Vol Change (in.^3)	Flow (in^3/min)	q, Flow (in^3/hr)	V (Fig 9)	K20, Coef. Of Permeability at 20 deg C (in./hr)	**Infiltration Rate [flow/surf area] (in./hr) (FS=1)**
Start Date	Start time:		**ft**	**in.**						F	G	H					
12/16/2013	12:52:00 PM																
12/16/13	12:52	29.25			**74**			25.75	5.4	0					0.9		
12/16/13	12:53	28						25.75	5.4	0	1	497	497	29805	0.9	10.01	**14.65**
12/16/13	12:54	27						25.75	5.4	0	1	397	397	23844	0.9	8.00	**11.72**
12/16/13	12:55	26.625						25.75	5.4	0	1	149	149	8942	0.9	3.00	**4.39**
12/16/13	12:57	25.875						25.75	5.4	0	2	298	149	8942	0.9	3.00	**4.39**
12/16/13	13:05	20.25						25.75	5.4	0	8	2235	279	16766	0.9	5.63	**8.24**
12/16/13	13:23	10.75			76			25.75	5.4	0	18	3775	210	12585	0.9	4.11	**6.02**
										0							
12/16/13	13:27	31.125			76			25.75	5.4	0					0.9		
12/16/13	13:49	20.25						25.75	5.4	0	22	4322	196	11787	0.9	3.85	**5.64**
12/16/13	14:01	14.25			77			25.75	5.4	0	12	2384	199	11922	0.9	3.85	**5.63**
										0							
12/16/13	14:06	31.375			77			25.75	5.4	0					0.9		
12/16/13	14:37	18.5			77			25.75	5.4	0	31	5117	165	9903	0.9	3.20	**4.68**
12/16/13	15:07	7.25			77			25.75	5.4	0	30	4471	149	8942	0.9	2.89	**4.22**
12/16/13	15:20	3						25.75	5.4	0	13	1689	130	7795	0.9	2.52	**3.68**
										0							

Results of Well Permeameter Test, from USBR 7300-89 Method.

Project: **Coastal Commercial Chino, Project No. 10557.004**

Exploration #/Location: ***LB-3***

Initial Depth to top of float rod (in.) 25.125

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Field Data | **Calculations**

Date (and comments)	Time	**Water Level in Supply Barrel (in.)**	Depth to top of float rod (when changed)		Water Temp in Barrel (deg F)	DL Interpre-tation? ("Y")	DL -- Head of Water in Barrel (in.)	h, Height of Water in Well (in.)	h/r	Total Elapsed Time (minutes)	Δt (min)	Vol Change (in.^3)	Flow (in^3/min)	q, Flow (in^3/hr)	Cumulative Vol (gal)	V (Fig 9)	K20, Coef. Of Permeability at 20 deg C (in./hr)	**Infiltration Rate [flow/surf area] (in./hr) (FS=1)**
Start Date	Start time:		**ft**	**in.**						E	G	H						
12/16/2013	10:25:00 AM																	
12/16/13	10:25	30.25			**69**			25.125	5.3	0					0	1.0		
12/16/13	11:04	28.375			74			25.125	5.3		39	745	19	1146		0.9	0.40	**0.58**
12/16/13	11:35	27.375			77			25.125	5.3		31	397	13	769		0.9	0.26	**0.37**
12/16/13	12:27	25.75			79			25.125	5.3		52	646	12	745		0.8	0.24	**0.35**
12/16/13	13:09	24.5			81			25.125	5.3		42	497	12	710		0.8	0.23	**0.33**
12/16/13	13:53	23.25			81			25.125	5.3		44	497	11	677		0.8	0.22	**0.31**
12/16/13	14:49	20.75			82			25.125	5.3		56	994	18	1064		0.8	0.34	**0.49**
12/16/13	15:45	19.125			83			25.125	5.3		56	646	12	692		0.8	0.22	**0.31**

Results of Well Permeameter Test, from USBR 7300-89 Method.

Project: **Coastal Commercial Chino, Project No. 10557.004**

Exploration #/Location: ***LB-5***

Initial Depth to top of float rod (in.) 26.5

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Field Data **Calculations**

Date (and comments)	Time	**Water Level in Supply Barrel (in.)**	Depth to top of float rod (when changed)		Water Temp in Barrel (deg F)	DL Interpre-tation? ("Y")	DL -- Head of Water in Barrel (in.)	h, Height of Water in Well (in.)	h/r	Total Elapsed Time (minutes)	Δt (min)	Vol Change (in.^3)	Flow (in^3/min)	q, Flow (in^3/hr)	Cumulative Vol (gal)	V (Fig 9)	K20, Coef. Of Permeability at 20 deg C (in./hr)	**Infiltration Rate [flow/surf area] (in./hr) (FS=1)**
Start Date	Start time:		**ft**	**in.**														
12/16/2013	2:25:00 PM									F	G	H						
12/16/13	14:25	31			**77**			14.75	3.0	0					0	0.9		
12/16/13	14:26	30						14.75	3.0		1	397	397	23844		0.9	16.33	**17.75**
12/16/13	14:27	29.125						14.75	3.0		1	348	348	20864		0.9	14.29	**15.53**
12/16/13	14:28	28.125						14.75	3.0		1	397	397	23844		0.9	16.33	**17.75**
12/16/13	14:29	27.25						14.75	3.0		1	348	348	20864		0.9	14.29	**15.53**
12/16/13	14:30	26.25						14.75	3.0		1	397	397	23844		0.9	16.33	**17.75**
12/16/13	14:32	24.375						14.75	3.0		2	745	373	22354		0.9	15.31	**16.64**
12/16/13	14:42	15.375			77			14.75	3.0		10	3577	358	21460		0.9	14.70	**15.97**
12/16/13	14:53	6						14.75	3.0		11	3726	339	20322		0.9	13.92	**15.13**
12/16/13	15:01	25.125			79			14.75	3.0							0.8		
12/16/13	15:02	24.5						14.75	3.0		1	248	248	14903		0.8	9.96	**10.82**
12/16/13	15:24	7.75			79			14.75	3.0	0	22	6657	303	18154	0	0.8	12.13	**13.18**
12/16/13	15:31	2.375						14.75	3.0	0	7	2136	305	18309	0	0.8	12.23	**13.30**
										0					0			

APPENDIX C

LABORATORY TEST RESULTS

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TESTS for SULFATE CONTENT
CHLORIDE CONTENT and pH of SOILS

Project Name: Coastal Commercial Chino Tested By : G. Berdy Date: 12/26/13

Project No. : 10557.004 Data Input By: J. Ward Date: 01/03/14

Boring No.	LB-4			
Sample No.	B-4			
Sample Depth (ft)	0-5			
Soil Identification:	Olive brown (SP-SM)g			
Wet Weight of Soil + Container (g)	301.40			
Dry Weight of Soil + Container (g)	299.00			
Weight of Container (g)	64.80			
Moisture Content (%)	1.02			
Weight of Soaked Soil (g)	100.50			

SULFATE CONTENT, DOT California Test 417, Part II

Beaker No.	31			
Crucible No.	28			
Furnace Temperature (°C)	820			
Time In / Time Out	8:50/9:35			
Duration of Combustion (min)	45			
Wt. of Crucible + Residue (g)	21.1490			
Wt. of Crucible (g)	21.1467			
Wt. of Residue (g) (A)	0.0023			
PPM of Sulfate (A) x 41150	94.65			
PPM of Sulfate, Dry Weight Basis	**96**			

CHLORIDE CONTENT, DOT California Test 422

ml of Extract For Titration (B)	15			
ml of AgNO3 Soln. Used in Titration (C)	1.2			
PPM of Chloride (C -0.2) * 100 * 30 / B	200			
PPM of Chloride, Dry Wt. Basis	**202**			

pH TEST, DOT California Test 532/643

pH Value	**6.94**			
Temperature °C	21.0			

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SOIL RESISTIVITY TEST

DOT CA TEST 532 / 643

Project Name:	Coastal Commercial Chino		Tested By :	G. Berdy	Date: 12/31/13
Project No. :	10557.004		Data Input By:	J. Ward	Date: 01/03/14
Boring No.:	LB-4		Depth (ft.) :	0-5	
Sample No. :	B-4				

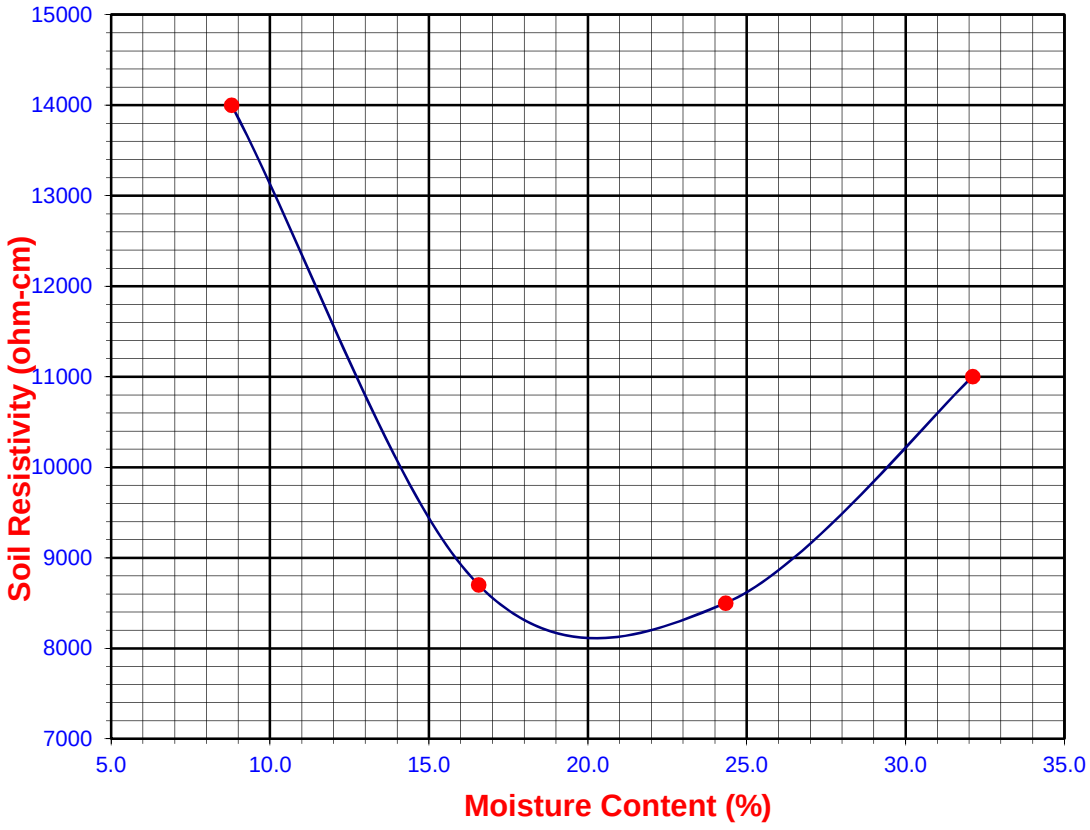
Soil Identification:* Olive brown (SP-SM)g

*California Test 643 requires soil specimens to consist only of portions of samples passing through the No. 8 US Standard Sieve before resistivity testing. Therefore, this test method may not be representative for coarser materials.

