Appendix I Preliminary Hydrology Study

Appendices

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Preliminary Hydrology Study

Chaffey College Fontana Campus

Site Address:

11070 Sierra Avenue
Fontana, CA 92337

Prepared for:

Chaffey Community College District
5885 Haven Ave
Rancho Cucamonga, CA 91737

Prepared by:

Engineer: Kathereen M. Shinkai Registration No.: 68369
5301 California Avenue, Suite 100
Irvine, CA 92617
Phone: (949) 261-1001

Date Prepared:

January 2, 2023

Table of Contents

Appendices:

Map Pockets:

1.0 Introduction

1.1 Project Description

The Chaffey College Fontana Campus is located at 11070 Sierra Avenue in Fontana, California. See Figure 1, Vicinity Map located at the end of section 1.0. Per FEMA map number 06071C8666H revised August 28, 2008 the project is in zone X defined as areas determined to be outside the 0.2% annual chance flood plain. See Appendix B.

The majority of the existing site is undeveloped with several trees and fencing. The eastern edge of the site was previously occupied by several single family homes that have since been demolished.

The proposed project will be built in 2 phases, however this preliminary Hydrology Study encompasses the full built out condition. Phase 1 includes the parking lot, sidewalks, utility infrastructure, landscaped areas, welcome center/library, an instructional building, automotive technology building, and an O&M building. Phase 2 includes an instructional building, student and community center, and CTE building. See Appendix A for a phased site plan. The project's disturbed area is 624,485 s.f. (14.3 acres).

This report has been prepared to calculate the pre-construction and post-construction hydrologic and hydraulic conditions for peak storm water runoff rates per the San Bernadino County Hydrology Manual (dated August 1986).

1.2 Drainage Examination

Existing Site Conditions

Site drainage for the existing condition is divided into 4 basins. Basin A1-A2 is the approximately half of the site that surface flows to the west edge then towards the south. Basin B1-B2 is the other half of the site that surface flows to the south. Stormwater from Basins A2 and B2 confluence at the existing offsite detention basin at Point of Interest 1 as shown on the Existing Hydrology Exhibit in map pocket 1.

After the confluence at point of interest #1, the detention basin has overflow release into a 54" storm drain line on Sierra Avenue that ultimately connects to a storm drain line on Jurupa Avenue. Stormwater conveyance continues via underground storm drain system and ultimately indirectly discharges to the Declez Channel. The Declez Channel flows to the San Sevaine Channel, then Santa Ana River, Reach 3, then Reach 2, then Reach 1 before ultimately discharging into the Pacific Ocean. See Appendix F for as-built drawings of the existing detention basin.

Proposed Neighboring Detention Basin Improvements

At the time of this preliminary hydrology report, the southern neighboring property with the existing detention basin is in the entitlements phase to reduce the size of the detention basin and build affordable housing units. The existing 108" inflow pipe from Sierra Avenue is proposed to run along the southern property edge and release into the reduced basin at the western portion of the property. A proposed 84" overflow release runs through adjacent properties, Juniper Avenue, and ultimately connects back into the storm drain line on Jurupa Avenue. See Appendix F for the proposed storm drain drawings and See Figure 1 below for further clarification of improvements.

Figure 1: Offsite Existing and Proposed Storm Drain Line

Proposed Site Conditions

Site drainage for the proposed condition is divided into 7 basins with no offsite storm water conditions. Basins A1-A6 confluence with Basin B1 at the underground detention system then connect to a proposed 108" RCP storm drain line by others. Similar to the existing drainage pattern, point of interest #1 is at the 108" storm drain that eventually outlets to the detention basin.

Basins A1-A6 occupy the north, west, and south portions of the site and is composed of stormwater from contributing building roof drains, hardscape areas, and the parking lots. Stormwater conveyance is via overland flow and is collected by miscellaneous drain inlets. Flow in the onsite underground pipe system continues to convey stormwater toward the southern edge of the property where stormwater will be routed to drywells where infiltration is feasible. Stormwater in excess of stormwater treatment requirements will be stored in an underground detention basin and released to the City of Fontana storm drain system.

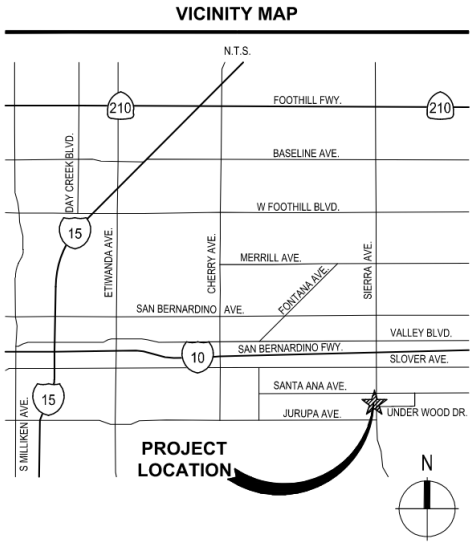
Basin B1 occupies the eastern portion of the site and is composed of stormwater from contributing building roof drains and hardscape areas. Stormwater conveyance is via underground piping and overland flow into a proposed bioretention planter with underdrains. The bioretention planter is sized to accommodate stormwater treatment requirements. Stormwater in excess of requirements will be routed to be stored in an underground detention basin and released to the 108" City of Fontana storm drain.

The 108" City of Fontana storm drain is routed to the resized detention basin. As mentioned previously, the overflow from the detention basin is conveyed via underground storm drain systems in Jurupa Avenue and ultimately discharges to the Declez Channel. The Declez Channel flows to the San Sevaine Channel, then Santa Ana River, Reach 3, then Reach 2, then Reach 1 before ultimately discharging into the Pacific Ocean.

1.3 Water Quality

The Chaffey College Fontana Campus is a priority development project and is subject to all requirements outlined in the City of Fontana WQMP Handbook. All water quality design and proposed best management practices proposed for the project can be found in the report titled "Preliminary Water Quality Management Plan (WQMP) for Chaffey College Fontana Campus", prepared by LPA. (Job #30671.01)

Figure 2: Vicinity Map



2.0 Hydrology

2.1 Methodology

The Advanced Engineering Software (AES) was used to calculate the existing and proposed 100-year storm events. The program follows the computational techniques and criteria for the estimation of runoff, discharges, and volume, as put forth by the San Bernadino County Hydrology Manual, prepared by the Williamson and Schmid, Civil Engineers dated August 1986.The AES output pages can be found in Appendix C.

Existing watershed characteristics were obtained from topographic survey information prepared for the project by Value Engineering. Basin areas, pervious areas, and flow paths are depicted in the Existing and Proposed Hydrology Maps created for this study and included at the end of this report.

Existing and proposed impervious/pervious ratios was determined through analysis of land use for each basin. Within the AES software platform, the closest corresponding impervious percentage for each basin was selected to determine a runoff coefficient for each basin. The computer-generated runoff coefficient for each basin was utilized for the existing and proposed hydrology analysis.

A basin routing analysis was necessary to demonstrate 100-Year event post project peak flow rates equal to or less than the existing peak flow rates. The time of concentration and peak flow rate hydrology was extracted from AES at pre underground detention system, Node 203. This hydrology data was entered into AES Computational Hydraulics (CH1) program to develop a 100-year pre-detention hydrograph. The hydrograph generated from AES CH1 was imported into Hydraflow hydrographs for a basin routing analysis. A post detention peak flow rate was obtained from the post detention hydrograph. The post detention peak flow rate was then brought back into AES as User Specified Hydrology at Node 204, see Appendix D.

2.2 Results

The 100-year peak flow rates for drainage basins A1-A2 and B1-B2 are summarized in Table A below for the existing condition. The 100-year peak flow rates for drainage basins A1-A6 and B1 are summarized in Table B below for the proposed condition.

Refer to Appendix C for detailed hydrology calculations.

Table A: Existing Site (100-Yr)

Basin ID	Basin Acreage (ac)	Percent Impervious	T_C (min)	Q_{100} (cfs)
A1	0.7	0%	7.72	2.49
A2	7.6	0%	12.49	20.87
B1	0.2	0%	9.27	0.62
B2	5.8	0%	26.59	8.27
Total*	**14.3**	**N/A**	**12.49**	**27.95**

** Total encompasses existing peak flow Q*

Table B: Proposed Site (100-Yr)

Basin ID	Basin Acreage (ac)	Percent Impervious	T_C (min)	Q_{100} (cfs)
A1	2.3	80%	10.17	6.88
A2	1.8	80%	9.95	5.47
A3	3.0	80%	9.43	9.46
A4	2.9	80%	16.17	6.19
A5	0.4	80%	8.47	1.36
A6	1.3	80%	10.44	3.82
B1	2.6	80%	12.94	6.54
Total	**2.4**	**N/A**	**10.98**	**27.68**

** Total encompasses proposed peak flow Q post onsite detention*

3.0 Conclusions

This drainage study analyzes the existing and proposed hydrologic and hydraulic conditions for the Chaffey College Fontana Campus.

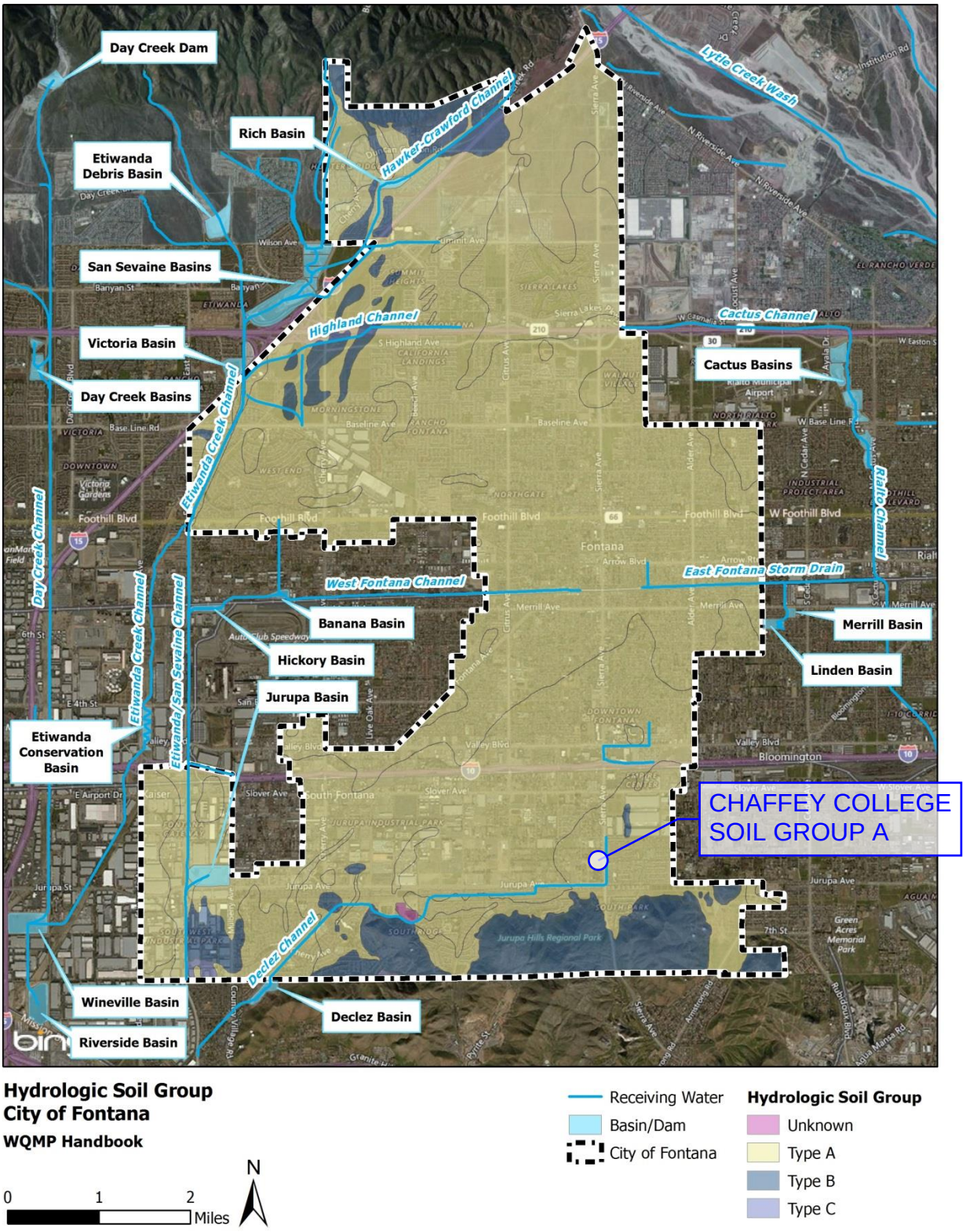
Hydrologic analyses were conducted to determine the existing and proposed 100-yr peak flow rates in accordance with the San Bernadino County Hydrology Manual, dated August 1986.

The proposed detention system has been designed to attenuate peak flow rates from the project site. Basin routing modeling of the proposed detention basin system demonstrates a decrease of 100-year peak flow rates from 36.11 CFS to 27.68 CFS. Due to the proposed construction of the stormwater detention facility, the proposed post project condition will have a net reduction of 100-year peak flow rates of 0.27 CFS.

APPENDIX A

Soil Hydrologic Groups Map

100 Year Rainfall Map



Hydrologic Soil Group
City of Fontana
WQMP Handbook

0 1 2 Miles

N

Receiving Water
Basin/Dam
City of Fontana

Hydrologic Soil Group
Unknown
Type A
Type B
Type C

Figure 2-1 Hydrologic Soil Group

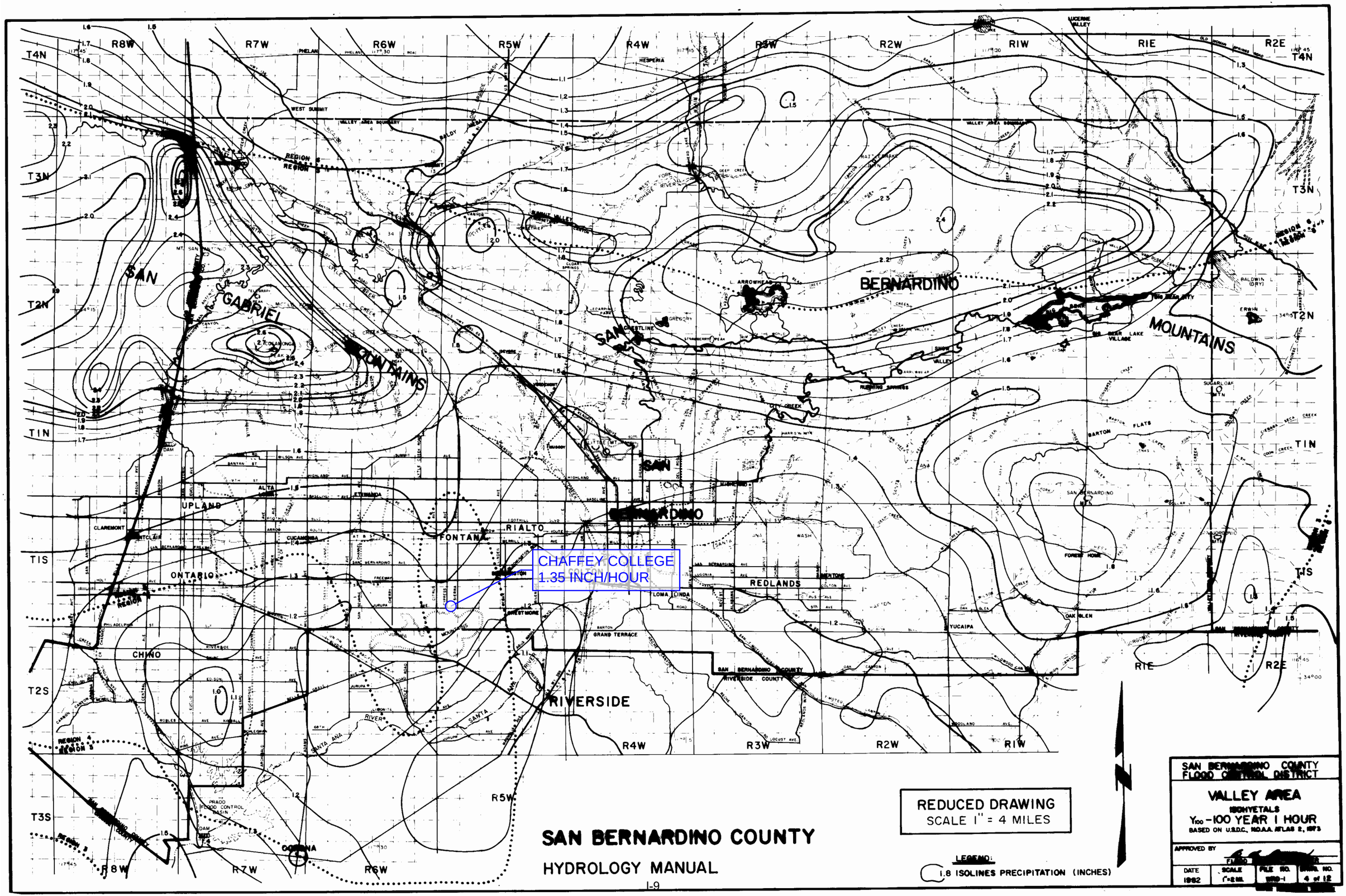

CHAFFEY COLLEGE
1.35 INCH/HOUR
REDUCED DRAWING
SCALE 1" = 4 MILES
LEGEND:
1.8 ISOLINES PRECIPITATION (INCHES)
SAN BERNARDINO COUNTY
HYDROLOGY MANUAL
SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT
VALLEY AREA
ISOHYETALS
Y100 - 100 YEAR 1 HOUR
BASED ON U.S.D.C., NOAA ATLAS 2, 1973
APPROVED BY
DATE 1982
SCALE 1"=2MI.
FILE NO. WRD-1
SHEET NO. 4 of 12