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	10	8.80	14000	14000
2	20	16.57	8700	8700
3	30	24.34	8500	8500
4	40	32.11	11000	11000
5				

Moisture Content (%) (MCi)	1.02
Wet Wt. of Soil + Cont. (g)	301.40
Dry Wt. of Soil + Cont. (g)	299.00
Wt. of Container (g)	64.80
Container No.	
Initial Soil Wt. (g) (Wt)	130.00
Box Constant	1.000
MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 532 / 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 532 / 643	
8100	**20.3**	**96**	**202**	**6.94**	**21.0**



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TESTS for SULFATE CONTENT
CHLORIDE CONTENT and pH of SOILS

Project Name: Coastal Commercial Chino Tested By : G. Berdy Date: 12/26/13

Project No. : 10557.004 Data Input By: J. Ward Date: 01/03/14

Boring No.	LB-4			
Sample No.	B-4			
Sample Depth (ft)	0-5			
Soil Identification:	Olive brown (SP-SM)g			
Wet Weight of Soil + Container (g)	301.40			
Dry Weight of Soil + Container (g)	299.00			
Weight of Container (g)	64.80			
Moisture Content (%)	1.02			
Weight of Soaked Soil (g)	100.50			

SULFATE CONTENT, DOT California Test 417, Part II

Beaker No.	31			
Crucible No.	28			
Furnace Temperature (°C)	820			
Time In / Time Out	8:50/9:35			
Duration of Combustion (min)	45			
Wt. of Crucible + Residue (g)	21.1490			
Wt. of Crucible (g)	21.1467			
Wt. of Residue (g) (A)	0.0023			
PPM of Sulfate (A) x 41150	94.65			
PPM of Sulfate, Dry Weight Basis	**96**			

CHLORIDE CONTENT, DOT California Test 422

ml of Extract For Titration (B)	15			
ml of AgNO3 Soln. Used in Titration (C)	1.2			
PPM of Chloride (C -0.2) * 100 * 30 / B	200			
PPM of Chloride, Dry Wt. Basis	**202**			

pH TEST, DOT California Test 532/643

pH Value	**6.94**			
Temperature °C	21.0			

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SOIL RESISTIVITY TEST

DOT CA TEST 532 / 643

Project Name:	Coastal Commercial Chino		Tested By :	G. Berdy	Date: 12/31/13
Project No. :	10557.004		Data Input By:	J. Ward	Date: 01/03/14
Boring No.:	LB-4		Depth (ft.) :	0-5	
Sample No. :	B-4				

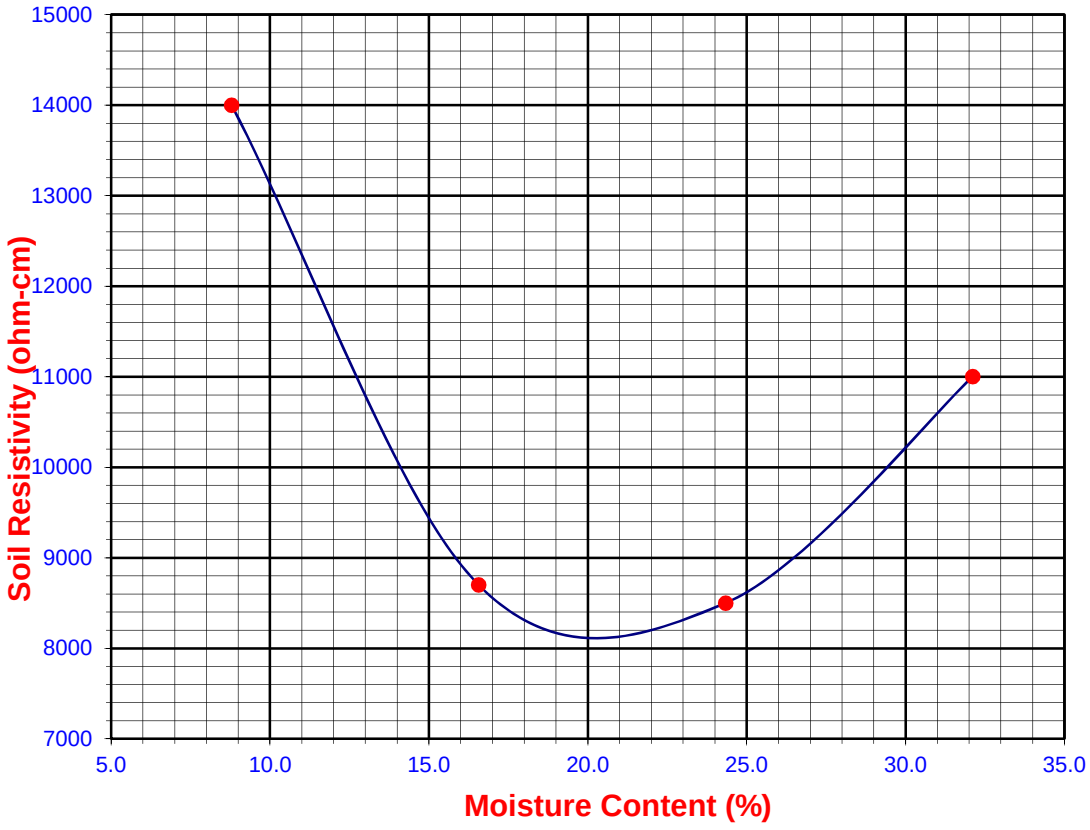
Soil Identification:* Olive brown (SP-SM)g

*California Test 643 requires soil specimens to consist only of portions of samples passing through the No. 8 US Standard Sieve before resistivity testing. Therefore, this test method may not be representative for coarser materials.

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	10	8.80	14000	14000
2	20	16.57	8700	8700
3	30	24.34	8500	8500
4	40	32.11	11000	11000
5				

Moisture Content (%) (MCi)	1.02
Wet Wt. of Soil + Cont. (g)	301.40
Dry Wt. of Soil + Cont. (g)	299.00
Wt. of Container (g)	64.80
Container No.	
Initial Soil Wt. (g) (Wt)	130.00
Box Constant	1.000
MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 532 / 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 532 / 643	
8100	**20.3**	**96**	**202**	**6.94**	**21.0**



MODIFIED PROCTOR COMPACTION TEST

ASTM D 1557

Project Name:	Coastal Commercial Chino	Tested By:	O. Figueroa	Date:	12/27/13
Project No.:	10557.004	Input By:	J. Ward	Date:	01/03/14
Boring No.:	LB-4	Depth (ft.):	0-5		
Sample No.:	B-4				
Soil Identification:	Olive brown poorly-graded sand with silt and gravel (SP-SM)g				

Preparation Method:	X	Moist	
		Dry	
Compaction Method	X	Mechanical Ram	
		Manual Ram	

Scalp Fraction (%)	
#3/4	
#3/8	
#4	15.4

Rammer Weight (lb.) = 10.0

Height of Drop (in.) = 18.0

Mold Volume (ft³) 0.03310

TEST NO.	1	2	3	4	5	6
Wt. Compacted Soil + Mold (g)	3773.0	3834.0	3898.0	3899.0		
Weight of Mold (g)	1859.0	1859.0	1859.0	1859.0		
Net Weight of Soil (g)	1914.0	1975.0	2039.0	2040.0		
Wet Weight of Soil + Cont. (g)	475.80	450.50	423.80	506.90		
Dry Weight of Soil + Cont. (g)	462.20	428.90	395.80	463.60		
Weight of Container (g)	48.50	51.30	54.80	52.70		
Moisture Content (%)	3.29	5.72	8.21	10.54		
Wet Density (pcf)	127.5	131.5	135.8	135.9		
Dry Density (pcf)	123.4	124.4	125.5	122.9		

Maximum Dry Density (pcf) 125.5

Corrected Dry Density (pcf) 130.5

Optimum Moisture Content (%) 8.0

Corrected Moisture Content (%) 7.0

[X] Procedure A
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if +#4 is 20% or less

[ ] Procedure B
Soil Passing 3/8 in. (9.5 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
Use if +#4 is >20% and +3/8 in. is 20% or less