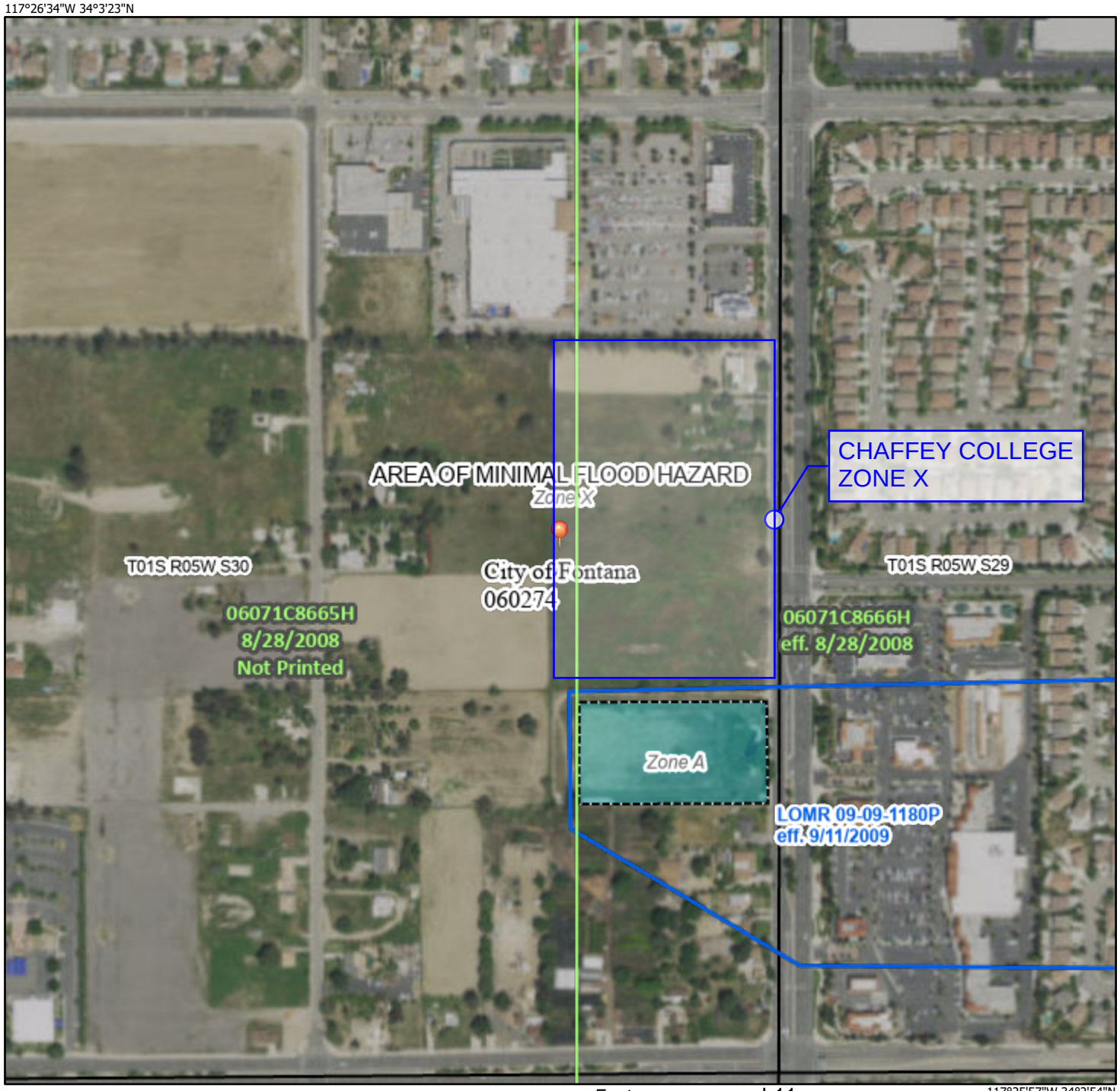
FIGURE B-4

APPENDIX B

FEMA FIRM Map Number 06071C8666H and FIRMETTE

National Flood Hazard Layer FIRMette

FEMA



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

Legend

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

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

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

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 11/27/2022 at 7:45 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0 North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 11 North. The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, NNGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from digital orthophotography collected by the U.S. Department of Agriculture Farm Service Agency. This imagery was flown in 2005 and was produced with a 1-meter ground sample distance.

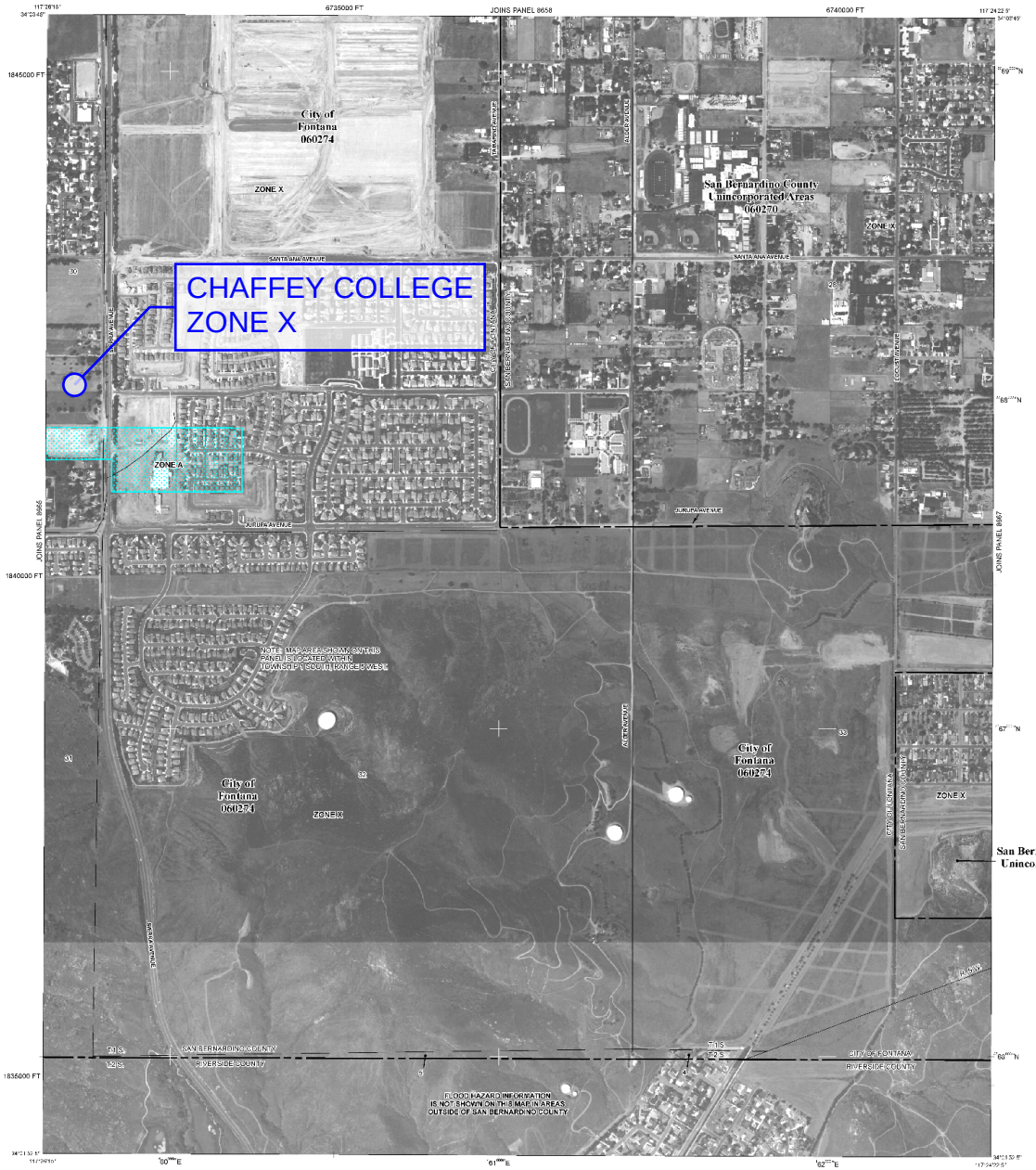
This map may reflect more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A — No Base Flood Elevations determined.
ZONE AE — Base Flood Elevations determined.
ZONE AH — Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR — Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99 — Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V — Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary
0.2% annual chance floodplain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513 — Base Flood Elevation line and value; elevation in feet*
(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* References to the North American Vertical Datum of 1988

A — A — Cross section line
23 — 23 — Transect line
87°07'45", 32°22'30" — Geographic coordinates, referenced to the North American Datum of 1983 (NAD 83), western hemisphere
1000-meter Universal Transverse Mercator grid values, zone 11N
600000 FT — 5000-foot grid ticks: California State Plane coordinate system, zone V (FIPSZON 0405), Lambert Conformal Conic projection
DX510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5 — River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
March 18, 1998

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
August 28, 2008 - to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 800'
250 0 500 1000 FEET
150 0 150 300 METERS

PANEL 8666H

FIRM
FLOOD INSURANCE RATE MAP

SAN BERNARDINO COUNTY, CALIFORNIA AND INCORPORATED AREAS
PANEL 8666 OF 9400
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
FONTANA, CITY OF	060274	8666	H
SAN BERNARDINO COUNTY	060270	8666	H

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
06071C8666H

MAP REVISED
AUGUST 28, 2008

Federal Emergency Management Agency

APPENDIX C

Existing 100-Year Hydrology Calculation

Proposed 100-Year Hydrology Calculation

```
**************************************************************************
            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 1618

                          Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* EXISTING 100 YEAR                                                     *
*                                                                       *
*                                                                       *
 *************************************************************************

  FILE NAME: ECH100.DAT
  TIME/DATE OF STUDY: 08:26 12/08/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *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) = 1.3500

  *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

+-------------------------------------------------------------------------+
| AREA A1                                                                 |
|                                                                         |
|                                                                         |
+-------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1156.00  DOWNSTREAM(FEET) =   1155.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.718
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.621
  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
  ".4 DWELLING/ACRE"         A        0.70      0.74     0.900    52    7.72
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      2.49
  TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      2.49

+-------------------------------------------------------------------------+
| AREA A2                                                                 |
|                                                                         |
|                                                                         |
+-------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    203.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1155.00  DOWNSTREAM(FEET) =   1133.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1280.00   CHANNEL SLOPE =  0.0172
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   8.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.461
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  RESIDENTIAL
  ".4 DWELLING/ACRE"          A        7.60      0.74     0.900    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.28
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.47
  AVERAGE FLOW DEPTH(FEET) =   0.23   TRAVEL TIME(MIN.) =   4.77
  Tc(MIN.) =   12.49
  SUBAREA AREA(ACRES) =     7.60       SUBAREA RUNOFF(CFS) =   19.11
  EFFECTIVE AREA(ACRES) =      8.30     AREA-AVERAGED Fm(INCH/HR) =   0.67
  AREA-AVERAGED Fp(INCH/HR) =   0.74  AREA-AVERAGED Ap =   0.90
  TOTAL AREA(ACRES) =        8.3         PEAK FLOW RATE(CFS) =      20.87

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.32   FLOW VELOCITY(FEET/SEC.) =   5.28
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    203.00 =    1380.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    203.00 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.) =   12.49
  RAINFALL INTENSITY(INCH/HR) =   3.46
  AREA-AVERAGED Fm(INCH/HR) =  0.67
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =       8.30
  TOTAL STREAM AREA(ACRES) =       8.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      20.87

+--------------------------------------------------------------------------+
| AREA B1                                                                  |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1154.20  DOWNSTREAM(FEET) =   1153.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.271
```

```
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.139
  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
  ".4 DWELLING/ACRE"         A        0.20      0.74     0.900    52    9.27
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      0.62
  TOTAL AREA(ACRES) =      0.20   PEAK FLOW RATE(CFS) =      0.62

+-------------------------------------------------------------------------+
| AREA B2                                                                 |
|                                                                         |
|                                                                         |
+-------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    203.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1153.80  DOWNSTREAM(FEET) =   1133.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   831.00   CHANNEL SLOPE =  0.0250
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   8.000
  MANNING'S FACTOR = 0.150   MAXIMUM DEPTH(FEET) =   1.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.200
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         A        5.80      0.74     0.900    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.07
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.80
  AVERAGE FLOW DEPTH(FEET) =   0.46   TRAVEL TIME(MIN.) =  17.32
  Tc(MIN.) =   26.59
  SUBAREA AREA(ACRES) =     5.80       SUBAREA RUNOFF(CFS) =    8.00
  EFFECTIVE AREA(ACRES) =      6.00     AREA-AVERAGED Fm(INCH/HR) =   0.67
  AREA-AVERAGED Fp(INCH/HR) =   0.74  AREA-AVERAGED Ap =   0.90
  TOTAL AREA(ACRES) =        6.0         PEAK FLOW RATE(CFS) =       8.27

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.61   FLOW VELOCITY(FEET/SEC.) =   0.92
  LONGEST FLOWPATH FROM NODE    201.00 TO NODE    203.00 =     931.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    203.00 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.) =   26.59
  RAINFALL INTENSITY(INCH/HR) =   2.20
  AREA-AVERAGED Fm(INCH/HR) =  0.67
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =       6.00
  TOTAL STREAM AREA(ACRES) =       6.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       8.27

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       20.87   12.49    3.461  0.74( 0.67) 0.90       8.3     101.00
      2        8.27   26.59    2.200  0.74( 0.67) 0.90       6.0     201.00

  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       27.95   12.49    3.461  0.74( 0.67) 0.90      11.1     101.00
      2       19.71   26.59    2.200  0.74( 0.67) 0.90      14.3     201.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      27.95    Tc(MIN.) =    12.49
  EFFECTIVE AREA(ACRES) =      11.12   AREA-AVERAGED Fm(INCH/HR) =  0.67
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       14.3
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    203.00 =    1380.00 FEET.
========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       14.3  TC(MIN.) =     12.49
  EFFECTIVE AREA(ACRES) =     11.12  AREA-AVERAGED Fm(INCH/HR)=  0.67
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap = 0.900
  PEAK FLOW RATE(CFS)   =      27.95

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       27.95   12.49    3.461  0.74( 0.67) 0.90      11.1     101.00
      2       19.71   26.59    2.200  0.74( 0.67) 0.90      14.3     201.00
========================================================================
========================================================================
```

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 1618

                          Analysis prepared by:



 ************************* DESCRIPTION OF STUDY *************************
* PROPOSED 100 YEAR                                                     *
*                                                                       *
*                                                                       *
 ************************************************************************

  FILE NAME: CH100.DAT
  TIME/DATE OF STUDY: 11:45 01/02/2023
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *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) = 1.3500

  *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    101.00 TO NODE    102.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   232.00
  ELEVATION DATA: UPSTREAM(FEET) =   1157.40  DOWNSTREAM(FEET) =   1154.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.642
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.043
  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        2.30      0.74     0.800    52    9.64
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  SUBAREA RUNOFF(CFS) =      7.14
  TOTAL AREA(ACRES) =      2.30   PEAK FLOW RATE(CFS) =      7.14

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    112.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1152.00  DOWNSTREAM(FEET) =  1145.90
  FLOW LENGTH(FEET) =   725.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.10
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.14
  PIPE TRAVEL TIME(MIN.) =   1.98    Tc(MIN.) =   11.62
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    112.00 =     957.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 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.) =   11.62
  RAINFALL INTENSITY(INCH/HR) =   3.61
  AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.74
```

```
  AREA-AVERAGED Ap =  0.80
  EFFECTIVE STREAM AREA(ACRES) =       2.30
  TOTAL STREAM AREA(ACRES) =       2.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.14

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    111.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   278.00
  ELEVATION DATA: UPSTREAM(FEET) =   1153.50  DOWNSTREAM(FEET) =   1148.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.834
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.996
  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    9.83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  SUBAREA RUNOFF(CFS) =      5.51
  TOTAL AREA(ACRES) =      1.80   PEAK FLOW RATE(CFS) =      5.51

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    112.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1146.20  DOWNSTREAM(FEET) =  1145.90
  FLOW LENGTH(FEET) =    22.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.85
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.51
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    9.89
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    112.00 =     300.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
```

```
  TIME OF CONCENTRATION(MIN.) =    9.89
  RAINFALL INTENSITY(INCH/HR) =   3.98
  AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.80
  EFFECTIVE STREAM AREA(ACRES) =       1.80
  TOTAL STREAM AREA(ACRES) =       1.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.51

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        7.14   11.62    3.614  0.74( 0.59) 0.80       2.3     101.00
      2        5.51    9.89    3.983  0.74( 0.59) 0.80       1.8     110.00

  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       12.33    9.89    3.983  0.74( 0.59) 0.80       3.8     110.00
      2       12.05   11.62    3.614  0.74( 0.59) 0.80       4.1     101.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      12.33    Tc(MIN.) =     9.89
  EFFECTIVE AREA(ACRES) =       3.76   AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.80
  TOTAL AREA(ACRES) =        4.1
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    112.00 =     957.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    115.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1145.90  DOWNSTREAM(FEET) =  1143.20
  FLOW LENGTH(FEET) =   368.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.54
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.33
  PIPE TRAVEL TIME(MIN.) =   0.94    Tc(MIN.) =   10.83
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    115.00 =    1325.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    115.00 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.) =   10.83
  RAINFALL INTENSITY(INCH/HR) =   3.77
  AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.80
  EFFECTIVE STREAM AREA(ACRES) =       3.76
  TOTAL STREAM AREA(ACRES) =       4.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      12.33

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    114.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   212.00
  ELEVATION DATA: UPSTREAM(FEET) =   1150.30  DOWNSTREAM(FEET) =   1147.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.430
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.098
  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        3.00      0.74     0.800    52    9.43
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  SUBAREA RUNOFF(CFS) =      9.46
  TOTAL AREA(ACRES) =      3.00   PEAK FLOW RATE(CFS) =      9.46

****************************************************************************
  FLOW PROCESS FROM NODE    114.00 TO NODE    115.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1145.40  DOWNSTREAM(FEET) =  1144.50
  FLOW LENGTH(FEET) =    93.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.79
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.46
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =    9.66
  LONGEST FLOWPATH FROM NODE    113.00 TO NODE    115.00 =     305.00 FEET.

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

```
 FLOW PROCESS FROM NODE    115.00 TO NODE    115.00 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.) =    9.66
 RAINFALL INTENSITY(INCH/HR) =   4.04
 AREA-AVERAGED Fm(INCH/HR) =  0.59
 AREA-AVERAGED Fp(INCH/HR) =  0.74
 AREA-AVERAGED Ap =  0.80
 EFFECTIVE STREAM AREA(ACRES) =       3.00
 TOTAL STREAM AREA(ACRES) =       3.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.46

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       12.33   10.83    3.772  0.74( 0.59) 0.80       3.8     110.00
     1       12.05   12.56    3.450  0.74( 0.59) 0.80       4.1     101.00
     2        9.46    9.66    4.039  0.74( 0.59) 0.80       3.0     113.00

 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       21.38    9.66    4.039  0.74( 0.59) 0.80       6.4     113.00
     2       21.05   10.83    3.772  0.74( 0.59) 0.80       6.8     110.00
     3       19.89   12.56    3.450  0.74( 0.59) 0.80       7.1     101.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      21.38    Tc(MIN.) =     9.66
 EFFECTIVE AREA(ACRES) =       6.35   AREA-AVERAGED Fm(INCH/HR) =  0.59
 AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.80
 TOTAL AREA(ACRES) =        7.1
 LONGEST FLOWPATH FROM NODE    101.00 TO NODE    115.00 =    1325.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    115.00 TO NODE    142.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1144.50  DOWNSTREAM(FEET) =  1140.40
 FLOW LENGTH(FEET) =   358.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.90
```

```
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.38
  PIPE TRAVEL TIME(MIN.) =   0.67    Tc(MIN.) =   10.33
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    142.00 =    1683.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    142.00 TO NODE    142.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    121.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   290.00
  ELEVATION DATA: UPSTREAM(FEET) =   1199.00  DOWNSTREAM(FEET) =   1198.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   16.174
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.964
  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        2.90      0.74     0.800    52   16.17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  SUBAREA RUNOFF(CFS) =      6.19
  TOTAL AREA(ACRES) =      2.90   PEAK FLOW RATE(CFS) =      6.19

****************************************************************************
  FLOW PROCESS FROM NODE    121.00 TO NODE    132.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1147.00  DOWNSTREAM(FEET) =  1145.00
  FLOW LENGTH(FEET) =   338.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.15
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.19
  PIPE TRAVEL TIME(MIN.) =   1.09    Tc(MIN.) =   17.27
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    132.00 =     628.00 FEET.

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

```
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   17.27
  RAINFALL INTENSITY(INCH/HR) =   2.85
  AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.80
  EFFECTIVE STREAM AREA(ACRES) =       2.90
  TOTAL STREAM AREA(ACRES) =       2.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.19

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    131.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   174.00
  ELEVATION DATA: UPSTREAM(FEET) =   1154.45  DOWNSTREAM(FEET) =   1150.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.759
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.606
  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        0.40      0.74     0.800    52    7.76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  SUBAREA RUNOFF(CFS) =      1.44
  TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      1.44

****************************************************************************
  FLOW PROCESS FROM NODE    131.00 TO NODE    132.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1148.20  DOWNSTREAM(FEET) =  1145.00
  FLOW LENGTH(FEET) =    85.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.22
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.44
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    7.96
  LONGEST FLOWPATH FROM NODE    130.00 TO NODE    132.00 =     259.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    132.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.96
  RAINFALL INTENSITY(INCH/HR) =   4.54
  AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.80
  EFFECTIVE STREAM AREA(ACRES) =       0.40
  TOTAL STREAM AREA(ACRES) =       0.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.44

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        6.19   17.27    2.850  0.74( 0.59) 0.80       2.9     120.00
      2        1.44    7.96    4.538  0.74( 0.59) 0.80       0.4     130.00

  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        6.43    7.96    4.538  0.74( 0.59) 0.80       1.7     130.00
      2        7.01   17.27    2.850  0.74( 0.59) 0.80       3.3     120.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       7.01    Tc(MIN.) =    17.27
  EFFECTIVE AREA(ACRES) =       3.30   AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.80
  TOTAL AREA(ACRES) =        3.3
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    132.00 =     628.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    142.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1145.00  DOWNSTREAM(FEET) =  1140.40
  FLOW LENGTH(FEET) =   148.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.96
```

```
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.01
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   17.52
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    142.00 =     776.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    142.00 TO NODE    142.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        6.43    8.22    4.450  0.74( 0.59) 0.80       1.7     130.00
      2        7.01   17.52    2.826  0.74( 0.59) 0.80       3.3     120.00
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    142.00 =     776.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       21.38   10.33    3.880  0.74( 0.59) 0.80       6.4     113.00
      2       21.05   11.50    3.638  0.74( 0.59) 0.80       6.8     110.00
      3       19.89   13.24    3.342  0.74( 0.59) 0.80       7.1     101.00
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    142.00 =    1683.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       26.39    8.22    4.450  0.74( 0.59) 0.80       6.8     130.00
      2       27.94   10.33    3.880  0.74( 0.59) 0.80       8.4     113.00
      3       27.69   11.50    3.638  0.74( 0.59) 0.80       9.0     110.00
      4       26.64   13.24    3.342  0.74( 0.59) 0.80       9.7     101.00
      5       23.17   17.52    2.826  0.74( 0.59) 0.80      10.4     120.00
    TOTAL AREA(ACRES) =        10.4

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       27.94  Tc(MIN.) =   10.328
  EFFECTIVE AREA(ACRES) =      8.44  AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.80
  TOTAL AREA(ACRES) =       10.4
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    142.00 =    1683.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    142.00 TO NODE    142.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

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

```
 FLOW PROCESS FROM NODE    140.00 TO NODE    141.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   229.00
 ELEVATION DATA: UPSTREAM(FEET) =   1151.00  DOWNSTREAM(FEET) =   1148.40

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.094
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.933
 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        1.30      0.74     0.800    52   10.09
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
 SUBAREA RUNOFF(CFS) =      3.91
 TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      3.91

****************************************************************************
 FLOW PROCESS FROM NODE    141.00 TO NODE    142.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1146.40  DOWNSTREAM(FEET) =  1140.40
 FLOW LENGTH(FEET) =   128.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.05
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.91
 PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   10.31
 LONGEST FLOWPATH FROM NODE    140.00 TO NODE    142.00 =     357.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    142.00 TO NODE    142.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        3.91   10.31    3.885  0.74( 0.59) 0.80       1.3     140.00
 LONGEST FLOWPATH FROM NODE    140.00 TO NODE    142.00 =     357.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
```

```
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1       26.39    8.22    4.450  0.74( 0.59) 0.80       6.8     130.00
    2       27.94   10.33    3.880  0.74( 0.59) 0.80       8.4     113.00
    3       27.69   11.50    3.638  0.74( 0.59) 0.80       9.0     110.00
    4       26.64   13.24    3.342  0.74( 0.59) 0.80       9.7     101.00
    5       23.17   17.52    2.826  0.74( 0.59) 0.80      10.4     120.00
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    142.00 =    1683.00 FEET.

  ** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1       30.04    8.22    4.450  0.74( 0.59) 0.80       7.8     130.00
    2       31.83   10.31    3.885  0.74( 0.59) 0.80       9.7     140.00
    3       31.84   10.33    3.880  0.74( 0.59) 0.80       9.7     113.00
    4       31.30   11.50    3.638  0.74( 0.59) 0.80      10.3     110.00
    5       29.90   13.24    3.342  0.74( 0.59) 0.80      11.0     101.00
    6       25.82   17.52    2.826  0.74( 0.59) 0.80      11.7     120.00
  TOTAL AREA(ACRES) =        11.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       31.84  Tc(MIN.) =   10.328
  EFFECTIVE AREA(ACRES) =      9.74  AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.80
  TOTAL AREA(ACRES) =       11.7
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    142.00 =    1683.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    142.00 TO NODE    203.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1140.40  DOWNSTREAM(FEET) =  1140.00
  FLOW LENGTH(FEET) =    52.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.47
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      31.84
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   10.43
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    203.00 =    1735.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    203.00 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.) =   10.43
  RAINFALL INTENSITY(INCH/HR) =   3.86
```

```
  AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.80
  EFFECTIVE STREAM AREA(ACRES) =       9.74
  TOTAL STREAM AREA(ACRES) =      11.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      31.84

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   200.00
  ELEVATION DATA: UPSTREAM(FEET) =   1199.50  DOWNSTREAM(FEET) =   1199.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.942
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.389
  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        2.60      0.74     0.800    52   12.94
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  SUBAREA RUNOFF(CFS) =      6.54
  TOTAL AREA(ACRES) =      2.60   PEAK FLOW RATE(CFS) =      6.54

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    203.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1150.00  DOWNSTREAM(FEET) =  1140.00
  FLOW LENGTH(FEET) =   662.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  10.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.38
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.54
  PIPE TRAVEL TIME(MIN.) =   1.49    Tc(MIN.) =   14.44
  LONGEST FLOWPATH FROM NODE    201.00 TO NODE    203.00 =     862.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    203.00 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.) =   14.44
  RAINFALL INTENSITY(INCH/HR) =   3.17
  AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.80
  EFFECTIVE STREAM AREA(ACRES) =       2.60
  TOTAL STREAM AREA(ACRES) =       2.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.54

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       30.04    8.32    4.416  0.74( 0.59) 0.80       7.8     130.00
      1       31.83   10.41    3.862  0.74( 0.59) 0.80       9.7     140.00
      1       31.84   10.43    3.857  0.74( 0.59) 0.80       9.7     113.00
      1       31.30   11.60    3.619  0.74( 0.59) 0.80      10.3     110.00
      1       29.90   13.35    3.327  0.74( 0.59) 0.80      11.0     101.00
      1       25.82   17.62    2.815  0.74( 0.59) 0.80      11.7     120.00
      2        6.54   14.44    3.174  0.74( 0.59) 0.80       2.6     201.00

  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       35.63    8.32    4.416  0.74( 0.59) 0.80       9.3     130.00
      2       37.81   10.41    3.862  0.74( 0.59) 0.80      11.6     140.00
      3       37.82   10.43    3.857  0.74( 0.59) 0.80      11.6     113.00
      4       37.46   11.60    3.619  0.74( 0.59) 0.80      12.4     110.00
      5       36.31   13.35    3.327  0.74( 0.59) 0.80      13.4     101.00
      6       35.40   14.44    3.174  0.74( 0.59) 0.80      13.8     201.00
      7       31.45   17.62    2.815  0.74( 0.59) 0.80      14.3     120.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      37.82    Tc(MIN.) =    10.43
  EFFECTIVE AREA(ACRES) =      11.62   AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.80
  TOTAL AREA(ACRES) =       14.3
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    203.00 =    1735.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   10.85   RAINFALL INTENSITY(INCH/HR) =  3.77
```

```
  EFFECTIVE AREA(ACRES) =    11.55
  TOTAL AREA(ACRES) =    14.30        PEAK FLOW RATE(CFS) =     27.68
  AREA-AVERAGED Fm(INCH/HR) =   0.15  AREA-AVERAGED Fp(INCH/HR) =   0.74
  AREA-AVERAGED Ap =  0.20
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

****************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    205.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1140.00  DOWNSTREAM(FEET) =  1139.20
  FLOW LENGTH(FEET) =    73.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.37
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      27.68
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   10.98
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    205.00 =    1808.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       14.3  TC(MIN.) =     10.98
  EFFECTIVE AREA(ACRES) =     11.55  AREA-AVERAGED Fm(INCH/HR)=  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap = 0.200
  PEAK FLOW RATE(CFS)   =      27.68
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

APPENDIX D

Proposed 100-Year Hydrograph

Hydrograph Basin Routing

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


    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =   14.30
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.100
    LOW LOSS FRACTION = 0.784
    TIME OF CONCENTRATION(MIN.) = 10.85
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    USER SPECIFIED RAINFALL VALUES ARE USED
    RETURN FREQUENCY(YEARS) = 100
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.35
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.91
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.34
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  2.28
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  3.16
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  5.79

--------------------------------------------------------------------------------

    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     3.68
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     3.22

********************************************************************************
  TIME     VOLUME       Q    0.       10.0      20.0      30.0      40.0
 (HOURS)    (AF)      (CFS)
--------------------------------------------------------------------------------
  0.09      0.0000      0.00  Q         .         .         .         .
  0.27      0.0022      0.29  Q         .         .         .         .
  0.45      0.0066      0.30  Q         .         .         .         .
  0.63      0.0111      0.30  Q         .         .         .         .
  0.81      0.0155      0.30  Q         .         .         .         .
  0.99      0.0200      0.30  Q         .         .         .         .
  1.17      0.0245      0.30  Q         .         .         .         .
  1.35      0.0291      0.31  Q         .         .         .         .
  1.53      0.0337      0.31  Q         .         .         .         .
  1.71      0.0383      0.31  Q         .         .         .         .
  1.89      0.0430      0.31  Q         .         .         .         .
  2.08      0.0477      0.32  Q         .         .         .         .
  2.26      0.0524      0.32  Q         .         .         .         .
  2.44      0.0571      0.32  Q         .         .         .         .
  2.62      0.0619      0.32  Q         .         .         .         .
  2.80      0.0668      0.32  Q         .         .         .         .
  2.98      0.0716      0.33  Q         .         .         .         .
  3.16      0.0765      0.33  Q         .         .         .         .
  3.34      0.0815      0.33  Q         .         .         .         .
  3.52      0.0865      0.34  Q         .         .         .         .
  3.70      0.0915      0.34  Q         .         .         .         .
  3.88      0.0966      0.34  Q         .         .         .         .
  4.06      0.1017      0.34  Q         .         .         .         .
```

4.25	0.1068	0.35	Q	.	.	.	.
4.43	0.1120	0.35	Q	.	.	.	.
4.61	0.1172	0.35	Q	.	.	.	.
4.79	0.1225	0.36	Q	.	.	.	.
4.97	0.1280	0.38	Q	.	.	.	.
5.15	0.1337	0.39	Q	.	.	.	.
5.33	0.1396	0.41	Q	.	.	.	.
5.51	0.1457	0.42	Q	.	.	.	.
5.69	0.1521	0.44	Q	.	.	.	.
5.87	0.1588	0.45	Q	.	.	.	.
6.05	0.1657	0.47	Q	.	.	.	.
6.23	0.1729	0.49	Q	.	.	.	.
6.42	0.1803	0.51	Q	.	.	.	.
6.60	0.1880	0.52	Q	.	.	.	.
6.78	0.1960	0.55	Q	.	.	.	.
6.96	0.2043	0.56	Q	.	.	.	.
7.14	0.2130	0.59	Q	.	.	.	.
7.32	0.2219	0.60	Q	.	.	.	.
7.50	0.2311	0.63	Q	.	.	.	.
7.68	0.2407	0.65	Q	.	.	.	.
7.86	0.2507	0.68	Q	.	.	.	.
8.04	0.2610	0.70	Q	.	.	.	.
8.22	0.2717	0.73	Q	.	.	.	.
8.40	0.2827	0.75	Q	.	.	.	.
8.59	0.2942	0.79	Q	.	.	.	.
8.77	0.3061	0.80	Q	.	.	.	.
8.95	0.3184	0.84	Q	.	.	.	.
9.13	0.3312	0.86	Q	.	.	.	.
9.31	0.3444	0.91	Q	.	.	.	.
9.49	0.3581	0.93	Q	.	.	.	.
9.67	0.3724	0.98	Q	.	.	.	.
9.85	0.3871	1.00	Q	.	.	.	.
10.03	0.4024	1.05	.Q	.	.	.	.
10.21	0.4183	1.08	.Q	.	.	.	.
10.39	0.4348	1.13	.Q	.	.	.	.
10.57	0.4520	1.16	.Q	.	.	.	.
10.76	0.4698	1.22	.Q	.	.	.	.
10.94	0.4883	1.26	.Q	.	.	.	.
11.12	0.5076	1.32	.Q	.	.	.	.
11.30	0.5276	1.36	.Q	.	.	.	.
11.48	0.5485	1.44	.Q	.	.	.	.
11.66	0.5703	1.48	.Q	.	.	.	.
11.84	0.5930	1.56	.Q	.	.	.	.
12.02	0.6167	1.61	.Q	.	.	.	.
12.20	0.6432	1.94	.Q	.	.	.	.
12.38	0.6726	1.99	.Q	.	.	.	.
12.56	0.7033	2.11	. Q	.	.	.	.
12.74	0.7353	2.17	. Q	.	.	.	.
12.93	0.7688	2.31	. Q	.	.	.	.
13.11	0.8038	2.38	. Q	.	.	.	.

13.29	0.8406	2.54	. Q . . . .
13.47	0.8793	2.63	. Q . . . .
13.65	0.9201	2.83	. Q . . . .
13.83	0.9633	2.94	. Q . . . .
14.01	1.0091	3.19	. Q . . . .
14.19	1.0584	3.41	. Q . . . .
14.37	1.1122	3.79	. Q . . . .
14.55	1.1702	3.98	. Q . . . .
14.73	1.2330	4.43	. Q . . . .
14.91	1.3013	4.71	. Q . . . .
15.10	1.3768	5.40	. Q . . . .
15.28	1.4609	5.85	. Q . . . .
15.46	1.5626	7.77	. Q . . . .
15.64	1.6899	9.27	. Q. . . .
15.82	1.8489	12.00	. . Q . . .
16.00	2.0548	15.55	. . Q . . .
16.18	2.4428	36.37	. . . . Q .
16.36	2.7932	10.52	. Q . . . .
16.54	2.9196	6.39	. Q . . . .
16.72	3.0049	5.03	. Q . . . .
16.90	3.0738	4.19	. Q . . . .
17.08	3.1321	3.61	. Q . . . .
17.27	3.1820	3.06	. Q . . . .
17.45	3.2253	2.73	. Q . . . .
17.63	3.2640	2.46	. Q . . . .
17.81	3.2992	2.24	. Q . . . .
17.99	3.3312	2.05	. Q . . . .
18.17	3.3592	1.70	.Q . . . .
18.35	3.3833	1.52	.Q . . . .
18.53	3.4051	1.40	.Q . . . .
18.71	3.4251	1.29	.Q . . . .
18.89	3.4437	1.19	.Q . . . .
19.07	3.4608	1.10	.Q . . . .
19.26	3.4767	1.02	.Q . . . .
19.44	3.4915	0.95	Q . . . .
19.62	3.5052	0.89	Q . . . .
19.80	3.5180	0.82	Q . . . .
19.98	3.5299	0.77	Q . . . .
20.16	3.5410	0.71	Q . . . .
20.34	3.5513	0.67	Q . . . .
20.52	3.5609	0.62	Q . . . .
20.70	3.5698	0.58	Q . . . .
20.88	3.5781	0.54	Q . . . .
21.06	3.5858	0.50	Q . . . .
21.24	3.5930	0.46	Q . . . .
21.42	3.5997	0.43	Q . . . .
21.61	3.6058	0.40	Q . . . .
21.79	3.6115	0.37	Q . . . .
21.97	3.6168	0.35	Q . . . .
22.15	3.6220	0.34	Q . . . .