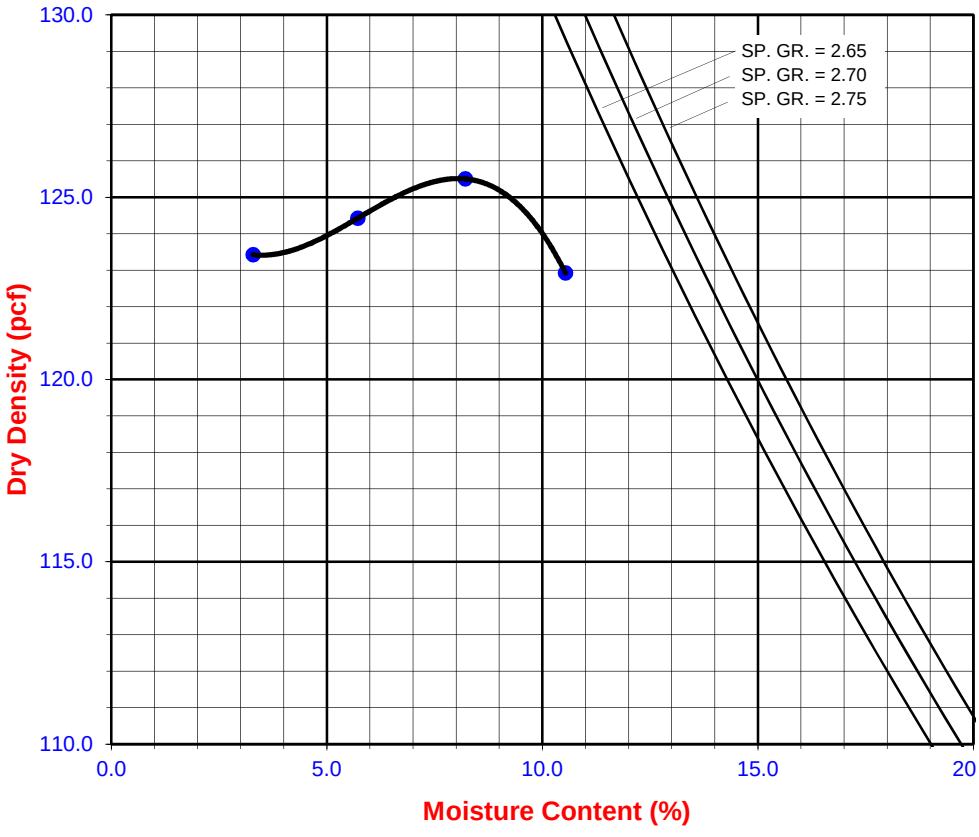
[ ] Procedure C
Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)
Use if +3/8 in. is >20% and +¾ in. is <30%

Particle-Size Distribution:

GR:SA:FI

Atterberg Limits:

LL,PL,PI



ATTERBERG LIMITS

ASTM D 4318

Project Name:	Coastal Commercial Chino	Tested By:	G. Bathala	Date:	12/30/13
Project No. :	10557.004	Input By:	J. Ward	Date:	01/03/13
Boring No.:	LB-3	Checked By:	J. Ward		
Sample No.:	R-4	Depth (ft.)	15.0		
Soil Identification:	Olive sandy silt s(ML)				

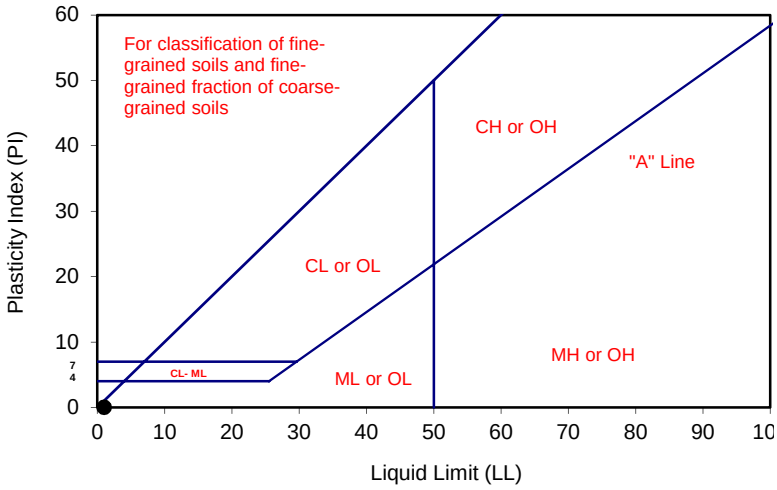
TEST	PLASTIC LIMIT		LIQUID LIMIT			
NO.	1	2	1	2	3	4
Number of Blows [N]			5			
Wet Wt. of Soil + Cont. (g)	18.01	16.94	35.69	**Cannot get more than 5 blows:**		
Dry Wt. of Soil + Cont. (g)	17.10	16.27	30.12	**NonPlastic**		
Wt. of Container (g)	13.51	13.61	13.51			
Moisture Content (%) [Wn]	25.35	25.19	33.53			

Liquid Limit	**NP**
Plastic Limit	**25**
Plasticity Index	**NP**
Classification	**NP**

PI at "A" - Line = 0.73(LL-20) =

One - Point Liquid Limit Calculation

$LL = Wn(N/25)^{0.121}$



PROCEDURES USED

☐ Wet Preparation

Multipoint - Wet

☒ Dry Preparation

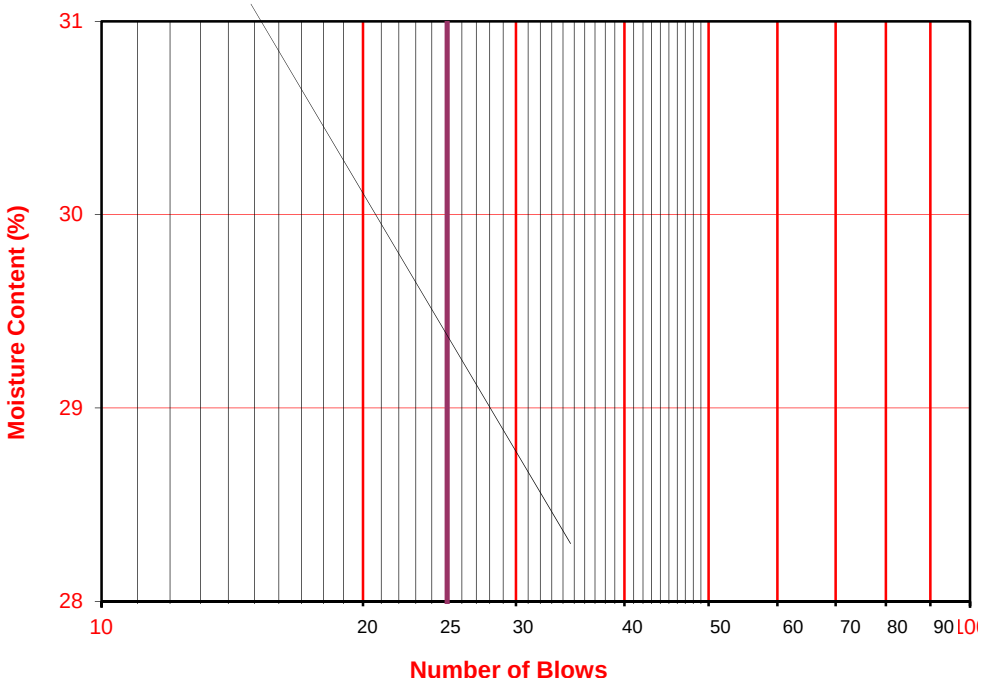
Multipoint - Dry

☒ Procedure A

Multipoint Test

☐ Procedure B

One-point Test



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ONE-DIMENSIONAL SWELL OR SETTLEMENT POTENTIAL OF COHESIVE SOILS
(ASTM D 4546)

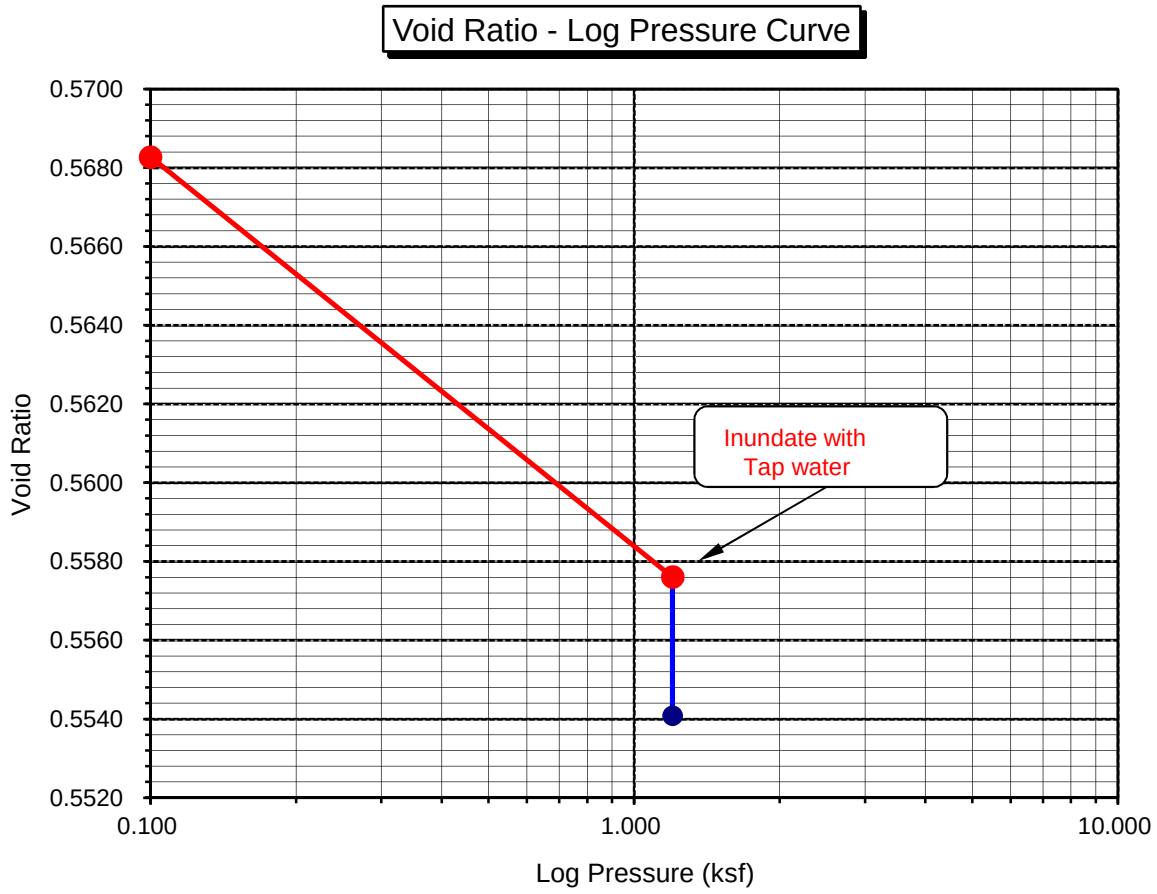
Project Name:	Coastal Commercial Chino	Tested By:	G. Bathala	Date:	12/20/13
Project No.:	10557.004	Checked By:	J. Ward	Date:	01/03/14
Boring No.:	LB-3	Sample Type:	Ring		
Sample No.:	R-3	Depth (ft.)	10.0		
Sample Description:	Olive silty sand (SM)				