22.33	3.6271	0.34	Q	.	.	.	.
22.51	3.6322	0.33	Q	.	.	.	.
22.69	3.6371	0.33	Q	.	.	.	.
22.87	3.6420	0.32	Q	.	.	.	.
23.05	3.6468	0.32	Q	.	.	.	.
23.23	3.6515	0.31	Q	.	.	.	.
23.41	3.6562	0.31	Q	.	.	.	.
23.60	3.6607	0.31	Q	.	.	.	.
23.78	3.6653	0.30	Q	.	.	.	.
23.96	3.6697	0.30	Q	.	.	.	.
24.14	3.6742	0.29	Q	.	.	.	.
24.32	3.6763	0.00	Q	.	.	.	.

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1443.1
10%	162.8
20%	65.1
30%	32.6
40%	21.7
50%	10.9
60%	10.9
70%	10.9
80%	10.9
90%	10.9

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	Manual	------	-------	36.37	-------	-------	0.000	-------	-------	36.37	<no description>
2	Diversion1	1	-------	0.230	-------	-------	0.000	-------	-------	0.230	Drywells
3	Diversion2	1	-------	36.14	-------	-------	0.000	-------	-------	36.14	Post Drywells
4	Reservoir	3	-------	27.68	-------	-------	0.000	-------	-------	27.68	Chambers

Hydrograph Report

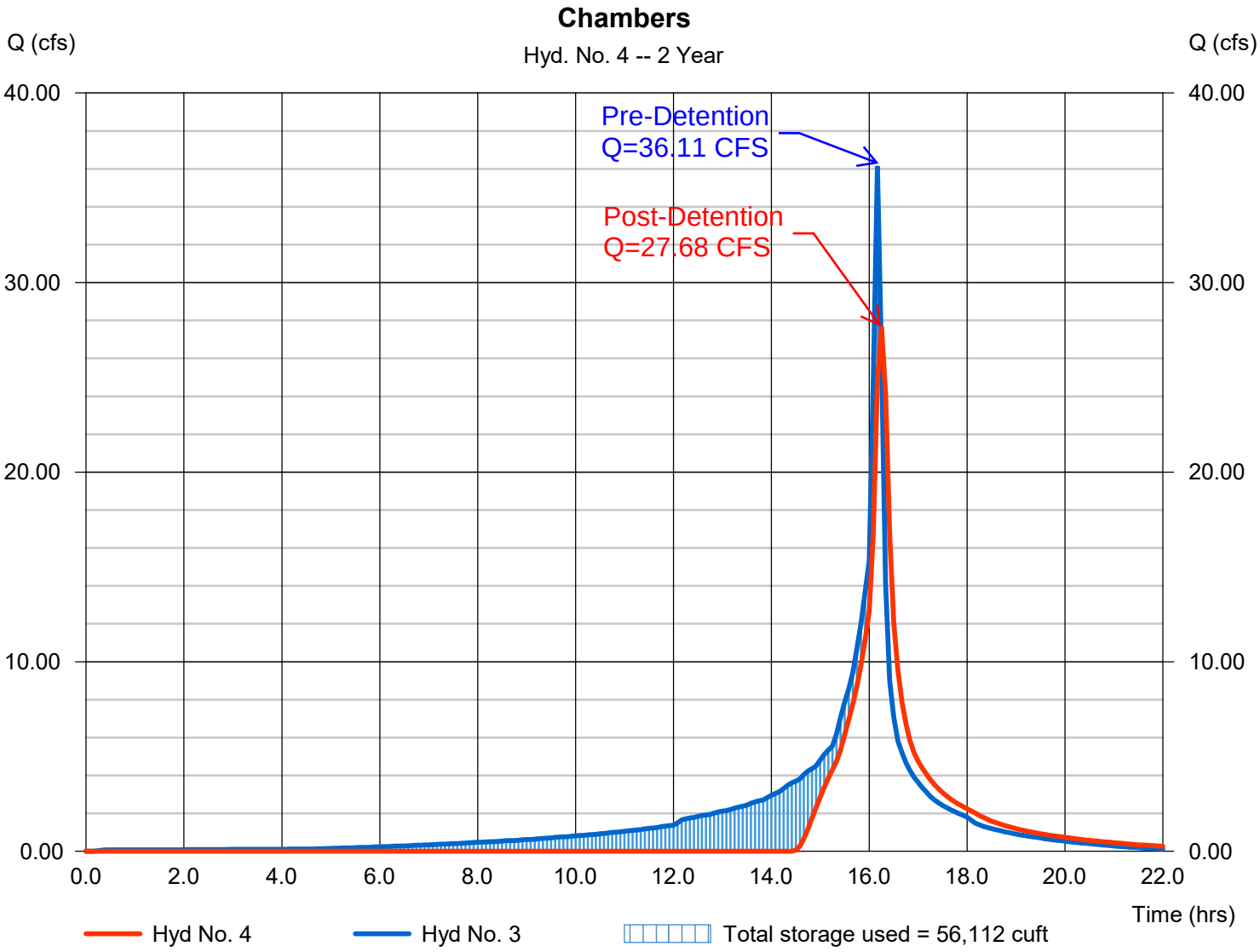
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Thursday, 12 / 15 / 2022

Hyd. No. 4

Chambers

Hydrograph type	= Reservoir	Peak discharge	= 27.68 cfs
Storm frequency	= 2 yrs	Time to peak	= 16.25 hrs
Time interval	= 5 min	Hyd. volume	= 103,213 cuft
Inflow hyd. No.	= 3 - Post Drywells	Max. Elevation	= 105.70 ft
Reservoir name	= <New Pond>	Max. Storage	= 56,112 cuft

Storage Indication method used.



Hydrograph Report

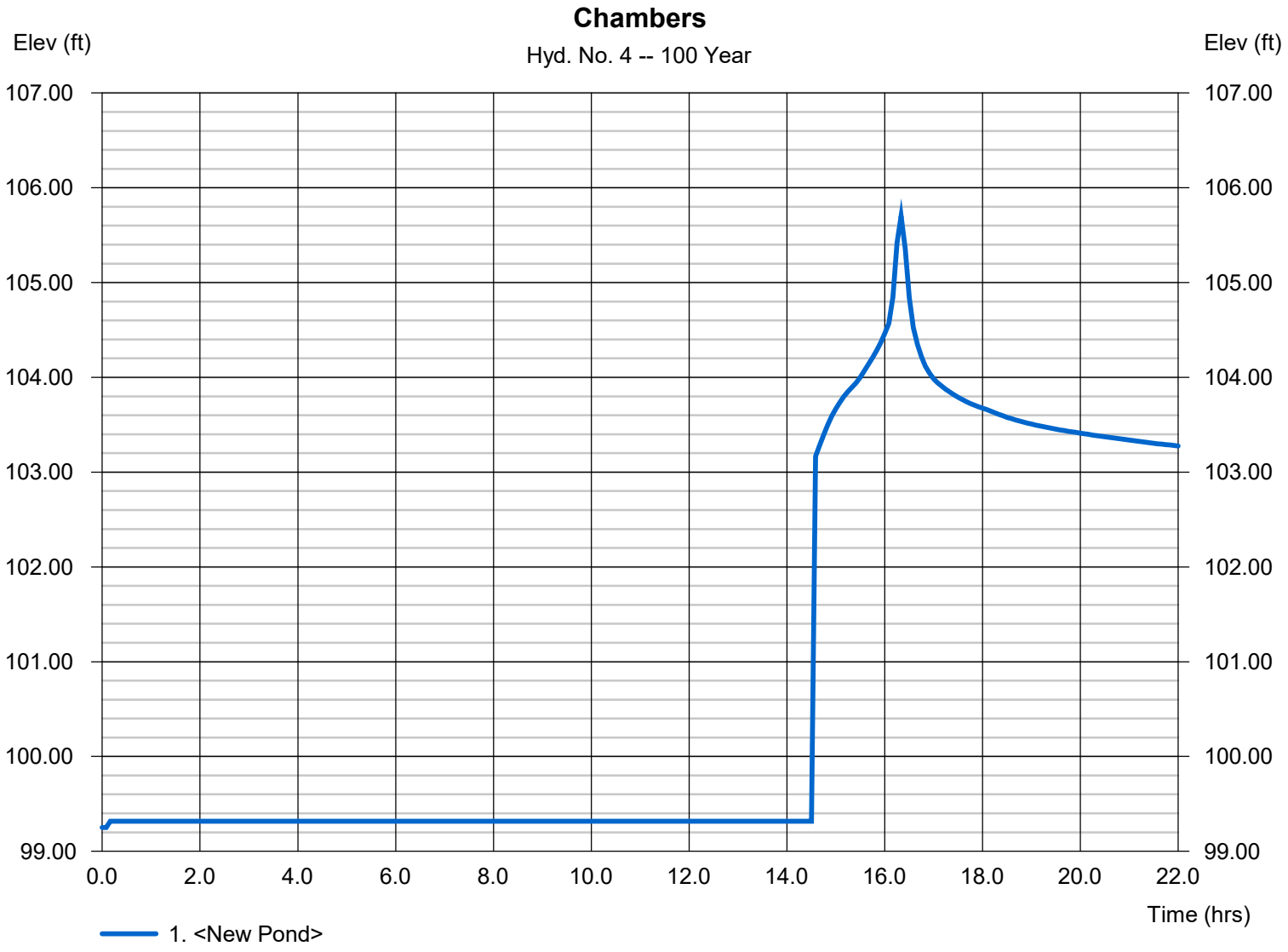
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Thursday, 12 / 15 / 2022

Hyd. No. 4

Chambers

Hydrograph type	=	Reservoir	Peak discharge	=	27.68 cfs
Storm frequency	=	100 yrs	Time to peak	=	16.25 hrs
Time interval	=	5 min	Hyd. volume	=	103,213 cuft
Inflow hyd. No.	=	3 - Post Drywells	Max. Elevation	=	105.70 ft
Reservoir name	=	<New Pond>	Max. Storage	=	56,112 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - <New Pond>

Pond Data

UG Chambers -Invert elev. = 100.00 ft, Rise x Span = 4.65 x 7.46 ft, Barrel Len = 6.59 ft, No. Barrels = 214, Slope = 0.00%, Headers = No
Encasement -Invert elev. = 99.25 ft, Width = 9.08 ft, Height = 6.75 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	99.25	n/a	0	0
0.68	99.93	n/a	3,458	3,458
1.35	100.60	n/a	7,236	10,694
2.03	101.28	n/a	7,628	18,322
2.70	101.95	n/a	7,451	25,773
3.38	102.63	n/a	7,163	32,936
4.05	103.30	n/a	6,735	39,670
4.72	103.97	n/a	6,097	45,767
5.40	104.65	n/a	4,955	50,723
6.08	105.32	n/a	3,458	54,181
6.75	106.00	n/a	3,458	57,639

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 30.00	0.00	0.00	0.00
Span (in)	= 30.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 103.08	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.00	0.00	0.00	0.00
Crest El. (ft)	= 106.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	99.25	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.68	3,458	99.93	0.00	---	---	---	0.00	---	---	---	---	---	0.000
1.35	10,694	100.60	0.00	---	---	---	0.00	---	---	---	---	---	0.000
2.03	18,322	101.28	0.00	---	---	---	0.00	---	---	---	---	---	0.000
2.70	25,773	101.95	0.00	---	---	---	0.00	---	---	---	---	---	0.000
3.38	32,936	102.63	0.00	---	---	---	0.00	---	---	---	---	---	0.000
4.05	39,670	103.30	0.34 ic	---	---	---	0.00	---	---	---	---	---	0.339
4.72	45,767	103.97	5.09 ic	---	---	---	0.00	---	---	---	---	---	5.090
5.40	50,723	104.65	13.85 ic	---	---	---	0.00	---	---	---	---	---	13.85
6.08	54,181	105.32	23.71 ic	---	---	---	0.00	---	---	---	---	---	23.71
6.75	57,639	106.00	30.54 ic	---	---	---	0.00	---	---	---	---	---	30.54

DRAFT

Maxwell® IV Drainage System Calculations Prepared on December 15, 2022

Project: **Chaffey College Extension - A1 - Fontana,CA**

Contact: Jenna Loventhal at LPA - Irvine, CA

Given:

Measured Infiltration Rate	30.00	in/hr
Safety Factor	5.00	
Design Infiltration Rate	6.00	in/hr
Mitigated Volume	39,200	ft^3
Required Drawdown Time	48	hours
Groundwater Depth for Design	100	ft

Proposed:

Drywell Rock Shaft Diameter	4	ft
Drywell Chamber Depth	18	ft
Rock Porosity	40	%
Depth to Infiltration	14	ft
Drywell Bottom Depth	76	ft

Apply Safety Factor to get Design Rate.

$30.00 \frac{in}{hr} \div 5 = 6.00 \frac{in}{hr}$

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

$6.00 \frac{in}{hr} \times \frac{1\ ft}{12\ in} \times \frac{1\ hr}{3600\ sec} = 0.000139 \frac{ft}{sec}$

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 76 foot deep drywell, infiltration occurs between 14 feet and 76 feet below grade. This provides 62 feet of infiltration depth in addition to the bottom area. Infiltration area per drywell is calculated below.

$6\ ft \times 18.85 \frac{ft^2}{ft} + 56\ ft \times 12.57 \frac{ft^2}{ft} + 12.57\ ft^2 = 829\ ft^2$

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

$0.000139 \frac{ft}{sec} \times 829\ ft^2 = 0.11519 \frac{ft^3}{sec}$

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

48 hrs: 0.1152 CFS x 48 hours x $\frac{3600\ sec}{1\ hr}$ = 19,905 cubic feet of retained water disposed of.

3 hrs: 0.1152 CFS x 3 hours x $\frac{3600\ sec}{1\ hr}$ = 1,244 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 18 feet.

$18\ ft \times 12.57\ ft^2 + 2\ ft \times 28.27\ ft^2 \times 40\ \% + 56\ ft \times 12.57\ ft^2 \times 40\ \% = 530\ ft^3$

The MaxWell System is composed of 2 drywell(s) .

Total volume provided = 1061 ft^3

Total 3 hour infiltration volume = 2,488 ft^3

Total 48 hour infiltration volume = 39,810 ft^3

Total infiltration flowrate = 0.23038 $\frac{ft^3}{sec}$

Based on the total mitigated volume of 39200 CF, after subtracting the volume stored in the MaxWell System and the volume infiltrated within 3 hours, the residual volume of 35651 CF could be stored in a separate detention system and connected to the drywell system.

For any questions, please contact Ryan Adaya at 951-202-1037 or via email at RAdaya@TorrentResources.com