Initial Dry Density (pcf):	107.5
Initial Moisture (%):	3.61
Initial Length (in.):	1.0000
Initial Dial Reading:	0.3063
Diameter(in):	2.416

Final Dry Density (pcf):	108.5
Final Moisture (%) :	17.2
Initial Void Ratio:	0.5683
Specific Gravity(assumed):	2.70
Initial Saturation (%)	17.2

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.100	0.3063	1.0000	0.00	0.00	0.5683	0.00
1.200	0.2983	0.9920	0.12	-0.80	0.5576	-0.68
H2O	0.2961	0.9898	0.12	-1.03	0.5541	-0.91

Percent Swell (+) / Settlement (-) After Inundation = -0.23



Boring No.	LB-1	LB-4						
Sample No.	R-4	R-2						
Depth (ft.)	15.0	5.0						
Sample Type	Ring	Ring						
Soil Identification	Brown poorly-graded sand with silt and gravel (SP-SM)g	Olive brown sandy silt s(ML)						
Moisture Correction								
Wet Weight of Soil + Container (g)	0.0	0.0						
Dry Weight of Soil + Container (g)	0.0	0.0						
Weight of Container (g)	1.0	1.0						
Moisture Content (%)	0.00	0.00						
Sample Dry Weight Determination								
Weight of Sample + Container (g)	822.7	915.4						
Weight of Container (g)	250.0	252.4						
Weight of Dry Sample (g)	572.7	663.0						
Container No.:								
After Wash								
Method (A or B)	B	B						
Dry Weight of Sample + Cont. (g)	782.9	519.1						
Weight of Container (g)	250.0	252.4						
Dry Weight of Sample (g)	532.9	266.7						
% Passing No. 200 Sieve	**6.9**	**59.8**						
% Retained No. 200 Sieve	93.1	40.2						

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PERCENT PASSING
No. 200 SIEVE
ASTM D 1140

Project Name: Coastal Commercial Chino
Project No.: 10557.004
Client Name: L&A/Rancho Cucamonga
Tested By: S. Felter Date: 12/23/13

APPENDIX D

SUMMARY OF SECONDARY SEISMIC HAZARD ANALYSIS

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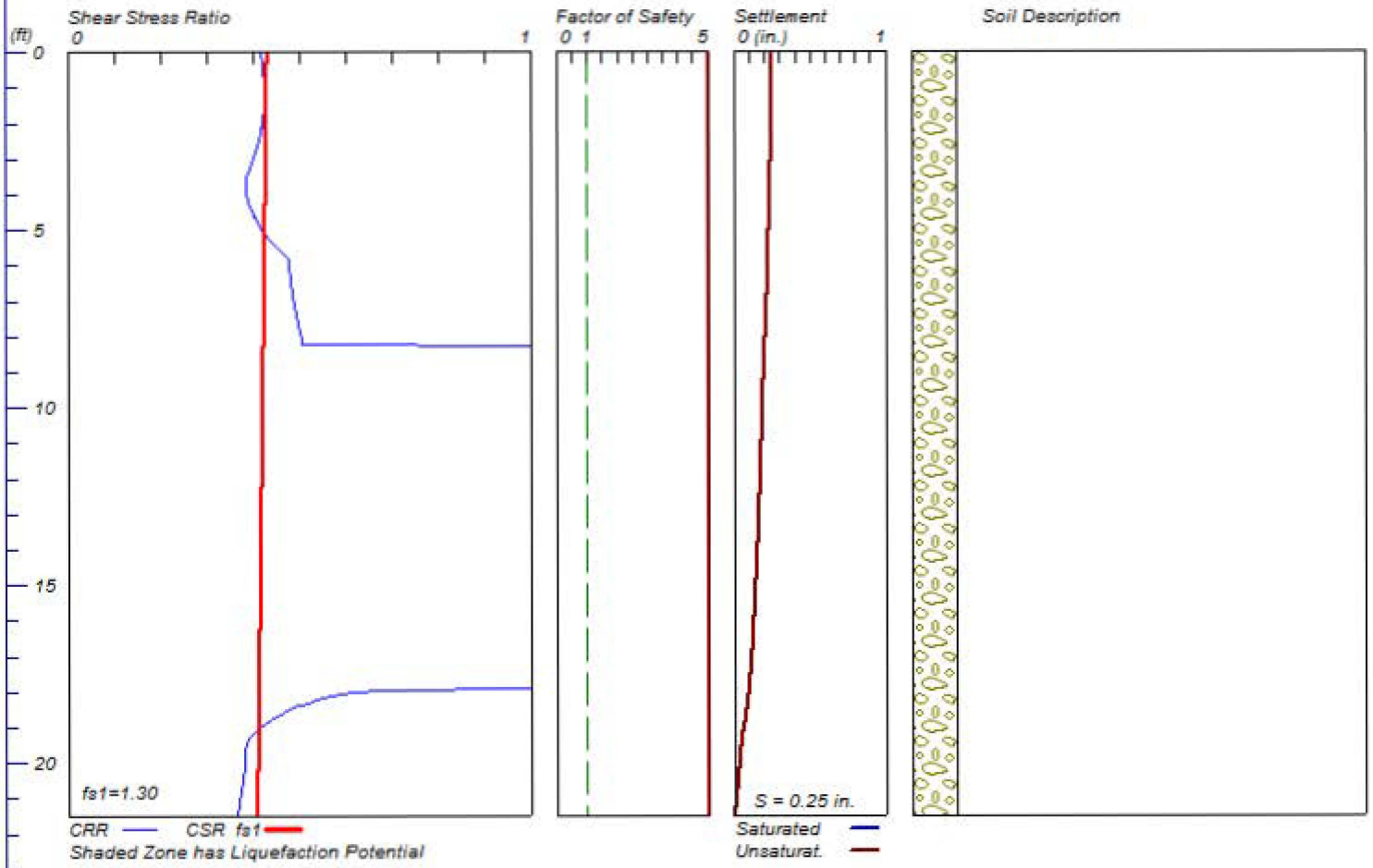
SEISMIC SETTLEMENT ANALYSIS

Coastal Commerce Chino

Hole No.=LB-1 Water Depth=100 ft Surface Elev.=849

Magnitude=6.57
Acceleration=0.51g

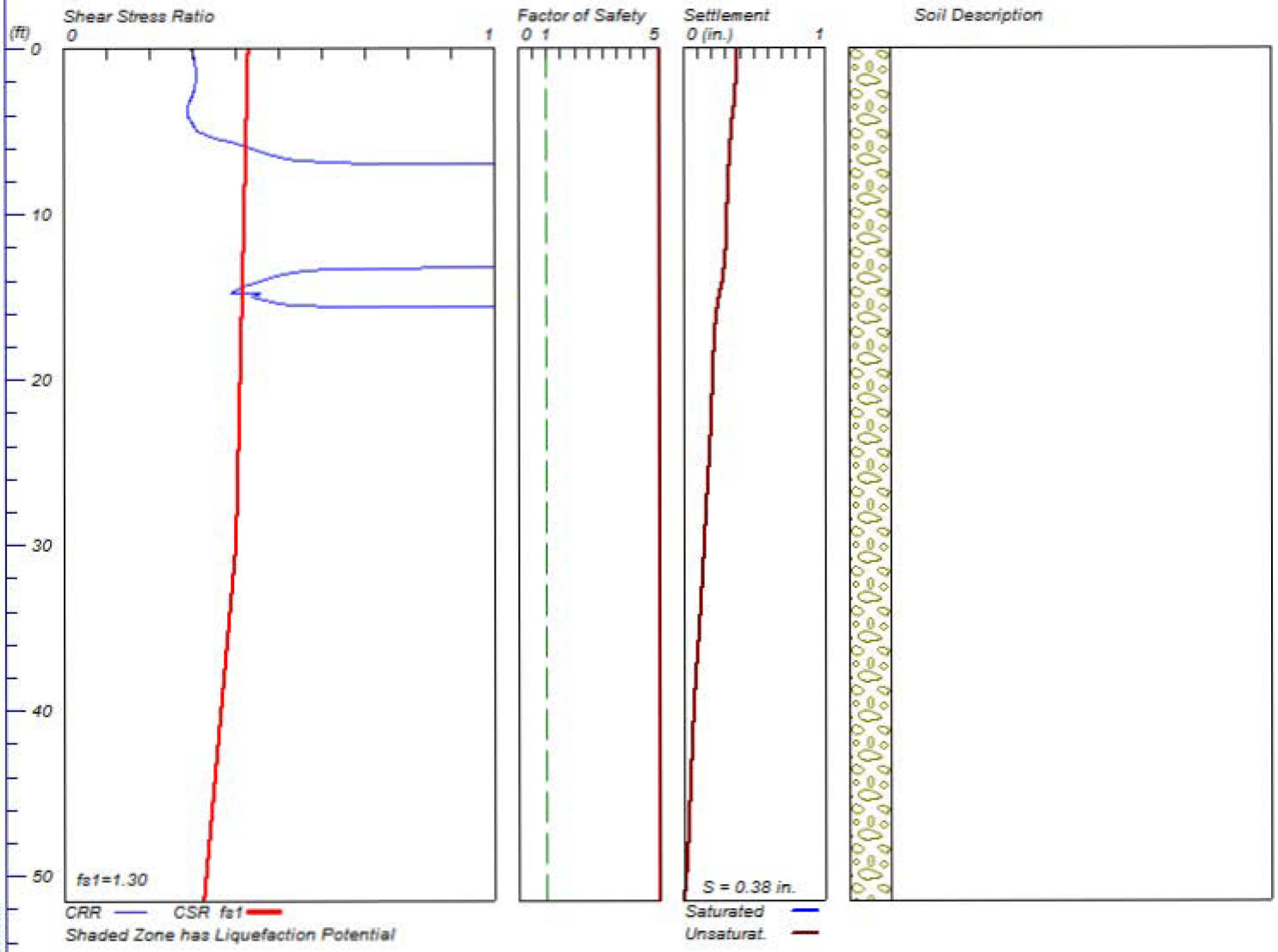


SEISMIC SETTLEMENT ANALYSIS

Coastal Commerce Chino

Hole No.=LB-2 Water Depth=100 ft Surface Elev.=844

Magnitude=6.57
Acceleration=0.51g

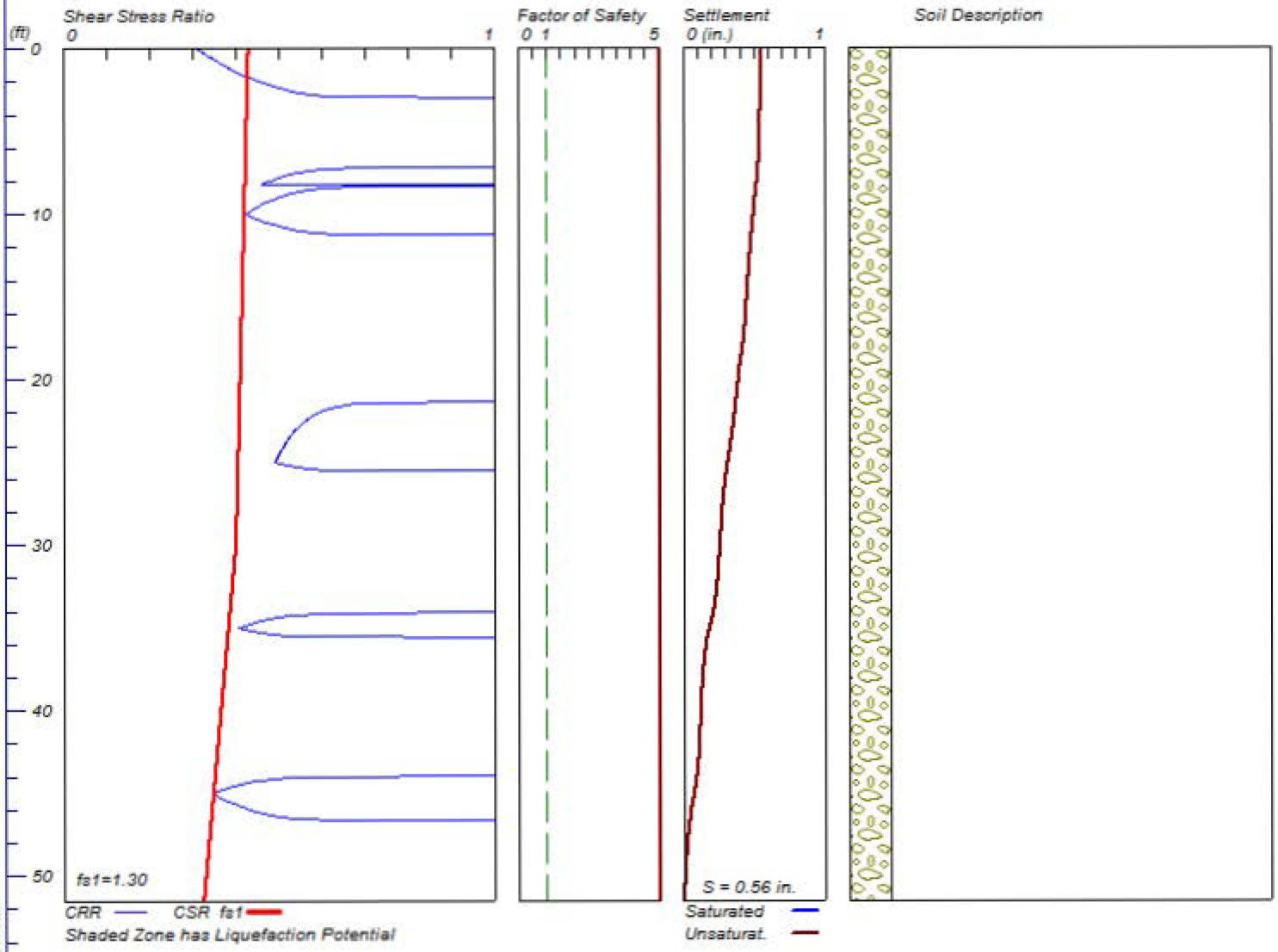


SEISMIC SETTLEMENT ANALYSIS

Coastal Commerce Chino

Hole No.=LB-3 Water Depth=100 ft Surface Elev.=852

Magnitude=6.57
Acceleration=0.51g

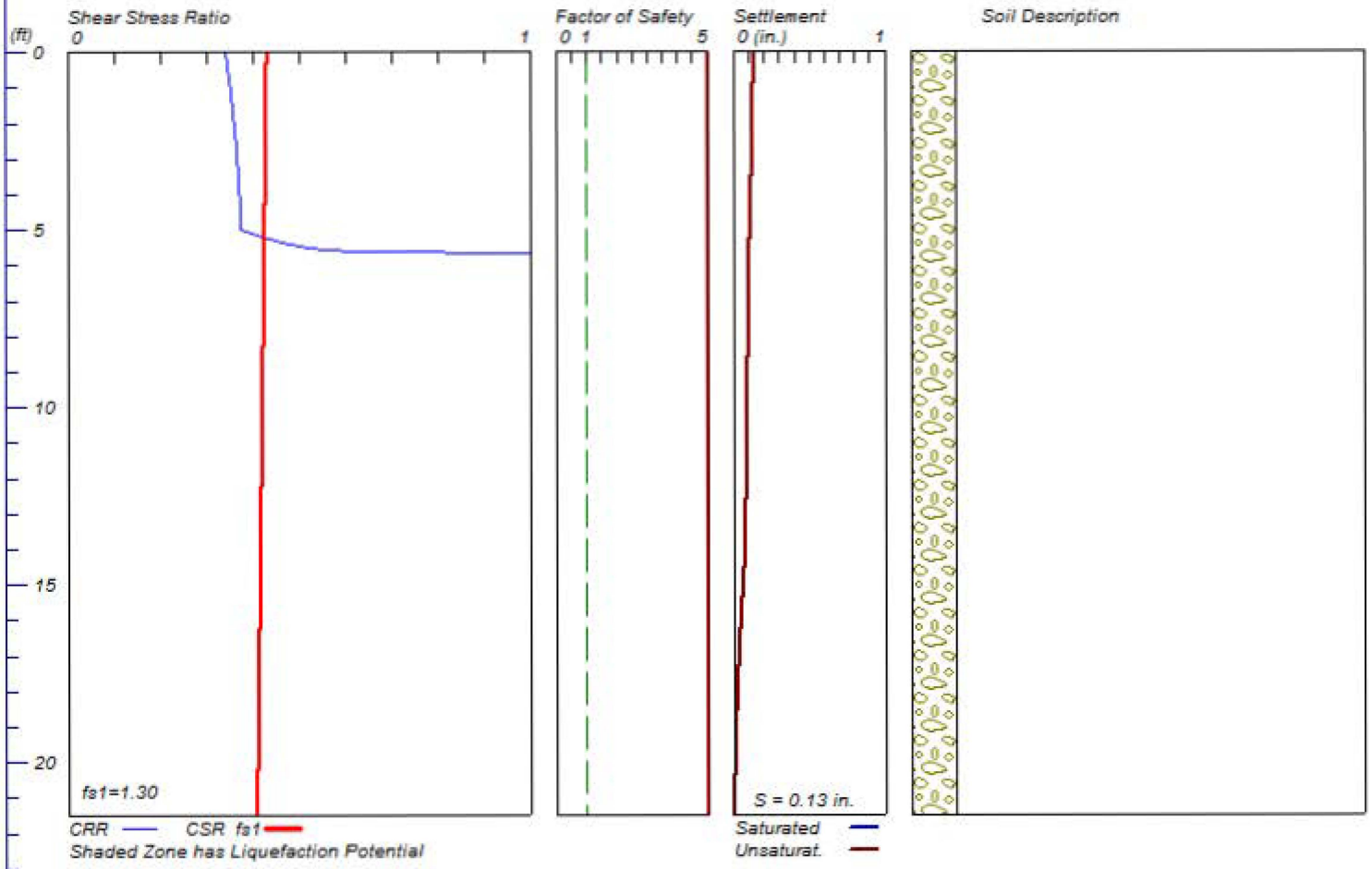


SEISMIC SETTLEMENT ANALYSIS

Coastal Commerce Chino

Hole No.=LB-4 Water Depth=100 ft Surface Elev.=850

Magnitude=6.57
Acceleration=0.51g

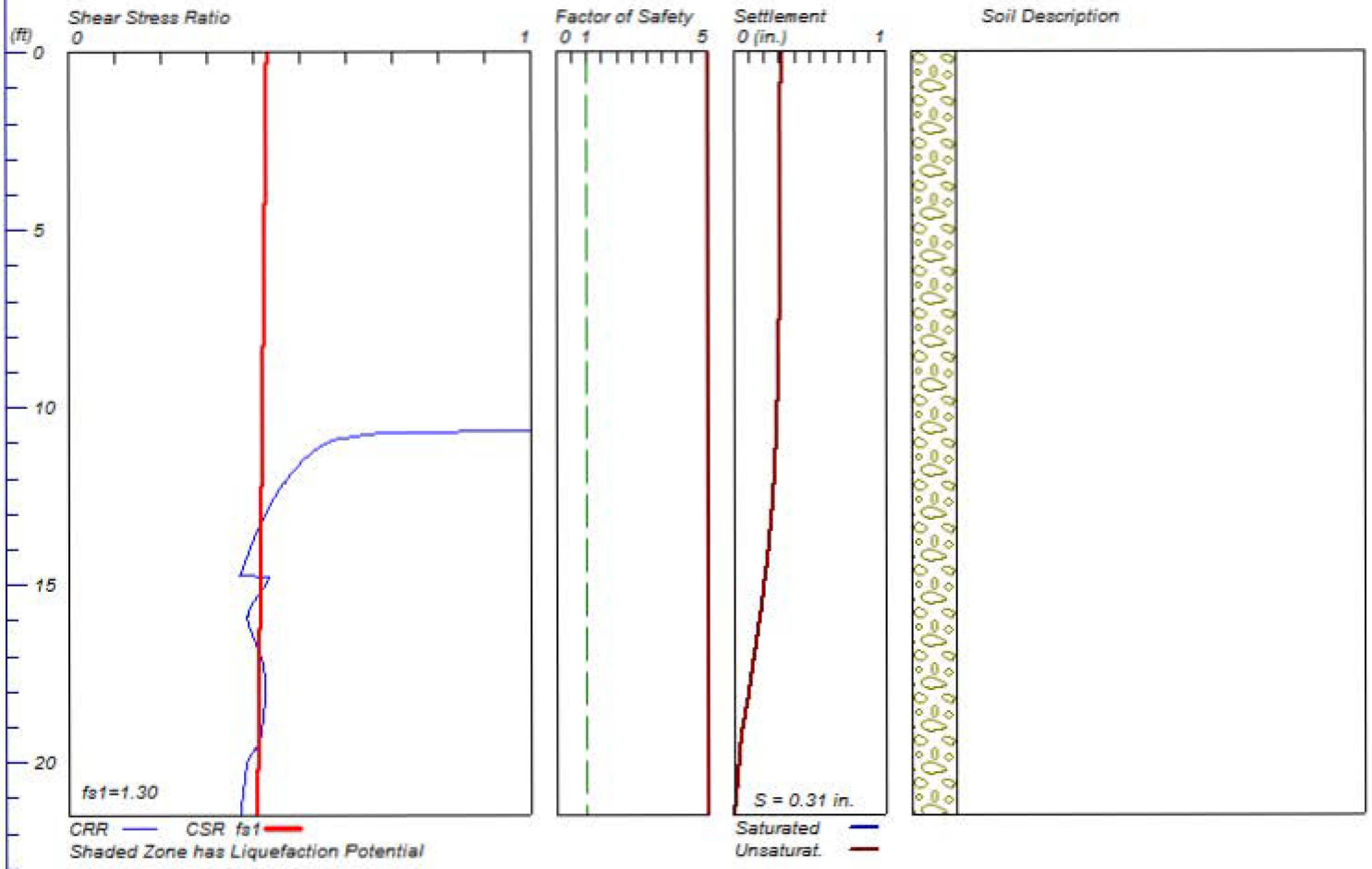


SEISMIC SETTLEMENT ANALYSIS

Coastal Commerce Chino

Hole No.=LB-5 Water Depth=100 ft Surface Elev.=848

Magnitude=6.57
Acceleration=0.51g



APPENDIX E

GENERAL EARTHWORK AND GRADING SPECIFICATIONS

Leighton

LEIGHTON AND ASSOCIATES, INC.

GENERAL EARTHWORK AND GRADING SPECIFICATIONS FOR ROUGH GRADING

Table of Contents

1.0 General

1.1 Intent: These General Earthwork and Grading Specifications are for the grading and earthwork shown on the approved grading plan(s) and/or indicated in the geotechnical report(s). These Specifications are a part of the recommendations contained in the geotechnical report(s). In case of conflict, the specific recommendations in the geotechnical report shall supersede these more general Specifications. Observations of the earthwork by the project Geotechnical Consultant during the course of grading may result in new or revised recommendations that could supersede these specifications or the recommendations in the geotechnical report(s).

1.2 The Geotechnical Consultant of Record: Prior to commencement of work, the owner shall employ the Geotechnical Consultant of Record (Geotechnical Consultant). The Geotechnical Consultants shall be responsible for reviewing the approved geotechnical report(s) and accepting the adequacy of the preliminary geotechnical findings, conclusions, and recommendations prior to the commencement of the grading.

Prior to commencement of grading, the Geotechnical Consultant shall review the "work plan" prepared by the Earthwork Contractor (Contractor) and schedule sufficient personnel to perform the appropriate level of observation, mapping, and compaction testing.

During the grading and earthwork operations, the Geotechnical Consultant shall observe, map, and document the subsurface exposures to verify the geotechnical design assumptions. If the observed conditions are found to be significantly different than the interpreted assumptions during the design phase, the Geotechnical Consultant shall inform the owner, recommend appropriate changes in design to accommodate the observed conditions, and notify the review agency where required. Subsurface areas to be geotechnically observed, mapped, elevations recorded, and/or tested include natural ground after it has been cleared for receiving fill but before fill is placed, bottoms of all "remedial removal" areas, all key bottoms, and benches made on sloping ground to receive fill.

The Geotechnical Consultant shall observe the moisture-conditioning and processing of the subgrade and fill materials and perform relative compaction testing of fill to determine the attained level of compaction. The Geotechnical Consultant shall provide the test results to the owner and the Contractor on a routine and frequent basis.

1.3 The Earthwork Contractor: The Earthwork Contractor (Contractor) shall be qualified, experienced, and knowledgeable in earthwork logistics, preparation and processing of ground to receive fill, moisture-conditioning and processing of fill, and compacting fill. The Contractor shall review and accept the plans, geotechnical report(s), and these Specifications prior to commencement of grading. The

Contractor shall be solely responsible for performing the grading in accordance with the plans and specifications.

The Contractor shall prepare and submit to the owner and the Geotechnical Consultant a work plan that indicates the sequence of earthwork grading, the number of "spreads" of work and the estimated quantities of daily earthwork contemplated for the site prior to commencement of grading. The Contractor shall inform the owner and the Geotechnical Consultant of changes in work schedules and updates to the work plan at least 24 hours in advance of such changes so that appropriate observations and tests can be planned and accomplished. The Contractor shall not assume that the Geotechnical Consultant is aware of all grading operations.

The Contractor shall have the sole responsibility to provide adequate equipment and methods to accomplish the earthwork in accordance with the applicable grading codes and agency ordinances, these Specifications, and the recommendations in the approved geotechnical report(s) and grading plan(s). If, in the opinion of the Geotechnical Consultant, unsatisfactory conditions, such as unsuitable soil, improper moisture condition, inadequate compaction, insufficient buttress key size, adverse weather, etc., are resulting in a quality of work less than required in these specifications, the Geotechnical Consultant shall reject the work and may recommend to the owner that construction be stopped until the conditions are rectified.