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

APPENDIX E

Hydrology Reference Material

NOAA Atlas 14, Volume 6, Version 2
Location name: Fontana, California, USA*
Latitude: 34.0537°, Longitude: -117.4359°
Elevation: 1056.86 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.106** (0.089-0.129)	**0.138** (0.115-0.168)	**0.181** (0.151-0.221)	**0.218** (0.179-0.267)	**0.269** (0.214-0.341)	**0.310** (0.241-0.402)	**0.352** (0.267-0.469)	**0.398** (0.293-0.546)	**0.463** (0.327-0.663)	**0.516** (0.352-0.765)
10-min	**0.152** (0.127-0.185)	**0.198** (0.165-0.240)	**0.260** (0.216-0.316)	**0.312** (0.257-0.383)	**0.385** (0.306-0.489)	**0.444** (0.345-0.576)	**0.505** (0.383-0.673)	**0.571** (0.421-0.783)	**0.664** (0.469-0.950)	**0.740** (0.504-1.10)
15-min	**0.184** (0.154-0.223)	**0.240** (0.199-0.291)	**0.314** (0.261-0.383)	**0.377** (0.311-0.463)	**0.466** (0.371-0.592)	**0.537** (0.418-0.697)	**0.611** (0.463-0.814)	**0.690** (0.509-0.946)	**0.803** (0.567-1.15)	**0.895** (0.609-1.33)
30-min	**0.275** (0.229-0.333)	**0.358** (0.298-0.434)	**0.470** (0.390-0.572)	**0.564** (0.464-0.692)	**0.696** (0.554-0.884)	**0.802** (0.624-1.04)	**0.913** (0.693-1.22)	**1.03** (0.760-1.41)	**1.20** (0.847-1.72)	**1.34** (0.911-1.98)
60-min	**0.403** (0.336-0.489)	**0.525** (0.437-0.636)	**0.688** (0.571-0.838)	**0.826** (0.680-1.01)	**1.02** (0.811-1.30)	**1.18** (0.914-1.53)	**1.34** (1.01-1.78)	**1.51** (1.11-2.07)	**1.76** (1.24-2.52)	**1.96** (1.33-2.91)
2-hr	**0.597** (0.497-0.723)	**0.769** (0.640-0.933)	**0.996** (0.827-1.21)	**1.18** (0.975-1.45)	**1.44** (1.15-1.83)	**1.65** (1.28-2.14)	**1.86** (1.41-2.47)	**2.07** (1.53-2.84)	**2.38** (1.68-3.40)	**2.62** (1.79-3.89)
3-hr	**0.751** (0.626-0.910)	**0.964** (0.803-1.17)	**1.25** (1.03-1.52)	**1.47** (1.21-1.81)	**1.79** (1.42-2.27)	**2.03** (1.58-2.63)	**2.28** (1.73-3.03)	**2.53** (1.87-3.47)	**2.89** (2.04-4.13)	**3.17** (2.16-4.70)
6-hr	**1.07** (0.888-1.29)	**1.37** (1.14-1.66)	**1.76** (1.46-2.14)	**2.08** (1.71-2.55)	**2.51** (1.99-3.18)	**2.83** (2.20-3.67)	**3.16** (2.40-4.21)	**3.50** (2.58-4.79)	**3.95** (2.79-5.65)	**4.31** (2.93-6.39)
12-hr	**1.41** (1.18-1.71)	**1.83** (1.52-2.22)	**2.36** (1.96-2.87)	**2.78** (2.29-3.41)	**3.34** (2.66-4.25)	**3.77** (2.93-4.89)	**4.19** (3.18-5.58)	**4.62** (3.40-6.33)	**5.19** (3.67-7.43)	**5.63** (3.84-8.35)
24-hr	**1.89** (1.67-2.18)	**2.48** (2.19-2.86)	**3.23** (2.85-3.74)	**3.83** (3.35-4.46)	**4.61** (3.91-5.56)	**5.20** (4.31-6.40)	**5.79** (4.69-7.29)	**6.37** (5.02-8.25)	**7.16** (5.41-9.65)	**7.75** (5.67-10.8)
2-day	**2.29** (2.03-2.64)	**3.07** (2.71-3.54)	**4.06** (3.58-4.70)	**4.86** (4.25-5.66)	**5.92** (5.01-7.13)	**6.72** (5.58-8.27)	**7.53** (6.10-9.48)	**8.35** (6.58-10.8)	**9.44** (7.14-12.7)	**10.3** (7.52-14.3)
3-day	**2.47** (2.18-2.84)	**3.35** (2.96-3.87)	**4.50** (3.97-5.21)	**5.43** (4.75-6.34)	**6.69** (5.66-8.06)	**7.65** (6.35-9.41)	**8.62** (6.98-10.9)	**9.61** (7.58-12.4)	**11.0** (8.29-14.8)	**12.0** (8.78-16.7)
4-day	**2.65** (2.35-3.06)	**3.65** (3.22-4.21)	**4.94** (4.35-5.71)	**5.99** (5.24-6.99)	**7.42** (6.28-8.94)	**8.52** (7.07-10.5)	**9.64** (7.81-12.1)	**10.8** (8.50-14.0)	**12.4** (9.35-16.7)	**13.6** (9.93-18.9)
7-day	**3.03** (2.69-3.50)	**4.22** (3.73-4.87)	**5.78** (5.10-6.69)	**7.07** (6.18-8.24)	**8.82** (7.47-10.6)	**10.2** (8.44-12.5)	**11.6** (9.37-14.6)	**13.0** (10.3-16.9)	**15.0** (11.3-20.2)	**16.6** (12.1-23.1)
10-day	**3.29** (2.91-3.79)	**4.61** (4.08-5.32)	**6.36** (5.61-7.36)	**7.80** (6.83-9.10)	**9.79** (8.29-11.8)	**11.3** (9.40-13.9)	**12.9** (10.5-16.3)	**14.6** (11.5-18.9)	**16.9** (12.8-22.8)	**18.7** (13.7-26.1)
20-day	**3.95** (3.50-4.56)	**5.60** (4.95-6.46)	**7.80** (6.88-9.03)	**9.65** (8.44-11.3)	**12.2** (10.3-14.7)	**14.3** (11.8-17.5)	**16.4** (13.3-20.6)	**18.6** (14.7-24.1)	**21.8** (16.5-29.4)	**24.3** (17.8-33.9)
30-day	**4.67** (4.13-5.38)	**6.61** (5.85-7.63)	**9.24** (8.15-10.7)	**11.5** (10.0-13.4)	**14.6** (12.3-17.6)	**17.1** (14.2-21.0)	**19.7** (16.0-24.8)	**22.5** (17.8-29.2)	**26.5** (20.1-35.8)	**29.7** (21.8-41.5)
45-day	**5.56** (4.92-6.41)	**7.80** (6.89-9.00)	**10.9** (9.58-12.6)	**13.5** (11.8-15.7)	**17.2** (14.6-20.7)	**20.2** (16.8-24.8)	**23.4** (19.0-29.5)	**26.8** (21.2-34.8)	**31.8** (24.1-42.9)	**35.9** (26.2-50.0)
60-day	**6.52** (5.77-7.52)	**9.03** (7.99-10.4)	**12.5** (11.0-14.5)	**15.5** (13.5-18.0)	**19.7** (16.7-23.8)	**23.2** (19.3-28.6)	**26.9** (21.8-33.9)	**31.0** (24.4-40.1)	**36.9** (27.9-49.7)	**41.7** (30.5-58.2)

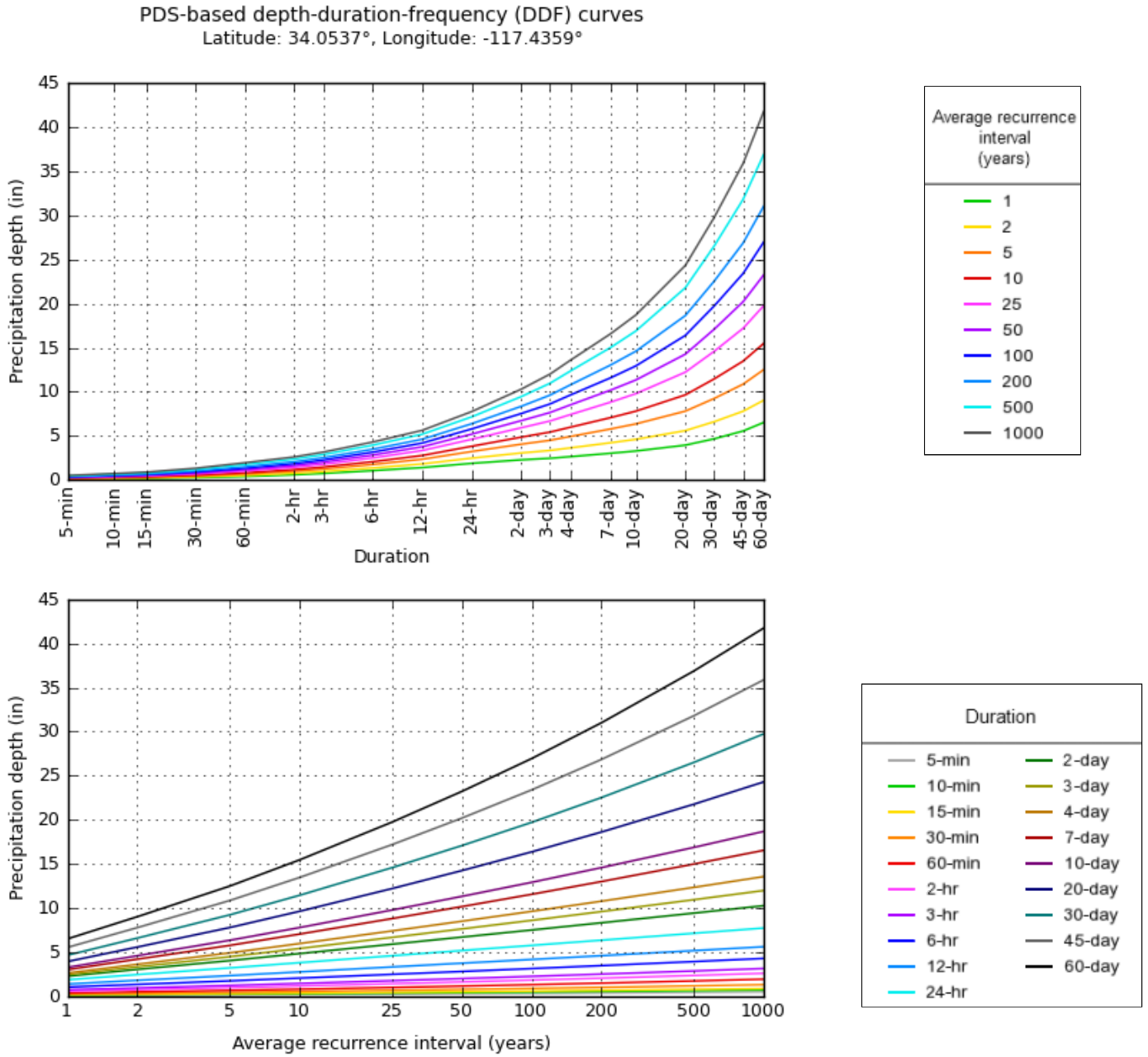
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical



NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Thu Dec 15 02:06:00 2022

Back to Top

Maps & aerials

Small scale terrain

Large scale terrain

Large scale map

Large scale aerial

Back to Top

US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

CN Value

Curve (1) Numbers of Hydrologic Soil-Cover Complexes For Pervious Areas-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group A	B	C	D
NATURAL COVERS -					
Barren (Rockland, eroded and graded land)		78	86	91	93
Chaparral, Broadleaf (Manzonita, ceanothus and scrub oak)	Poor	53	70	80	85
	Fair	40	63	75	81
	Good	31	57	71	78
Chaparral, Narrowleaf (Chamise and redshank)	Poor	71	82	88	91
	Fair	55	72	81	86
Grass, Annual or Perennial	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Meadows or Cienegas (Areas with seasonally high water table, principal vegetation is sod forming grass)	Poor	63	77	85	88
	Fair	51	70	80	84
	Good	30	58	71	78
Open Brush (Soft wood shrubs - buckwheat, sage, etc.)	Poor	62	76	84	88
	Fair	46	66	77	83
	Good	41	63	75	81
Woodland (Coniferous or broadleaf trees predominate. Canopy density is at least 50 percent.)	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	25	55	70	77
Woodland, Grass (Coniferous or broadleaf trees with canopy density from 20 to 50 percent)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
URBAN COVERS -					
Residential or Commercial Landscaping (Lawn, shrubs, etc.)	Good	32	56	69	75
Turf (Irrigated and mowed grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
AGRICULTURAL COVERS -					
Fallow (Land plowed but not tilled or seeded)		77	86	91	94

SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

CURVE NUMBERS FOR PERVIOUS AREAS

Figure C-3 (1 of 2)

CN Value for AMCIII

TABLE C.1. CURVE NUMBER RELATIONSHIPS

CN for AMC Condition II	Corresponding CN for AMC Condition I	III
100	100	100
95	87	99
90	78	98
85	70	97
80	63	94
75	57	91
70	51	87
65	45	83
60	40	79
55	35	75
50	31	70
45	27	65
40	23	60
35	19	55
30	15	50
25	12	45
20	9	39
15	7	33
10	4	26
5	2	17
0	0	0

33 → 53

C.6. ESTIMATION OF LOSS RATES

In estimating loss rates for design hydrology, a watershed curve number (CN) is determined for each soil-cover complex within the watershed using Figure C-3. The working range of CN values is between 0 and 98, where a low CN indicates low runoff potential (high infiltration), and a high CN indicates high runoff potential (low infiltration). Selection of a CN takes into account the major factors affecting loss rates on pervious surfaces including the hydrologic soil group, cover type and quality, and antecedent moisture condition (AMC).

Also included in the CN selection are the effects of "initial abstraction" (Ia) which represents the combined effects of other effective rainfall losses including depression storage, vegetation interception, evaporation, and transpiration, among other factors.

C.6.1. Estimation of Initial Abstraction (Ia)

The initial abstraction (Ia) for an area is a function of land use, treatment, and condition; interception; infiltration; depression storage; and antecedent soil moisture. An estimate for Ia is given by the SCS as

Ia = 0.2 *8.87 = 1.77

$$Ia = 0.2S \tag{C.1}$$

where S is an estimate of total soil capacity given by

S=(1000/53) - 10 = 8.87

$$S = \frac{1000}{CN} - 10 \tag{C.2}$$

where CN is the area curve number.

C.6.2. Estimation of Storm Runoff Yield

Given the CN for a subarea A_j, the corresponding 24-hour storm runoff yield fraction, Y_j, is estimated by

$$Y_j = \frac{(P_{24} - Ia)^2}{(P_{24} - Ia + S)P_{24}} \tag{C.3}$$

where

Y_j = 24-hour storm runoff yield fraction for subarea A_j

Yj = (5.79-1.77)^2/((5.79-1.77+8.87)*(5.79))
= 0.216

P_{24} = 24-hour storm rainfall

Ia = initial abstraction from (C.1)

S = see (C.2)

It is noted that should Ia be greater than P_{24} in (C.3), then Y_j is defined to be zero. In this manual, the notation Y and Y_j will represent the runoff yield fraction, rather than the volume of runoff.

If the area under study contains several (say m) CN designations, then the yield, Y, for the total area must represent the net effect of the several curve

numbers. By weighting each of the subarea yield values according to the respective areas,

$$Y = (Y_1A_1 + \cdots + Y_mA_m)/(A_1 + A_2 + \cdots + A_m) \qquad (C.4)$$

where each Y_j follows from (C.3).

C.6.3. Low Loss Rate, F*

In design storm runoff hydrograph studies, the following formula is used to estimate that portion of rainfall to be attributed to watershed losses:

$$\bar{Y} = 1 - Y \qquad (C.5)$$

where

$\bar{Y}$ = catchment low loss fraction

Y = catchment 24-hour storm runoff yield fraction computed from (C.4)

Ybar = 1 - 0.216
= 0.784

Using the low loss fraction, $\bar{Y}$, the corresponding low loss rate, F*, is given by

$$F^* = \bar{Y} \cdot I \qquad (C.6)$$

where I is the rainfall intensity and F* has units of inches/hour. Use of F* enables the design storm 24-hour storm runoff yield to approximate the yield values obtained from the CN approach (see Figure C-5).

C.6.4. Infiltration Rates

Soil infiltration rates have been estimated for each of the soil groups by laboratory studies and measurements. These measurements show that an initially dry soil will have an associated infiltration rate which essentially decreases with time as the soil becomes wetted. As the soil is subjected to continual heavy rainfall, this infiltration rate approaches a minimum (usually within about 30 minutes) which represents the infiltration capacity of the soil.

Fm Value

TABLE C.2. Fm (in/hr) VALUES
FOR TYPICAL COVER TYPES

COVER TYPE	SOIL GROUP A_p(1)	A	B	C	D
NATURAL:					
Barren	1.0	0.41	0.27	0.18	0.14
Row Crops (good)	1.0	0.59	0.41	0.29	0.22
Grass (fair)	1.0	0.82	0.56	0.40	0.31
Orchards (fair)	1.0	0.88	0.62	0.43	0.34
Woodland (fair)	1.0	0.95	0.69	0.50	0.40
URBAN:					
Residential (1 DU/AC)	0.80	0.78	0.60	0.45	0.37
Residential (2 DU/AC)	0.70	0.68	0.53	0.39	0.32
Residential (4 DU/AC)	0.60	0.58	0.45	0.34	0.28
Residential (10 DU/AC)	0.40	0.39	0.30	0.22	0.18
Condominium	0.35	0.34	0.26	0.20	0.16
Mobile Home Park	0.25	0.24	0.19	0.14	0.12
Apartments	0.20	0.19	0.15	0.11	0.09
Proposed Commercial/Industrial	0.10	0.10	0.08	0.06	0.05

NOTES:

(1) Recommended a_p values from Figure C-4

(2) AMC II assumed for all Fm values

(3) CN values obtained from Figure C-3

(4) DU/AC=dwelling unit per acre

It is noted that the Tc computation procedure is based upon the summation of an initial subarea time of concentration with the several travel times estimated by normal depth flow-velocities of the peak flow rates through subsequent subareas.

D.4. INTENSITY-DURATION CURVES

Rainfall intensity (I) is determined using intensity-duration curves which are appropriate for the study watershed.

San Bernardino County has prepared isohyetal maps corresponding to 10-year 1-hour and 100-year 1-hour return frequency precipitation. Point rainfall for intermediate return periods can be determined from Figure D-2. Intensity duration curves for a particular area can be developed using the log-log paper of Figure D-3, plotting the 1-hour point rainfall value for the desired return period, and drawing a straight line through the 1-hour value parallel to the required slope. The slope of the intensity duration curve is assumed to be 0.6 for watersheds in the southwest portion of the County. For desert and mountain watersheds, the slope of the intensity duration curves is assumed to be 0.7. These slope values may be modified if rainfall data record analysis indicates that such modifications are appropriate. Any modifications of the slope values must be approved by the County prior to submittal of a study for County review.

D.5. RUNOFF COEFFICIENT

The runoff coefficient (C) is the ratio of rate of runoff to the rate of rainfall at an average intensity (I) when the total drainage area is contributing. The selection of the runoff coefficient depends on rainfall intensity, drainage area slope, type and amount of vegetative cover, infiltration capacity of the ground surface, and various other factors.

Since one acre-inch/hour is equal to 1.008 cfs, the rational formula is used to estimate a peak flowrate in cfs. The runoff coefficient is assumed to be a function of the impervious and pervious area fractions, an infiltration rate,

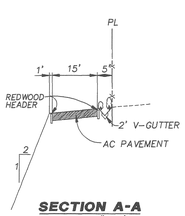
APPENDIX F

Phasing Diagram

As-Built Drawings

CAMPUS VISION PLAN

- (A) **Welcome Center/Library** Phase 1
- (B) **Instructional Building I** Phase 1
- (C) **Automotive Technology Building** Phase 1
- (D) **CTE Building** Phase 2
- (E) **Operations and Maintenance Building** Phase 1
- (F) **Instructional Building II** Phase 2
- (G) **Student and Community Center** Phase 2



SECTION A-A
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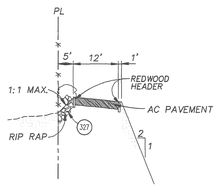
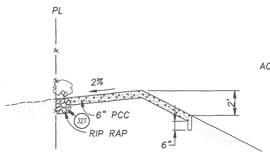
VERT.: 1"=4'



SECTION B-B
NOT TO SCALE



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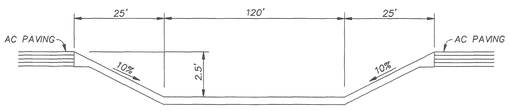
VERT.: 1"=4'



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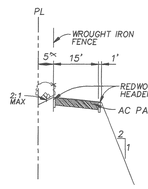

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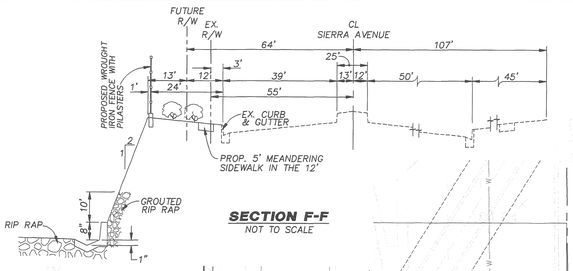
VERT.: 1"=4'



SECTION F-F
NOT TO SCALE

NOTE:
SINCE THIS IS A CITY FACILITY, THE CITY WILL IMPLEMENT A REGULAR MAINTENANCE PROGRAM TO KEEP THE DETENTION PLAN FREE OF ANY DEBRIS AND/OR SILT.