2.0 Preparation of Areas to be Filled

2.1 Clearing and Grubbing: Vegetation, such as brush, grass, roots, and other deleterious material shall be sufficiently removed and properly disposed of in a method acceptable to the owner, governing agencies, and the Geotechnical Consultant.

The Geotechnical Consultant shall evaluate the extent of these removals depending on specific site conditions. Earth fill material shall not contain more than 1 percent of organic materials (by volume). No fill lift shall contain more than 5 percent of organic matter. Nesting of the organic materials shall not be allowed.

If potentially hazardous materials are encountered, the Contractor shall stop work in the affected area, and a hazardous material specialist shall be informed immediately for proper evaluation and handling of these materials prior to continuing to work in that area.

As presently defined by the State of California, most refined petroleum products (gasoline, diesel fuel, motor oil, grease, coolant, etc.) have chemical constituents that are considered to be hazardous waste. As such, the indiscriminate dumping or spillage of these fluids onto the ground may constitute a misdemeanor, punishable by fines and/or imprisonment, and shall not be allowed.

2.2 Processing: Existing ground that has been declared satisfactory for support of fill by the Geotechnical Consultant shall be scarified to a minimum depth of 6 inches. Existing ground that is not satisfactory shall be overexcavated as specified in the following section. Scarification shall continue until soils are broken down and free of large clay lumps or clods and the working surface is reasonably uniform, flat, and free of uneven features that would inhibit uniform compaction.

2.3 Overexcavation: In addition to removals and overexcavations recommended in the approved geotechnical report(s) and the grading plan, soft, loose, dry, saturated, spongy, organic-rich, highly fractured or otherwise unsuitable ground shall be overexcavated to competent ground as evaluated by the Geotechnical Consultant during grading.

2.4 Benching: Where fills are to be placed on ground with slopes steeper than 5:1 (horizontal to vertical units), the ground shall be stepped or benched. Please see the Standard Details for a graphic illustration. The lowest bench or key shall be a minimum of 15 feet wide and at least 2 feet deep, into competent material as evaluated by the Geotechnical Consultant. Other benches shall be excavated a minimum height of 4 feet into competent material or as otherwise recommended by the Geotechnical Consultant. Fill placed on ground sloping flatter than 5:1 shall also be benched or otherwise overexcavated to provide a flat subgrade for the fill.

2.5 Evaluation/Acceptance of Fill Areas: All areas to receive fill, including removal and processed areas, key bottoms, and benches, shall be observed, mapped, elevations recorded, and/or tested prior to being accepted by the Geotechnical Consultant as suitable to receive fill. The Contractor shall obtain a written acceptance from the Geotechnical Consultant prior to fill placement. A licensed surveyor shall provide the survey control for determining elevations of processed areas, keys, and benches.

3.0 Fill Material

3.1 General: Material to be used as fill shall be essentially free of organic matter and other deleterious substances evaluated and accepted by the Geotechnical Consultant prior to placement. Soils of poor quality, such as those with unacceptable gradation, high expansion potential, or low strength shall be placed in areas acceptable to the Geotechnical Consultant or mixed with other soils to achieve satisfactory fill material.

3.2 Oversize: Oversize material defined as rock, or other irreducible material with a maximum dimension greater than 8 inches, shall not be buried or placed in fill unless location, materials, and placement methods are specifically accepted by the Geotechnical Consultant. Placement operations shall be such that nesting of oversized material does not occur and such that oversize material is completely surrounded by compacted or densified fill. Oversize material shall not be placed within 10 vertical feet of finish grade or within 2 feet of future utilities or underground construction.

3.3 Import: If importing of fill material is required for grading, proposed import material shall meet the requirements of Section 3.1. The potential import source shall be given to the Geotechnical Consultant at least 48 hours (2 working days) before importing begins so that its suitability can be determined and appropriate tests performed.

4.0 Fill Placement and Compaction

4.1 Fill Layers: Approved fill material shall be placed in areas prepared to receive fill (per Section 3.0) in near-horizontal layers not exceeding 8 inches in loose thickness. The Geotechnical Consultant may accept thicker layers if testing indicates the grading procedures can adequately compact the thicker layers. Each layer shall be spread evenly and mixed thoroughly to attain relative uniformity of material and moisture throughout.

4.2 Fill Moisture Conditioning: Fill soils shall be watered, dried back, blended, and/or mixed, as necessary to attain a relatively uniform moisture content at or slightly over optimum. Maximum density and optimum soil moisture content tests shall be performed in accordance with the American Society of Testing and Materials (ASTM Test Method D1557-91).

4.3 Compaction of Fill: After each layer has been moisture-conditioned, mixed, and evenly spread, it shall be uniformly compacted to not less than 90 percent of maximum dry density (ASTM Test Method D1557-91). Compaction equipment shall be adequately sized and be either specifically designed for soil compaction or of proven reliability to efficiently achieve the specified level of compaction with uniformity.

4.4 Compaction of Fill Slopes: In addition to normal compaction procedures specified above, compaction of slopes shall be accomplished by backrolling of slopes with sheepsfoot rollers at increments of 3 to 4 feet in fill elevation, or by other methods producing satisfactory results acceptable to the Geotechnical Consultant. Upon completion of grading, relative compaction of the fill, out to the slope face, shall be at least 90 percent of maximum density per ASTM Test Method D1557-91.

4.5 Compaction Testing: Field tests for moisture content and relative compaction of the fill soils shall be performed by the Geotechnical Consultant. Location and frequency of tests shall be at the Consultant's discretion based on field conditions encountered. Compaction test locations will not necessarily be selected on a random basis. Test locations shall be selected to verify adequacy of compaction levels in areas that are judged to be prone to inadequate compaction (such as close to slope faces and at the fill/bedrock benches).

4.6 Frequency of Compaction Testing: Tests shall be taken at intervals not exceeding 2 feet in vertical rise and/or 1,000 cubic yards of compacted fill soils embankment. In addition, as a guideline, at least one test shall be taken on slope faces for each 5,000 square feet of slope face and/or each 10 feet of vertical height of slope. The Contractor shall assure that fill construction is such that the testing schedule can be accomplished by the Geotechnical Consultant. The Contractor shall stop or slow down the earthwork construction if these minimum standards are not met.

4.7 Compaction Test Locations: The Geotechnical Consultant shall document the approximate elevation and horizontal coordinates of each test location. The Contractor shall coordinate with the project surveyor to assure that sufficient grade stakes are established so that the Geotechnical Consultant can determine the test locations with sufficient accuracy. At a minimum, two grade stakes within a horizontal distance of 100 feet and vertically less than 5 feet apart from potential test locations shall be provided.

5.0 Subdrain Installation

Subdrain systems shall be installed in accordance with the approved geotechnical report(s), the grading plan, and the Standard Details. The Geotechnical Consultant may recommend additional subdrains and/or changes in subdrain extent, location, grade, or material depending on conditions encountered during grading. All subdrains shall be surveyed by a land surveyor/civil engineer for line and grade after installation and prior to burial. Sufficient time should be allowed by the Contractor for these surveys.

6.0 Excavation

Excavations, as well as over-excavation for remedial purposes, shall be evaluated by the Geotechnical Consultant during grading. Remedial removal depths shown on geotechnical plans are estimates only. The actual extent of removal shall be determined by the Geotechnical Consultant based on the field evaluation of exposed conditions during grading. Where fill-over-cut slopes are to be graded, the cut portion of the slope shall be made, evaluated, and accepted by the Geotechnical Consultant prior to placement of materials for construction of the fill portion of the slope, unless otherwise recommended by the Geotechnical Consultant.

7.0 Trench Backfills

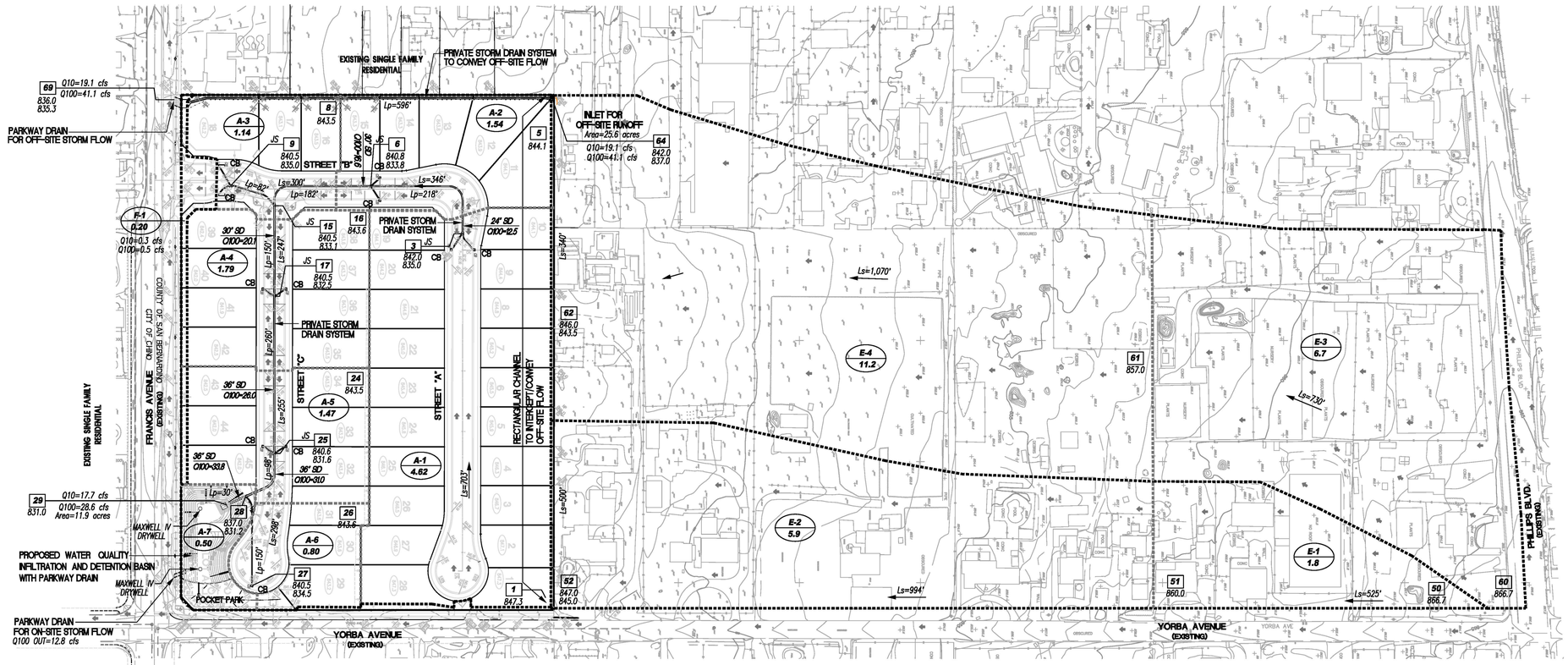
7.1 Safety: The Contractor shall follow all OHSA and Cal/OSHA requirements for safety of trench excavations.

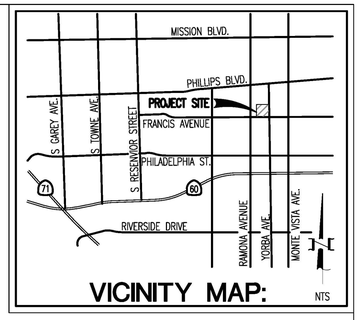
7.2 Bedding and Backfill: All bedding and backfill of utility trenches shall be done in accordance with the applicable provisions of Standard Specifications of Public Works Construction. Bedding material shall have a Sand Equivalent greater than 30 (SE>30). The bedding shall be placed to 1 foot over the top of the conduit and densified by jetting. Backfill shall be placed and densified to a minimum of 90 percent of maximum from 1 foot above the top of the conduit to the surface.

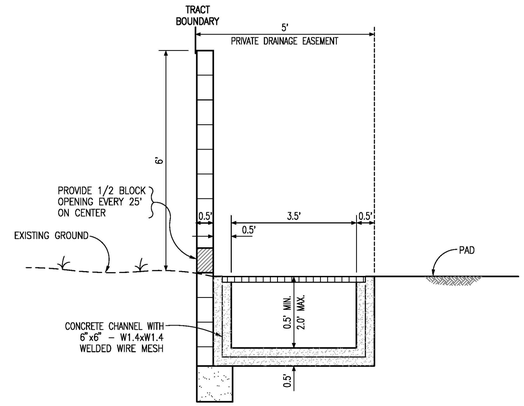
The Geotechnical Consultant shall test the trench backfill for relative compaction. At least one test should be made for every 300 feet of trench and 2 feet of fill.

7.3 Lift Thickness: Lift thickness of trench backfill shall not exceed those allowed in the Standard Specifications of Public Works Construction unless the Contractor can demonstrate to the Geotechnical Consultant that the fill lift can be compacted to the minimum relative compaction by his alternative equipment and method.

7.4 Observation and Testing: The jetting of the bedding around the conduits shall be observed by the Geotechnical Consultant.







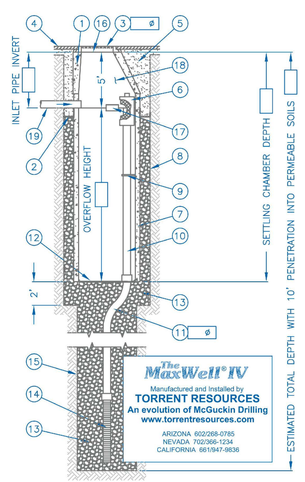
RECTANGULAR CHANNEL DETAIL
N.T.S.