PROPOSED CONCRETE APRON (2.5")

SWALE FLOWLINE

1+49.49
CL CMP INLET
EL B=1046.00
1042.00 INV

1+46.37 END PIPE/BEGIN CMP
1041.18 INV

LATERAL A
S=0.2830
(1800-D)

1+04.83 BEGIN PIPE
1030.25 INV

PROPOSED INFLOW PIPE SEE PUBLIC STORM DRAIN IMPROVEMENT PLANS

SAWCUT LINE

EX. 90" RCP

SIERRA AVENUE

EX. R/W

EX. CURB & GUTTER

PROPOSED LANDSCAPING

FUTURE R/W

PROPERTY LINE

PROPOSED TOE OF SLOPE

PROPOSED TOP

CONC. SPILLWAY

EX. CHANNEL TO BE REMOVED

PROPOSED OUTFLOW PIPE SEE PUBLIC STORM DRAIN IMPROVEMENT PLANS

PROPOSED SIDEWALK SEE STREET IMPROVEMENT PLAN

EXISTING DRIVEWAY

POWER POLE

INLET STRUCTURE

5'x3' RCB

TRANSITION STRUCTURE SEE PUBLIC STORM DRAIN IMPROVEMENT PLANS

COURSE DATA

	BEARING	DISTANCE
1	N00°32'02"W	49.49'

SCALE: 1"=20'

GRAPHIC SCALE
20 0 10 20 40 80
(IN FEET)
1"=20'

CONSTRUCTION NOTES

(3) CONSTRUCT CONCRETE V-GUTTER PER DETAIL ON SHEET 1
(9) CONSTRUCT 3" AC OVER 12" COMPACTED NATIVE (AS DIRECTED BY SOIL ENGINEER)
(18) INSTALL GATE PER LANDSCAPE ARCHITECT PLANS
(19) INSTALL REDWOOD HEADER PER DETAIL ON SHEET 1
(32) CONSTRUCT COMMERCIAL DRIVEWAY APPROACH (DUSTPAN TYPE) PER CITY OF FONTANA STD. 102-A
(60) SAWCUT AND REMOVE ANY EXISTING PAVEMENT IN AREAS INDICATED
(62) SAWCUT AND REMOVE EXISTING PCC SIDEWALK
(73) REMOVE EXISTING FENCE
(108) INSTALL RIP-RAP PER DETAIL SHEET 1
(182) INSTALL 6' HIGH WROUGHT IRON FENCE PER LANDSCAPE ARCHITECT PLANS
(305) CONSTRUCT MEANDERING SIDEWALK PER CITY OF FONTANA STD. No.1015
(323) INSTALL 6' HIGH WOOD FENCE PER LANDSCAPE ARCHITECT PLANS
(324) INSTALL WROUGHT IRON FENCE WITH PILASTERS PER LANDSCAPE ARCHITECT PLANS
(325) CONSTRUCT 8" CONCRETE CURB PER DETAIL ON SHEET 1, MONOLITHICALLY WITH CONCRETE PAVEMENT
(326) CONSTRUCT 8" PCC OVER COMPACTED NATIVE
(327) INSTALL GROUTED FACING STONE PER CALTRANS SPECIFICATIONS & PER DETAIL ON SHEET 1

STORM DRAIN CONSTRUCTION NOTES

(07) INSTALL 18" RCP (D-LOAD AND PROFILE AS SHOWN ON PLANS)
(048) CONSTRUCT CMP INLET PER DETAIL ON SHEET 1
(0197) INSTALL FLARED END SECTION PER CALTRANS STANDARD PLAN D94

EROSION CONTROL CONSTRUCTION NOTES

(E3) INSTALL A 15' LONG DOUBLE ROW OF SANDBAGS, 2 BAGS HIGH. OMIT ONE BAG AT THE FLOWLINE.
(E5) INSTALL 2 LAYERS OF SANDBAGS AROUND PERIMETER OF SITE AS SHOWN ON PLAN.

NOTE

**ALL WORK WITHIN PUBLIC RIGHT-OF-WAY IS PER SEPARATE PERMIT.

LEGAL DESCRIPTION

REAL PROPERTY IN THE CITY OF FONTANA, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, DESCRIBED AS FOLLOWS:

THE SOUTH ONE-HALF OF THE EAST ONE-HALF OF FARM LOT 769, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, ACCORDING TO MAP SHOWING SUBDIVISION OF LANDS BELONGING TO THE SEMI-TROPIC LAND AND WATER CO., AS PER PLAT RECORDED IN BOOK 11 OF MAPS, PAGE 12, RECORDS OF SAID COUNTY.

APN: 0255-101-22,23-0-000

APPROVED BY: _____ CITY ENGINEER R.C.E. 51152 DATE: 10-11-09

DWG. NO.: 3723

DIGALERT
DIAL BEFORE YOU DIG — TWO WORKING DAYS BEFORE YOU DIG
TOLL FREE 1-800-227-2600
A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

* NOTE:
HORIZONTAL AND VERTICAL LOCATIONS TO BE VERIFIED IN THE FIELD AND ENGINEER NOTIFIED OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION.

BENCHMARK ELEV. 1077.40
LOCATION:
CHISELED BOX IN EASTERLY TOP CURB TAMARIND AVE., 60' SOUTH OF TAMARIND CT., 500' SOUTH OF SLOVER

REV	DESCRIPTION	DATE

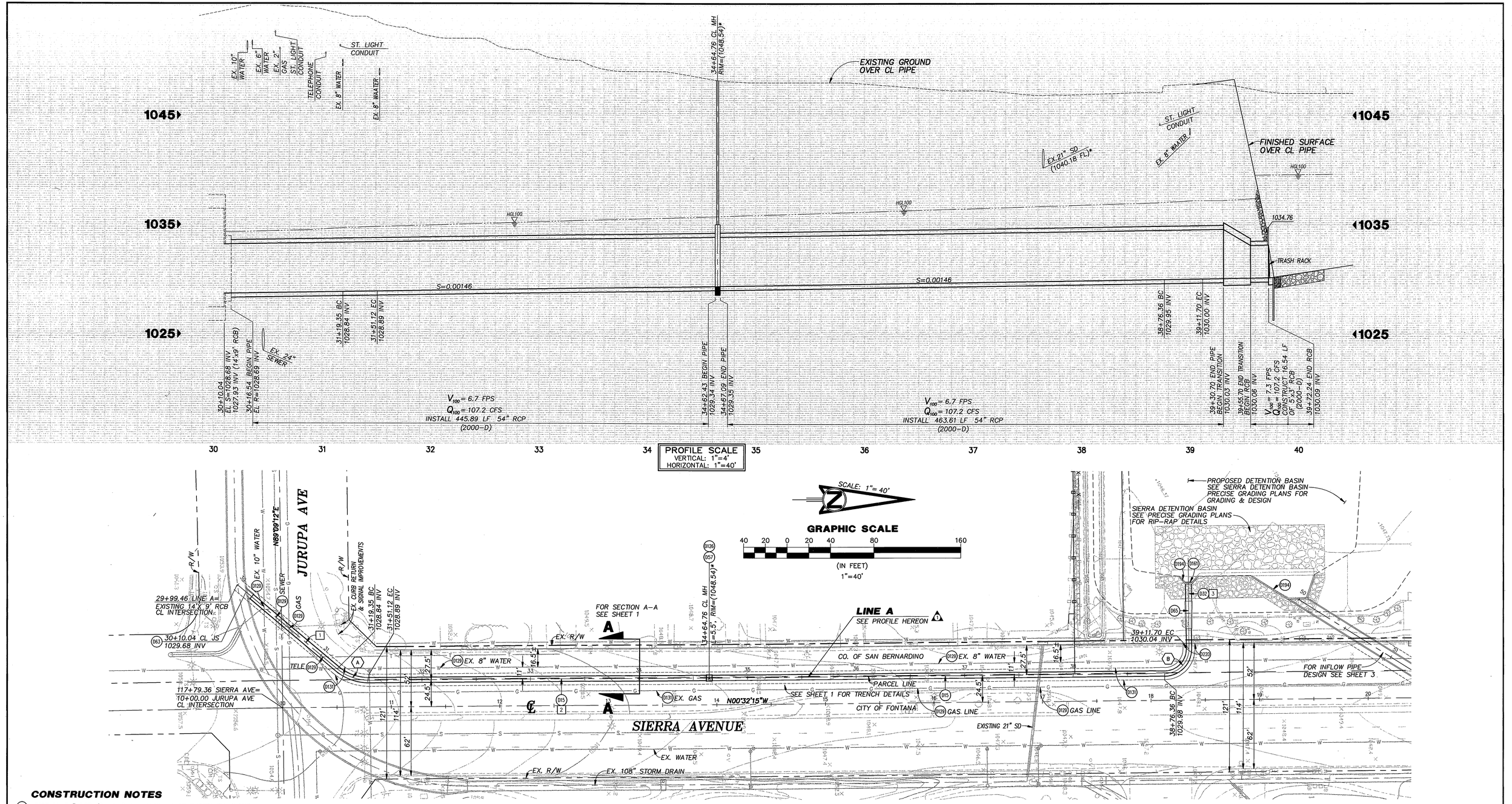
REGISTERED PROFESSIONAL ENGINEER MAURICE H. MURAD NO. 33366 EXPIRATION 6-30-2006 CIVIL STATE OF CALIFORNIA

PRECISE GRADING PLAN
FOR
SIERRA DETENTION BASIN
LENNAR PARTNERS
CITY OF FONTANA

HUITT-ZOLLARS
Huitt-Zollars, Inc. Ontario
1101 S. MILLIKEN AVENUE, SUITE G * ONTARIO, CALIFORNIA 91761 * (909) 390-8400
PREPARED UNDER THE SUPERVISION OF MAURICE H. MURAD
Maurice Murad 33366 R.C.E. 6-30-06 EXPIRES 9-29-04 DATE

DESIGNED BY M.H.M.
DRAWN BY H-Z STAFF
CHECKED BY M.H.M.
FIELD BOOK
SHEET 2 OF 3 SHEETS
JOB NO. 11020201

SEPT. 24, 2004 14:28
I:\FINAL\11020201\PLAN\02023.DWG



PROFILE SCALE
VERTICAL: 1"=4'
HORIZONTAL: 1"=40'

CONSTRUCTION NOTES

(015) INSTALL 54" RCP (D-LOAD AND PROFILE AS SHOWN ON PLANS)
(032) CONSTRUCT 5'x3' RCB PER CALTRANS STD. PLAN D80
(057) CONSTRUCT MANHOLE PIPE TO PIPE PER APWA STD. PLAN 320-1
(063) CONSTRUCT JUNCTION PIPE TO RCB PER APWA STD. PLAN 333-1
(065) CONSTRUCT TRANSITION STRUCTURE RCB TO PIPE PER APWA STD. PLAN 342-1
(0126) ADJUST MANHOLE RIM TO GRADE AFTER FINAL SURFACE HAS BEEN INSTALLED
(0129) PROTECT EXISTING UTILITY IN PLACE (TYPE AS INDICATED ON PLANS)
(0131) SAWCUT AND REMOVE EXISTING PAVEMENT AND REPLACE IN KIND AFTER CONSTRUCTION (PROVIDE SPECIAL SHORING BY CONTRACTOR AS NECESSARY)
(0161) INSTALL CHILD PROTECTION BARRIER (TRASH RACK) PER APWA STD. PLAN 360-0
(0194) INSTALL BOX CULVERT WINGWALL TYPE A PER CALTRANS STANDARD PLAN D84
(0220) SAWCUT AND REMOVE EXISTING CURB & GUTTER AND REPLACE IN KIND AFTER CONSTRUCTION

* NOTE:
HORIZONTAL AND VERTICAL LOCATIONS TO BE VERIFIED IN THE FIELD AND ENGINEER NOTIFIED OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION.

NOTE TO CONTRACTOR:
ANY EXISTING FACILITIES OUTSIDE THE LIMITS OF THE STORM DRAIN TRENCHING (STREET LIGHTS, CURB & GUTTER, POWER POLES, WATER LINES, ETC.) SHALL BE PROTECTED IN PLACE. IF ANY HAVE TO BE RELOCATED, THE COST WILL BE THE RESPONSIBILITY OF THE CONTRACTOR.

RECORD DRAWING

COURSE DATA		
	BEARING	DISTANCE
1	N39°54'24"E	119.35'
2	N00°32'15"W	725.24'
3	N89°27'45"E	111.76'

CURVE DATA				
	Δ	R	L	T
A	40°26'39"	45.00'	31.76'	16.58'
B	90°00'00"	22.50'	35.34'	22.50'

REGISTERED PROFESSIONAL ENGINEER MAURICE H. MURAD NO. 33366 EXPIRATION 6-30-2008 CIVIL STATE OF CALIFORNIA
7/9/07

DIGALERT
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TOLL FREE 1-800-227-2600
A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

BENCHMARK ELEV. 1077.40
LOCATION:
CHISELED BOX IN EASTERLY TOP OF CURB TAMARIND AVE., 60' SOUTH OF TAMARIND CT., 500' SOUTH OF SLOVER AVENUE.

NO.	REVISION DESCRIPTION	DATE	ENGR.	CITY	DATE
2	RECORD DRAWING	7/01/07	MHM		7-11-07
1	REVISED LOCATION OF LINE A	12/28/04	MHM		1-26-05

SHOULD CONSTRUCTION OF THE REQUIRED IMPROVEMENTS NOT COMMENCE WITHIN TWO YEARS OF THE DATE OF APPROVAL SHOWN HEREON AND CARRIED FORTH IN A DILIGENT MANNER, THE CITY ENGINEER MAY REQUIRE REVISIONS TO THE PLANS TO BRING THEM INTO CONFORMANCE WITH STANDARDS IN EFFECT.

REGISTERED PROFESSIONAL ENGINEER MAURICE H. MURAD NO. 33366 EXPIRATION 6-30-2006 CIVIL STATE OF CALIFORNIA

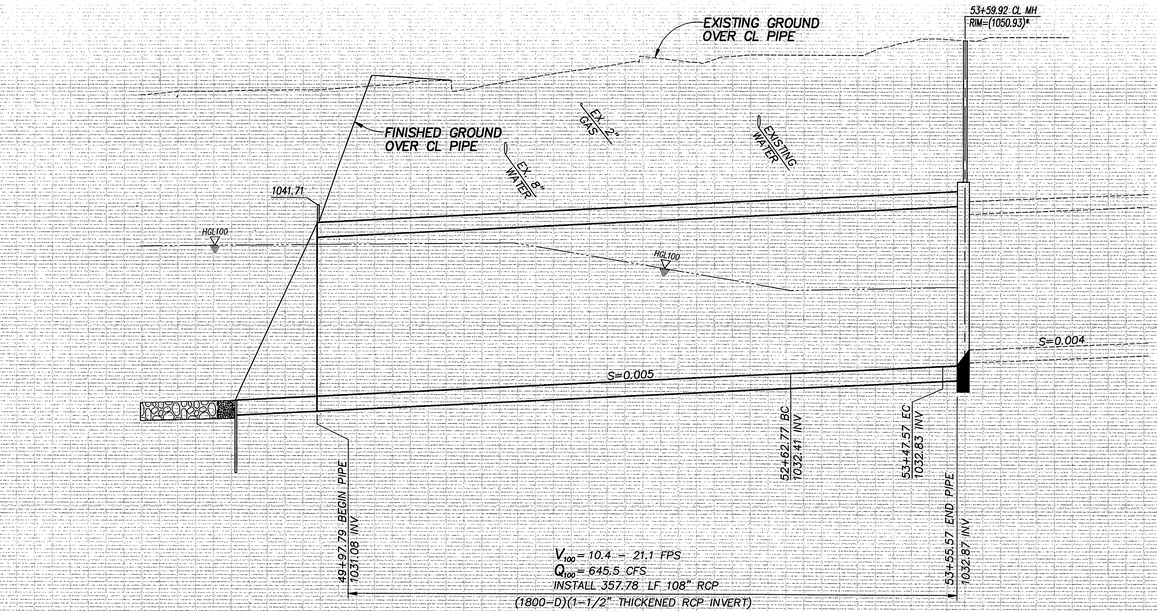
HUITT-ZOLLARS
Huitt-Zollars, Inc. Ontario
1101 S. MILLIKEN AVENUE, SUITE G * ONTARIO, CALIFORNIA 91761 * (909) 390-8400
PREPARED UNDER THE SUPERVISION OF MAURICE H. MURAD
33366 R.C.E. 6-30-06 EXPIRES 1-20-05 DATE