MAXWELL® IV DRAINAGE SYSTEM DETAIL AND SPECIFICATIONS

ITEM NUMBERS

1. **Manhole Cone** - Modified Flat Bottom.
2. **Moisture Membrane** - 6 Mil. Plastic. Applies only when native material is used for backfill. Place membrane securely against eccentric cone and hole sidewall.
3. **Bolted Ring & Grate** - Diameter as shown. Clean cast iron with wording **"Storm Water Only"** in raised letters. **Bolted in 2 locations** and secured to cone with mortar. Rim elevation ±0.02" of plans.
4. **Graded Basin or Paving** (by Others).
5. **Compacted Base Material** - 1-Sack Slurry except in landscaped installtions with no pipe connections.
6. **PureFlo® Debris Shield** - Rolled 16 ga. steel X 24" length with vented anti-siphon and Internal .265" Max. SWD flattened expanded steel screen X 12" length. **Fusion bonded epoxy coated.**
7. **Pre-cast Liner** - 4000 PSI concrete 48" ID. X 54" OD. **Center in hole** and align sections **to maximize bearing surface.**
8. **Min. 6' Ø Drilled Shaft.**
9. **Support Bracket** - Formed 12 Ga. steel. **Fusion bonded epoxy coated.**
10. **Overflow Pipe** - Sch. 40 PVC mated to drainage pipe at base seal.
11. **Drainage Pipe** - ADS highway grade with TRI-A coupler. **Suspend pipe** during backfill operations to prevent buckling or breakage. Diameter as noted.
12. **Base Seal** - Geotextile or concrete slurry.
13. **Rock** - Washed, sized between 3/8" and 1-1/2" to **best complement soil conditions.**
14. **FloFast® Drainage Screen** - Sch. 40 PVC 0.120" slotted well screen with 32 slots per row/ft. Diameter varies 120° overall length with TRI-B coupler.
15. **Min. 4' Ø Shaft** - Drilled to **maintain permeability** of drainage soils.
16. **Fabric Seal** - U.V. resistant geotextile - **to be removed by customer** at project completion.
17. **Absorbent** - Hydrophobic Petrochemical Sponge. Min. to 128 oz. capacity.
18. **Freeboard Depth** Varies with inlet pipe elevation. Increase settling chamber depth as needed to maintain all inlet pipe elevations above overflow pipe inlet.
19. **Optional Inlet Pipe** (Maximum 4", by Others). Extend moisture membrane and compacted base material or 1 sack slurry backfill below pipe invert.

The referenced drawing and specifications are available on CAD either through our office or web site. This detail is copyrighted (2004) but may be used as is in construction plans without further release. For information on product application, individual project specifications or site evaluation, contact our Design Staff for no-charge assistance in any phase of your planning.



AZ Lic. ROC070459 A, ROC047087 B-4, ADWR 363
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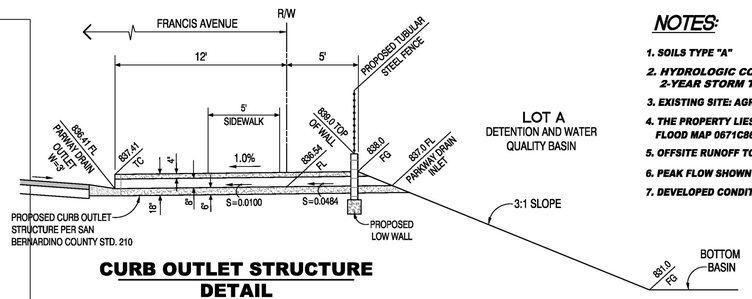
NV Lic. 0035300 A, NM Lic. 90504 GF5X
U.S. Patent No. 4,823,330 - ™ Trademark 1974, 1990, 2004



CURB OUTLET STRUCTURE DETAIL
N.T.S.

NOTES:

1. **SOILS TYPE "A"**
2. **HYDROLOGIC CONDITIONS OF CONCERN (HCOC) CALCULATIONS PER PWQMP REPORT, POST DEVELOPED 2-YEAR STORM TO BE MITIGATED AND 100-YEAR STORM MITIGATED TO 80% OF PRE-DEVELOPED CONDITION STORM**
3. **EXISTING SITE: AGRICULTURE USE, 40% IMPERVIOUS**
4. **THE PROPERTY LIES WITHIN FLOOD ZONE 'X' UNSHADED PER FEMA FLOOD MAP 0671C8815H, DATED AUGUST 28, 2008.**
5. **OFFSITE RUNOFF TO BYPASS ONSITE WATER QUALITY INFITRATION BASIN**
6. **PEAK FLOW SHOWN ARE FOR 100-YEAR STORM UNLESS NOTED OTHERWISE**
7. **DEVELOPED CONDITION PEAK TO BE DETAINED TO 80% OF PRE-DEVELOPED CONDITION PEAK FLOW**

LEGEND:

C.B.	CATCH BASIN
J.S.	JUNCTION STRUCTURE
Lp=XX'	LENGTH OF PIPE FLOW (feet)
X-Y / X.XX	SUB-AREA DESIGNATION / AREA (acres)
Q=X.X	100-year STORM PEAK FLOW (cfs)
Q10=X.X	10-year STORM PEAK FLOW (cfs)
Ls=XXX'	SURFACE FLOW LENGTH (feet)
	DRAINAGE BOUNDARY
	SUB-AREA DRAINAGE BOUNDARY
	DIRECTION OF SURFACE FLOW
XX	NODE NUMBER
XX.X	ELEVATION
XX.X	INVERT
	LOT AREA DRAIN SYSTEM WITH DIRECTION OF FLOW ARROW

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)
1 inch = 100 ft.

PREPARED FOR:

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PLANNERS ENGINEERS SURVEYORS

TENTATIVE TRACT NO. 20394
PRELIMINARY HYDROLOGY MAP
DEVELOPED CONDITION
COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA

Prepared: November 2021

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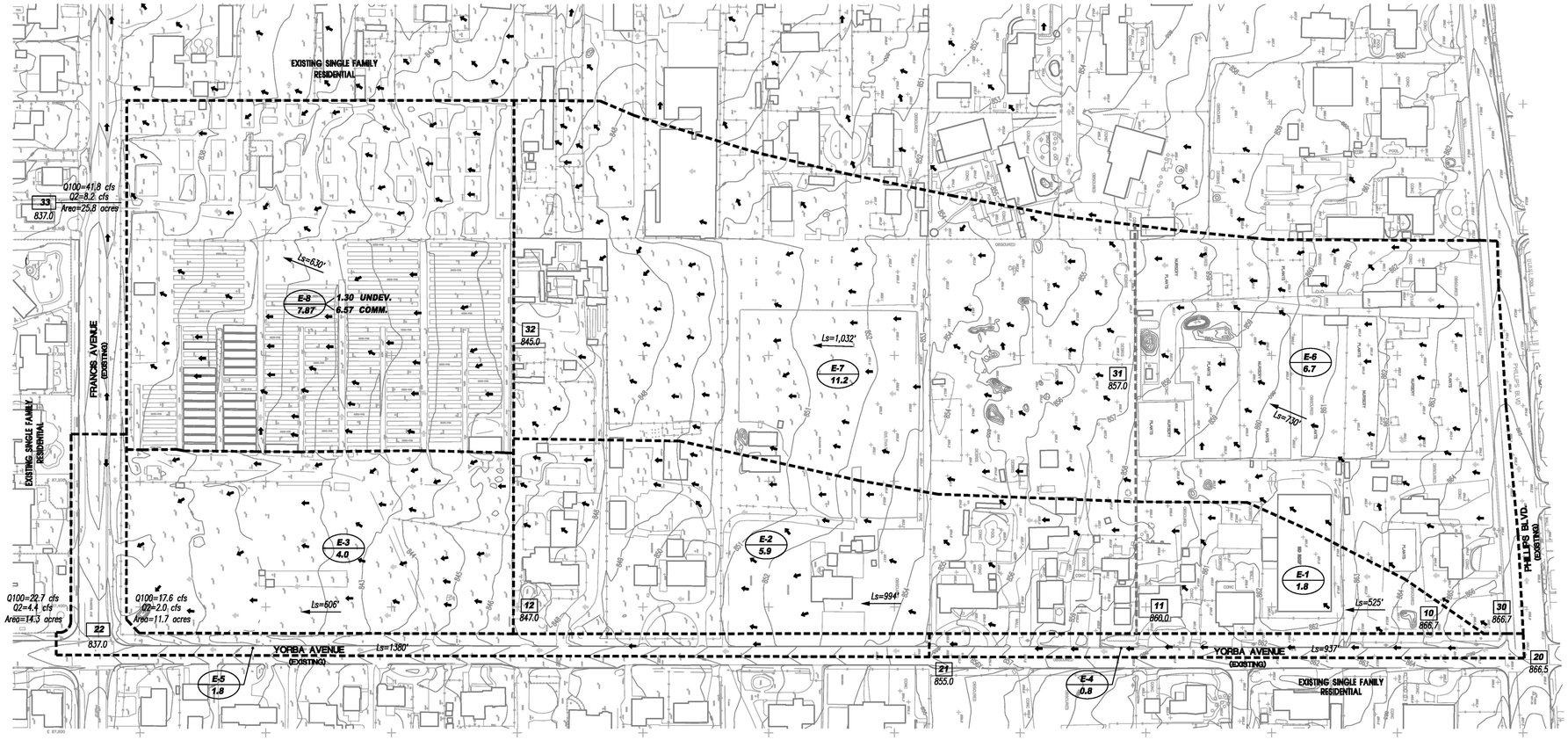

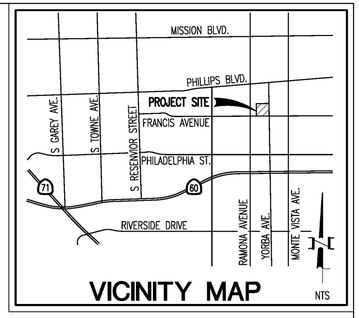

LEGEND:

C.B.	CATCH BASIN
J.S.	JUNCTION STRUCTURE
Lp=XX'	LENGTH OF PIPE FLOW (feet)
X-Y / X.XX	SUB-AREA DESIGNATION / AREA (acres)
Q=X.X	100-year STORM PEAK FLOW (cfs)
Q10=X.X	10-year STORM PEAK FLOW (cfs)
Ls=XXX'	SURFACE FLOW LENGTH (feet)
	DRAINAGE BOUNDARY
	SUB-AREA DRAINAGE BOUNDARY
	DIRECTION OF SURFACE FLOW
XX / XX.X / XX.X	NODE NUMBER / ELEVATION / INVERT
	LOT AREA DRAIN SYSTEM WITH DIRECTION OF FLOW ARROW

NORTH

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)

1 inch = 100 ft.

TENTATIVE TRACT NO. 20394

PRELIMINARY HYDROLOGY MAP EXISTING CONDITION

COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA

Prepared: November 2021

PREPARED FOR:

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