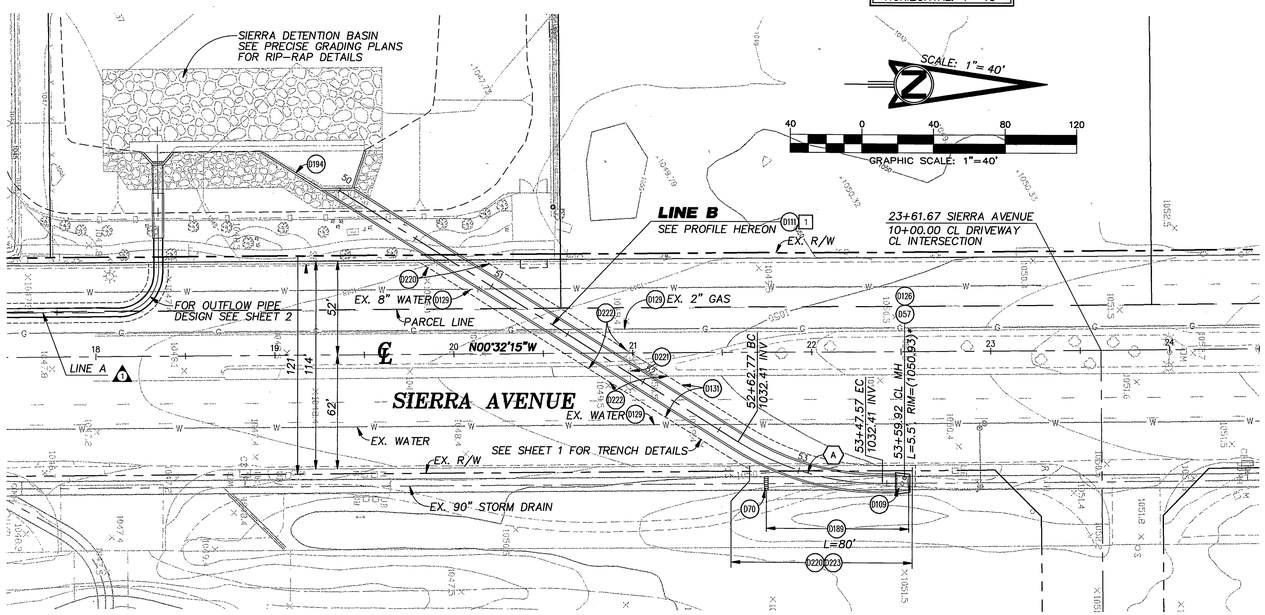
CITY OF FONTANA, CALIFORNIA
STORM DRAIN IMPROVEMENT PLANS

DRAWN BY:
DESIGNED BY:
CHECKED BY:
APPROVED BY: CITY ENGINEER R.C.E. 51152 DATE: 1-26-05
SCALE:
DATE:
DWG. NO.: 3724 2/5

DETENTION BASIN LINE A FROM JURUPA AVE TO 950' NORTH

JUL. 03, 2007 10:15 H:\PROJ\102200\LDWG\02.DWG





CONSTRUCTION NOTES

(057) CONSTRUCT MANHOLE PIPE TO PIPE PER APWA STD. PLAN 320-1
(064) CONSTRUCT TRANSITION STRUCTURE PIPE TO PIPE PER APWA STD. PLAN 340-1
(070) CONSTRUCT PIPE PLUG PER DETAIL ON SHEET 1
(091) INSTALL RIP-RAP PER CALTRANS SPECIFICATIONS AND DETAIL ON SHEET 1
(0109) REMOVE EXISTING MANHOLE STRUCTURE
(0111) INSTALL 108" RCP (D-LOAD AND PROFILE AS SHOWN ON PLANS)
(0126) ADJUST MANHOLE RIM TO GRADE AFTER FINAL SURFACE HAS BEEN INSTALLED
(0129) PROTECT EXISTING UTILITY IN PLACE (TYPE AS INDICATED ON PLANS)
(0131) SAWCUT AND REMOVE EXISTING PAVEMENT AND REPLACE IN KIND AFTER CONSTRUCTION (PROVIDE SPECIAL SHORING BY CONTRACTOR AS NECESSARY)
(0189) REMOVE PORTIONS OF EXISTING PIPE (LENGTH AS INDICATED ON PLANS)
(0194) INSTALL BOX CULVERT WINGWALL TYPE A PER CALTRANS STANDARD PLAN D84
(0220) SAWCUT AND REMOVE EXISTING CURB & GUTTER AND REPLACE IN KIND AFTER CONSTRUCTION
(0221) REMOVE EXISTING STREET LIGHTING AND REPLACE IN KIND AFTER CONSTRUCTION
(0222) REMOVE AND REPLACE EXISTING CURB IN KIND
(0223) REMOVE AND REPLACE EXISTING SIDEWALK IN KIND

REGISTERED PROFESSIONAL ENGINEER
MAURICE H. MURAD
NO. 33366
EXPIRATION
6-30-2008
CIVIL
STATE OF CALIFORNIA
7/3/07

COURSE DATA		
	BEARING	DISTANCE
1	N31°51'15"E	262.77'

CURVE DATA				
	Δ	R	L	T
A	32°23'30"	150.00'	84.80'	43.57'

RECORD DRAWING

NOTE TO CONTRACTOR:
ANY EXISTING FACILITIES OUTSIDE THE LIMITS OF THE STORM DRAIN TRENCHING (STREET LIGHTS, CURB & GUTTER, POWER POLES, WATER LINES, ETC.) SHALL BE PROTECTED IN PLACE. IF ANY HAVE TO BE RELOCATED, THE COST WILL BE THE RESPONSIBILITY OF THE CONTRACTOR.

* NOTE:
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BENCHMARK ELEV. 1077.40
LOCATION:
CHISELED BOX IN EASTERLY TOP OF CURB TAMARIND AVE., 60' SOUTH OF TAMARIND CT., 500' SOUTH OF SLOVER AVENUE.

NO.	REVISION DESCRIPTION	DATE	ENGR.	CITY	DATE
2	RECORD DRAWING	7/01/07			7-11-07
1	REVISED LOCATION OF LINE A	12/28/04			1-26-05

SHOULD CONSTRUCTION OF THE REQUIRED IMPROVEMENTS NOT COMMENCE WITHIN TWO YEARS OF THE DATE OF APPROVAL SHOWN HEREON AND CARRIED FORTH IN A DILIGENT MANNER, THE CITY ENGINEER MAY REQUIRE REVISIONS TO THE PLANS TO BRING THEM INTO CONFORMANCE WITH STANDARDS IN EFFECT.

REGISTERED PROFESSIONAL ENGINEER
MAURICE H. MURAD
NO. 33366
EXPIRATION
6-30-2006
CIVIL
STATE OF CALIFORNIA

HUITT-ZOLLARS
Huitt-Zollars, Inc. Ontario
1101 S. MILLIKEN AVENUE, SUITE G * ONTARIO, CALIFORNIA 91761 * (909) 390-8400
PREPARED UNDER THE SUPERVISION OF MAURICE H. MURAD
33366 6-30-06 1-20-05
R.C.E. EXPIRES DATE

CITY OF FONTANA, CALIFORNIA
STORM DRAIN IMPROVEMENT PLANS

DRAWN BY:
DESIGNED BY:
CHECKED BY:

DETENTION BASIN
LINE B
STA.49+97.86 TO STA.53+55.57

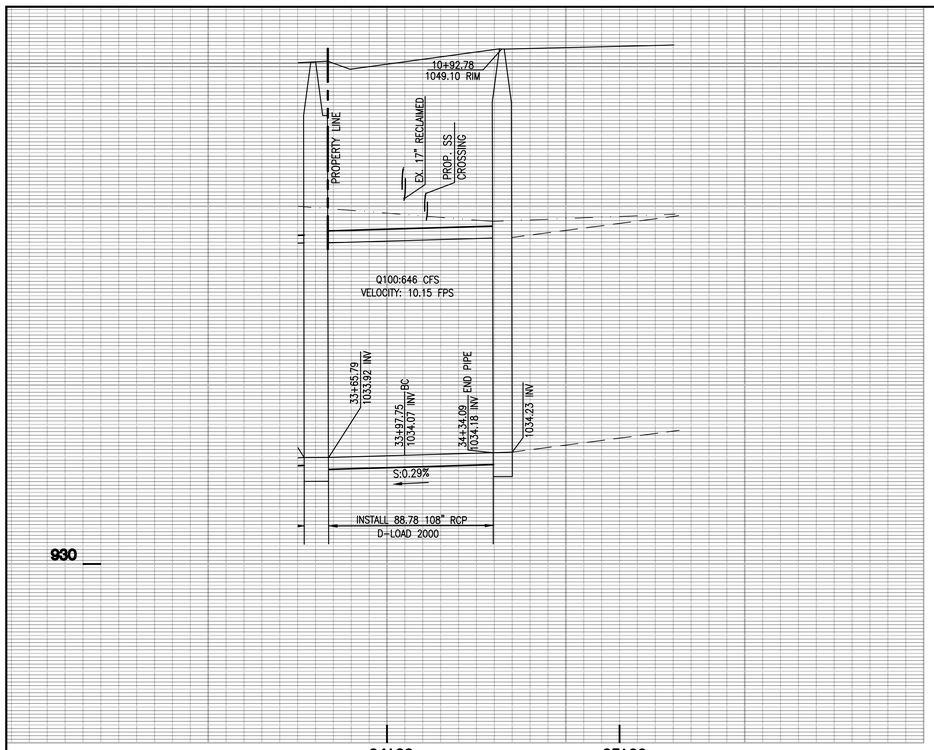
APPROVED BY:
CITY ENGINEER R.C.E. 51152 DATE: 1-26-05

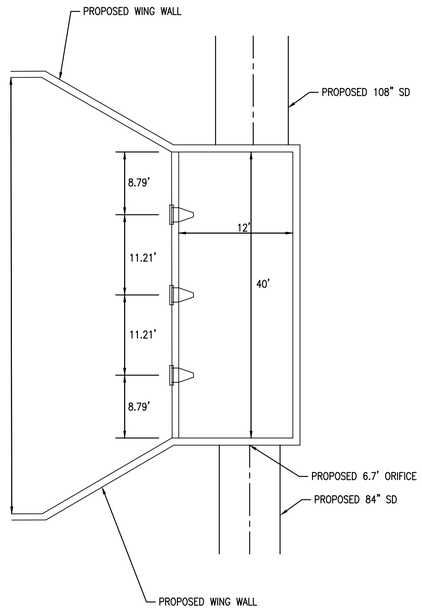
SCALE:
DATE:
DWG. NO.: 3724
3/5

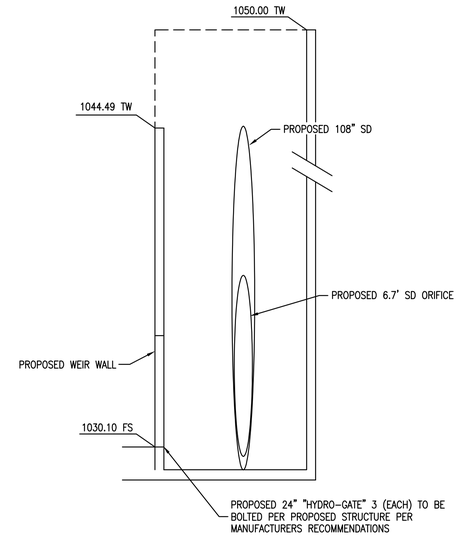
JUL. 03, 2007 10:15 H:\PROJ\1103\03\PLSHT03.DWG

PROPOSED (E) DETENTION BASIN IMPROVEMENT PLAN FOR REFERENCE ONLY

SCALE: HOR: 1"=30'
VER: 1"=3'

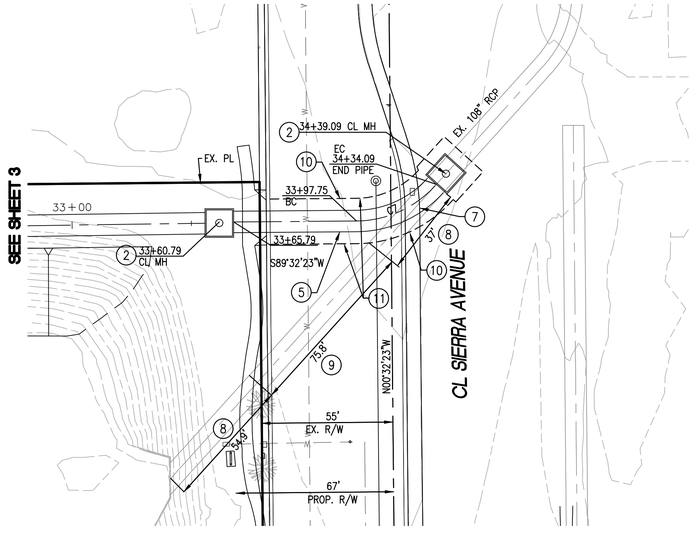




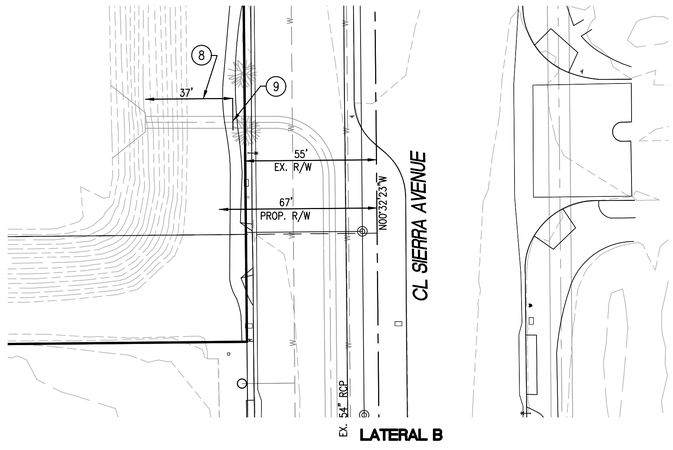


STRUCTURE DETAIL

CURVE TABLE			
CURVE #	LENGTH	RADIUS	DELTA
C1	17.40'	22.50'	44°19'11"
C2	21.17'	22.50'	53°54'26"
C3	10.00'	22.50'	25°28'32"
C4	20.06'	72.92'	15°45'54"
C5	35.32'	22.50'	89°57'03"
C6	70.05'	45.00'	89°11'38"
C7	37.26'	45.00'	47°26'50"



LATERAL A



LATERAL B

STORM DRAIN IMPROVEMENT NOTES:

1. INSTALL 84" RCP STORM DRAIN TO THE GRADES SHOWN, REPLACE PAVEMENT PER CITY STANDARD 1008.
2. INSTALL CITY OF FONTANA STD 3012 STORM DRAIN MANHOLE.
3. CONSTRUCT PCC FLOW BY BASIN DIVISION STRUCTURE PER STRUCTURAL DETAILS. STRUCTURAL PER RW1 AND RW2.
4. JOIN TO EXISTING BOX CULVERT PER DETAILS RW-3.
5. INSTALL 108" RCP STORM DRAIN TO THE GRADES SHOWN, REPLACE PAVEMENT PER CITY STANDARD 1008.
6. INSTALL 6'X7' RCB PER CALTRANS STD D-80.
7. EXISTING MEDIAN IMPROVEMENT, REPLACE IN KIND
8. REMOVE SECTION OF EXISTING RCP TO THE LIMITS SHOWN, BACK FILL PER SOILS REPORT RECOMMENDATIONS.
9. PLUG END OF EXISTING STORM DRAIN PER DETAIL 816 AND SLURRY INJECT. WITH 2 SACK SLURRY. BULK HEAD TO BE PER MAX DIAMETER SPECS.
10. PROPOSED FULL DEPTH SAWCUT, PROTECT THROUGH DURATION OF PROJECT.
11. PROPOSED FULL DEPTH AC REPLACED, 1" THICKER THAN EXISTING.
12. INSTALL 3'X8' RCB PER CALTRANS STD D-80.
13. CONSTRUCT SPPWC STD 342-2 TRANSITIONS STRUCTURE FROM PIPE TO RCB.
14. CONSTRUCT MANHOLE STRUCTURE PER SPPWC STD 323-2.

SCALE: 1" = 30'

0 15 30 60

BENCHMARK:
CITY OF FONTANA BM#517
PK NAIL IN POLE #3357396 AT THE NW CORNER OF REDWOOD & SANTA ANA
ELEV=981.36'

BASIS OF BEARINGS:
THE BEARINGS SHOWN HERON ARE BASED ON THE CENTERLINE OF SIERRA AVE PER RECORD OF SURVEY NO. 04-200 122-50 BEING N 00°32'15" E

PREPARED BY:
KES TECHNOLOGIES INC
CIVIL ENGINEERING
LAND PLANNING AND SURVEYING
1 VENTURE STE 130
IRVINE, CALIFORNIA 92618
PHONE (949) 339-5331
FAX (866) 426-2201

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TWO WORKING DAYS BEFORE YOU DIG
TOLL FREE 1-800-227-2600
A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

REV.	REVISION DESCRIPTION	DATE	ENGR.	CITY	DATE

SHOULD CONSTRUCTION OF THE REQUIRED IMPROVEMENTS NOT COMMENCE WITHIN TWO YEARS OF THE DATE OF APPROVAL SHOWN HEREON AND CARRIED FORTH IN A DILIGENT MANNER, THE CITY ENGINEER MAY REQUIRE REVISIONS TO THE PLANS TO BRING THEM INTO CONFORMANCE WITH STANDARDS IN EFFECT.

REGISTERED PROFESSIONAL ENGINEER
ALI MONSHIZADEH
C67674
EXP. 06/30/2023
CIVIL
STATE OF CALIFORNIA

Prepared Under The Supervision Of :

Date :
ALI MONSHIZADEH RCE 67674

CITY OF FONTANA, CALIFORNIA
STORM DRAIN IMPROVEMENT PLAN

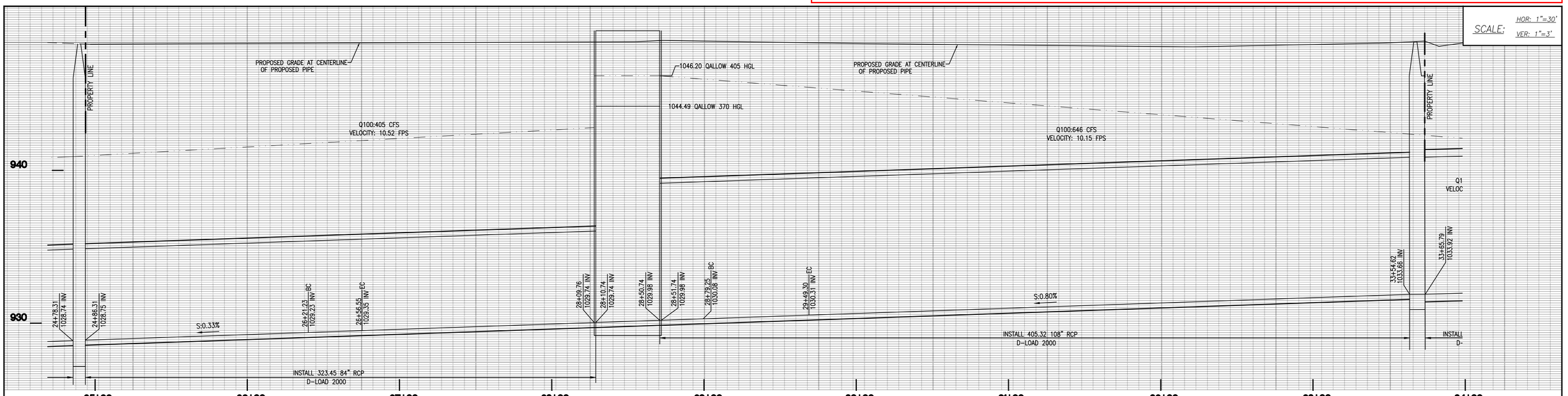
SIERRA AVENUE

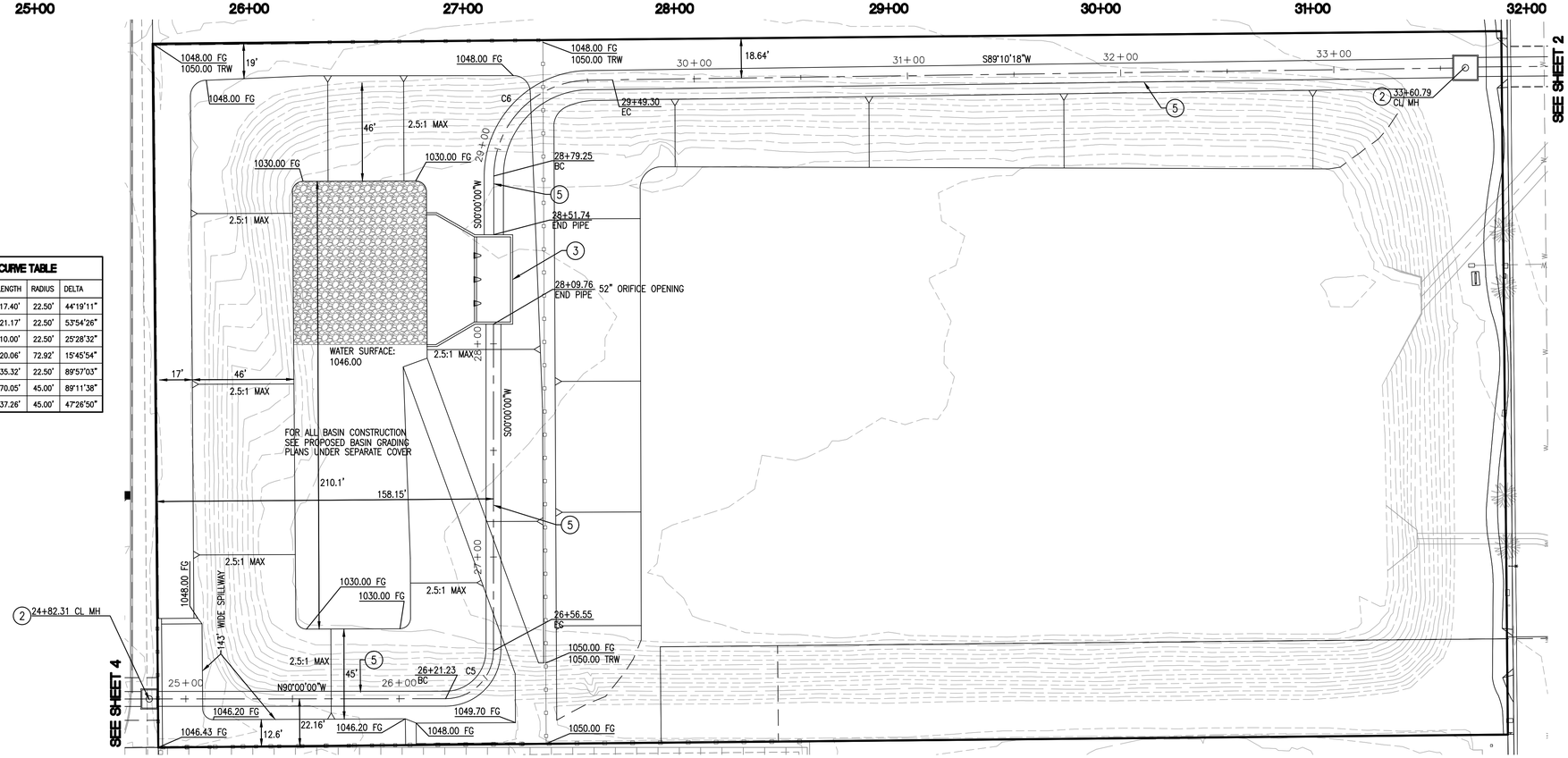
DRAWN BY: DSK
DESIGNED BY: DSK
CHECKED BY: AM
APPROVED BY: CITY ENGINEER DATE: R.C.E. 51152

SCALE: AS SHOWN
DATE: 03/22/22
DRAWING NO.: XXXX 2/9

PROPOSED (E) DETENTION BASIN IMPROVEMENT PLAN FOR REFERENCE ONLY

SCALE: HOR: 1"=30'
VER: 1"=3'





CURVE TABLE			
CURVE #	LENGTH	RADIUS	DELTA
C1	17.40'	22.50'	44°19'11"
C2	21.17'	22.50'	53°54'26"
C3	10.00'	22.50'	25°28'32"
C4	20.06'	72.92'	15°45'54"
C5	35.32'	22.50'	89°57'03"
C6	70.05'	45.00'	89°11'38"
C7	37.26'	45.00'	47°26'50"

STORM DRAIN IMPROVEMENT NOTES:

1. INSTALL 84" RCP STORM DRAIN TO THE GRADES SHOWN, REPLACE PAVEMENT PER CITY STANDARD 1008.
2. INSTALL CITY OF FONTANA STD 3012 STORM DRAIN MANHOLE.
3. CONSTRUCT PCC FLOW BY BASIN DIVISION STRUCTURE PER STRUCTURAL DETAILS. STRUCTURAL PER RW1 AND RW2.
4. JOIN TO EXISTING BOX CULVERT PER DETAILS RW-3.
5. INSTALL 108" RCP STORM DRAIN TO THE GRADES SHOWN, REPLACE PAVEMENT PER CITY STANDARD 1008.
6. INSTALL 6'X7' RCB PER CALTRANS STD D-80.
7. EXISTING MEDIAN IMPROVEMENT, REPLACE IN KIND
8. REMOVE SECTION OF EXISTING RCP TO THE LIMITS SHOWN, BACK FILL PER SOILS REPORT RECOMMENDATIONS.
9. PLUG END OF EXISTING STORM DRAIN PER DETAIL 816 AND SLURRY INJECT. WITH 2 SACK SLURRY. BULK HEAD TO BE PER MAX DIAMETER SPECS.
10. PROPOSED FULL DEPTH SAWCUT, PROTECT THROUGH DURATION OF PROJECT.
11. PROPOSED FULL DEPTH AC REPLACED, 1" THICKER THAN EXISTING.
12. INSTALL 3'X8' RCB PER CALTRANS STD D-80.
13. CONSTRUCT SPPWC STD 342-2 TRANSITIONS STRUCTURE FROM PIPE TO RCB.
14. CONSTRUCT MANHOLE STRUCTURE PER SPPWC STD 323-2.

BASIN GRADING NOTES:

- EXISTING STORM DRAIN BASIN SHALL BE BACKFILLED UNDER SEPARATE PERMIT
- EROSION CONTROL UNDER SEPARATE PERMIT
- WDID – IN PROCESS

SCALE: 1" = 30'

0 15 30 60

BENCHMARK:
CITY OF FONTANA BM#517
PK NAIL IN POLE #335739E AT THE NW CORNER OF REDWOOD & SANTA ANA
ELEV=881.36'

BASIS OF BEARINGS:
THE BEARINGS SHOWN HERON ARE BASED ON THE CENTERLINE OF SIERRA AVE PER RECORD OF SURVEY NO. 04-200 122-50 BEING N 00°32'15" E

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REV.	REVISION DESCRIPTION	DATE	ENGR.	CITY	DATE

SHOULD CONSTRUCTION OF THE REQUIRED IMPROVEMENTS NOT COMMENCE WITHIN TWO YEARS OF THE DATE OF APPROVAL SHOWN HEREON AND CARRIED FORTH IN A DILIGENT MANNER, THE CITY ENGINEER MAY REQUIRE REVISIONS TO THE PLANS TO BRING THEM INTO CONFORMANCE WITH STANDARDS IN EFFECT.

REGISTERED PROFESSIONAL ENGINEER ALI MONSHIZADEH C67674 EXP. 06/30/2023 CIVIL STATE OF CALIFORNIA

Prepared Under The Supervision Of :

Date :

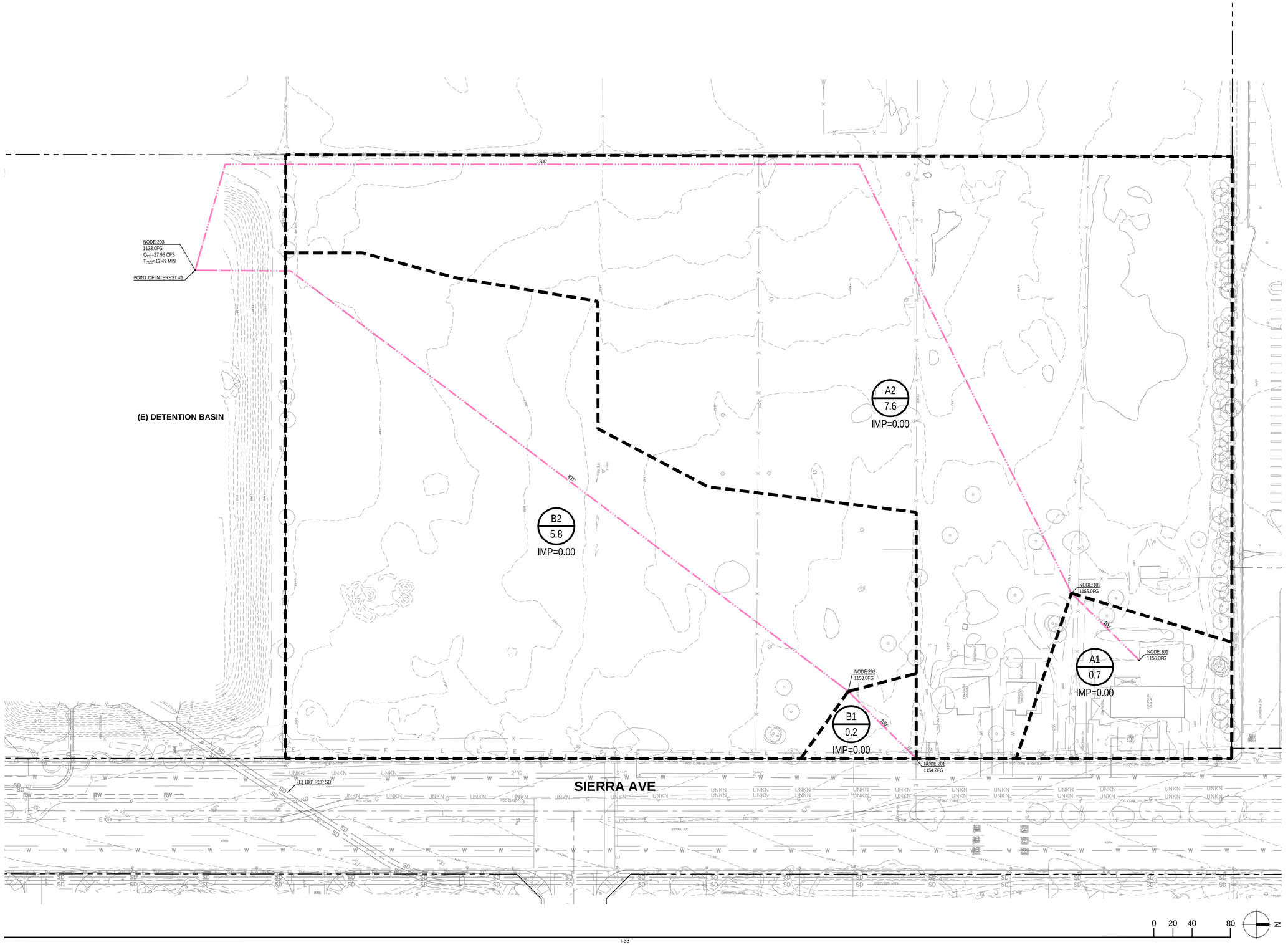
ALI MONSHIZADEH RCE 67674

CITY OF FONTANA, CALIFORNIA
STORM DRAIN IMPROVEMENT PLAN
JUNIPER TO SIERRA AVENUE

DRAWN BY:	DSK
DESIGNED BY:	DSK
CHECKED BY:	AM
APPROVED BY:	CITY ENGINEER
DATE:	R.C.E. 51152
SCALE:	AS SHOWN
DATE:	03/22/22
DRAWING NO.:	XXXX 3/9

LEGEND

- SURFACE FLOW
- LIMIT OF WORK/DELINEATION BETWEEN DRAINAGE AREAS
- NAME / X.XX — DRAINAGE SUBAREA / AREA (ACRES)
- IMP=0.XX — IMPERVIOUS RATIO



LPA

ARCHITECTURE ENGINEERING INTERIORS
LANDSCAPE ARCHITECTURE PLANNING

949-261-1001 Office

949-260-1190 Fax

LPADesignStudios.com

5301 California Avenue,
Suite 100
Irvine, California 92617

CHAFFEY COLLEGE FONTANA CAMPUS
11070 SIERRA AVENUE
FONTANA, CA 92337

Developed for
CHAFFEY COLLEGE

Revision	Date

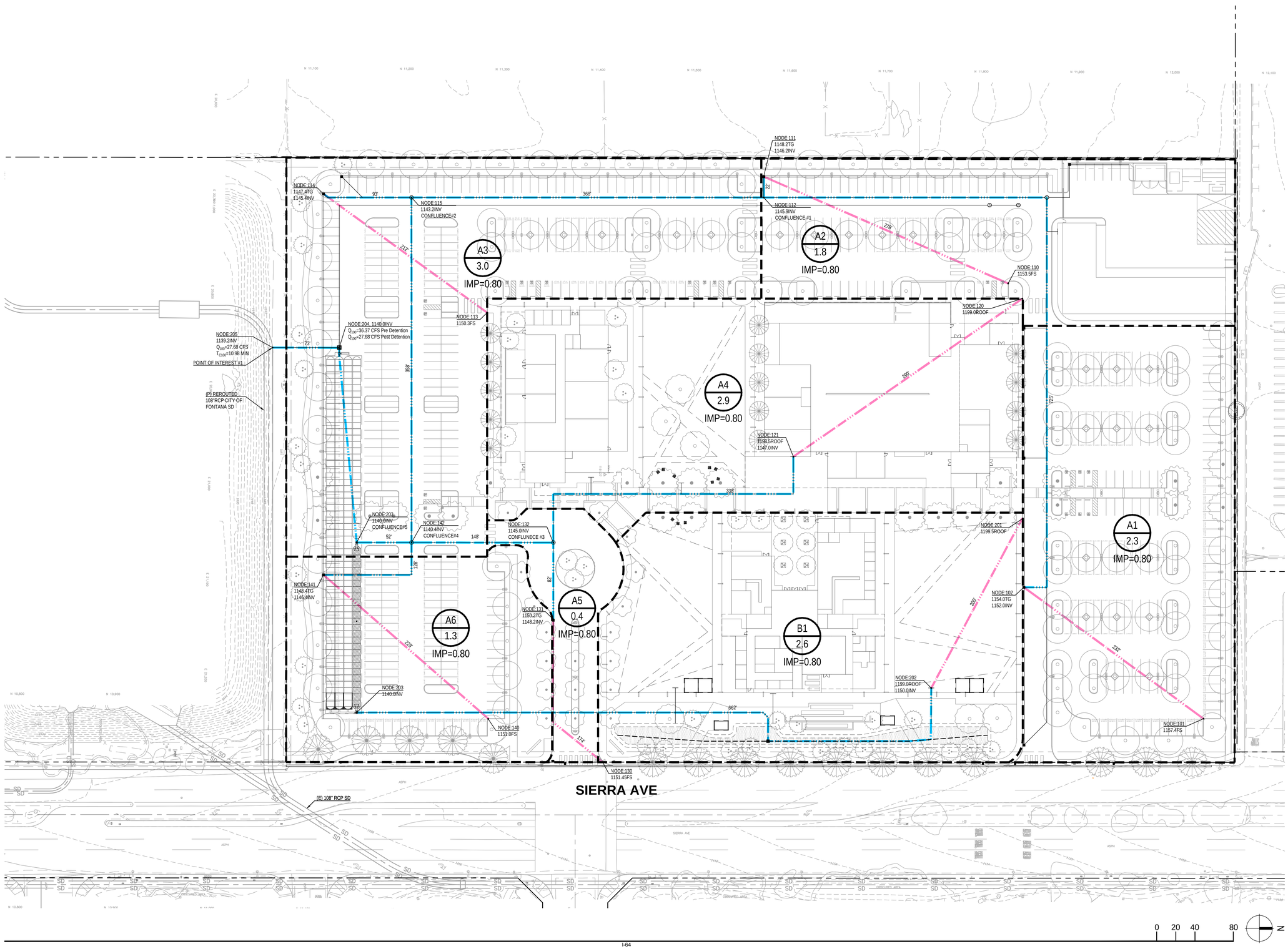
Submittal	Date

Job Number	30671.01
Date Published	MM/DD/YY
Checked By	K.S.
Scale	1" = 40'

EXISTING HYDROLOGY EXHIBIT

LEGEND

- SURFACE FLOW
- PIPE FLOW
- LIMIT OF WORK/DELINEATION BETWEEN DRAINAGE AREAS
- NAME / X.XX — DRAINAGE SUBAREA / AREA (ACRES)
- IMP=0.XX — IMPERVIOUS RATIO



0 20 40 80 N

I-64

LPA

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LANDSCAPE ARCHITECTURE PLANNING

949-261-1001 Office

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5301 California Avenue,
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11070 SIERRA AVENUE
FONTANA, CA 92337

Developed for
CHAFFEY COLLEGE

Revision	Date

Submittal	Date

Job Number	30671.01
Date Published	01/05/2023
Checked By	K.S.
Scale	1" = 40'

PROPOSED HYDROLOGY EXHIBIT