

PRELIMINARY HYDROLOGY REPORT

FOR

LOCUST AVE. DISTRIBUTUION CENTER

**2889 N LOCUST AVENUE
RIALTO, CA**

CITY OF RIALTO

Date: December 21, 2021

PLANS PREPARED UNDER THE SUPERVISION OF:

Fred Cornwell, P.E. - R.C.E 45591

Date

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1.0 INTRODUCTION

The purpose of this report is to present the hydrology analysis and drainage calculations for a proposed Locust Ave. industrial development located in the City of Rialto, California. The site proposes to construct an industrial building with an approximately 96,000 square feet footprint on approximately 4.7 net acres. This report will determine the existing and proposed storm water runoff rates from the Project site, provide analysis of the impacts to adjacent and downstream properties and facilities, and determine how to protect the building from 100-yr flood. This project is considered an "Industrial/Commercial Development".

2.0 EXISTING DRAINAGE CONDITIONS

The subject site is currently vacant barren land with exposed rock outcroppings and fronts on Locust Ave. to the west. It is surrounded by industrial to the north and south and residential to the east. The site drains from the north to the south and somewhat to the east. The low point on our site is near the southeasterly corner being approximately 10' lower than the street elevation. The site to the north drains onto the proposed project and our property drains onto the property to the south. The Master Plan of Drainage (MPD) shows that the properties to the east of Locust Ave. are tabulated to drain southerly and easterly to a system in Maple Ave. There is an existing 102" storm drain in Locust Ave. but our site is not tributary to that system.

3.0 PROPOSED DRAINAGE CONDITIONS

Drainage for the proposed site will be conveyed via sheet flow and gutters to three catch basins, with filters, which connect to storage pipes located along the southern portion of the site. The storage pipes will collect the drainage and allow to infiltrate. The project proposes to install a bypass storm drain that will collect the off-site flows coming from the north and outlet them at the low point along the southerly boundary. The outlet will have energy dissipating devices that will dissipate the flows as to mimic the historic flow pattern. The on-site infiltration pipes will be sized to contain and infiltrate up to the 100 year storm event. This will assure that the proposed project will have no adverse effect on the neighboring property because it will eliminate all historic flows that were coming from the vacant site. The storage pipe facility will be modeled as a flow through basin with the outlet flows being the infiltrated amount.

4.0 HYDROLOGICAL AND SOIL DATA

References used in this report were the following:

- San Bernardino County Flood Control District, Hydrology Manual, dated August 1986.
- NOAA Atlas 14, Volume 6, Version 2, Point Precipitation Frequency Estimates.

Based on the hydrological soils group designation the site consists of soil group "A". The soil group designation is presented in the enclosed "Hydrologic Soils Group Map" at the end of this Section.

- Slope of Intensity Duration Curve = 0.6

The point precipitation frequency estimates for the project site are presented at the end of this Section.

5.0 HYDROLOGY RESULTS

The results of the 2, 25 and 100-year storm events for both the existing and proposed conditions are shown on the hydrology maps in this report. We have also prepared a unit hydrograph for the proposed 100 year storm event which will be utilized in the basin routing model.

6.0 WATER QUALITY

The water quality as shown in the project's WQMP and described Section 3.0, will utilize the inlet filters and infiltration facility as the water quality BMP's. More information on the water quality is shown on the WQMP Site Plan (Exhibit D)

7.0 FLOOD PLAIN DESIGNATION

The site falls within a Zone "X" designation under the FEMA Map 06071C7920H, dated August 28, 2008. Zone X (Shaded) represents areas determined to be outside the 0.2% annual chance floodplain.

8.0 METHODOLOGY

The San Bernardino County Rational and Unit Hydrograph Methods described in the San Bernardino County Hydrology Manual were utilized to determine the storm flows. The San Bernardino County Unit Hydrograph Method was used to provide hydrological information for routing of the proposed basin. The Computer Software Programs used was Advanced Engineering Software (AES) Rational Tabling Version 15.0 for the Rational Method and the small area hydrograph module CH1 – v1.8 for the Hydrograph Routing to size the basins.

This report will analyze the 2, 25 & 100 year storms for the rational method and the 100 year storm for the basin routing.

9.0 HYDRAULICS

ON-SITE:

The storage facility consists of six 96" CMP pipes that are connected via 24" HDPE pipes at 20' o.c. This will allow the flows to fill all the pipes during storm events before being infiltrated.

The results are shown in Appendix D. These outflows will be modeled in the basin routing for the 100 year storm event.

The pipe flows and catch basin hydraulics will be analyzed using the rational method flows in the Final Hydrology report.

OFF-SITE:

The Master Plan of Drainage (MPD) shows an existing 39" pipe, labeled "XC4-5X in Maple Ave. and a proposed 54" pipe, labeled as "C4-5". The flows exiting our site will go through the neighboring property to the south and onto Summit Ave., then go easterly to the drainage facilities in Maple Ave.

10.0 RESULTS

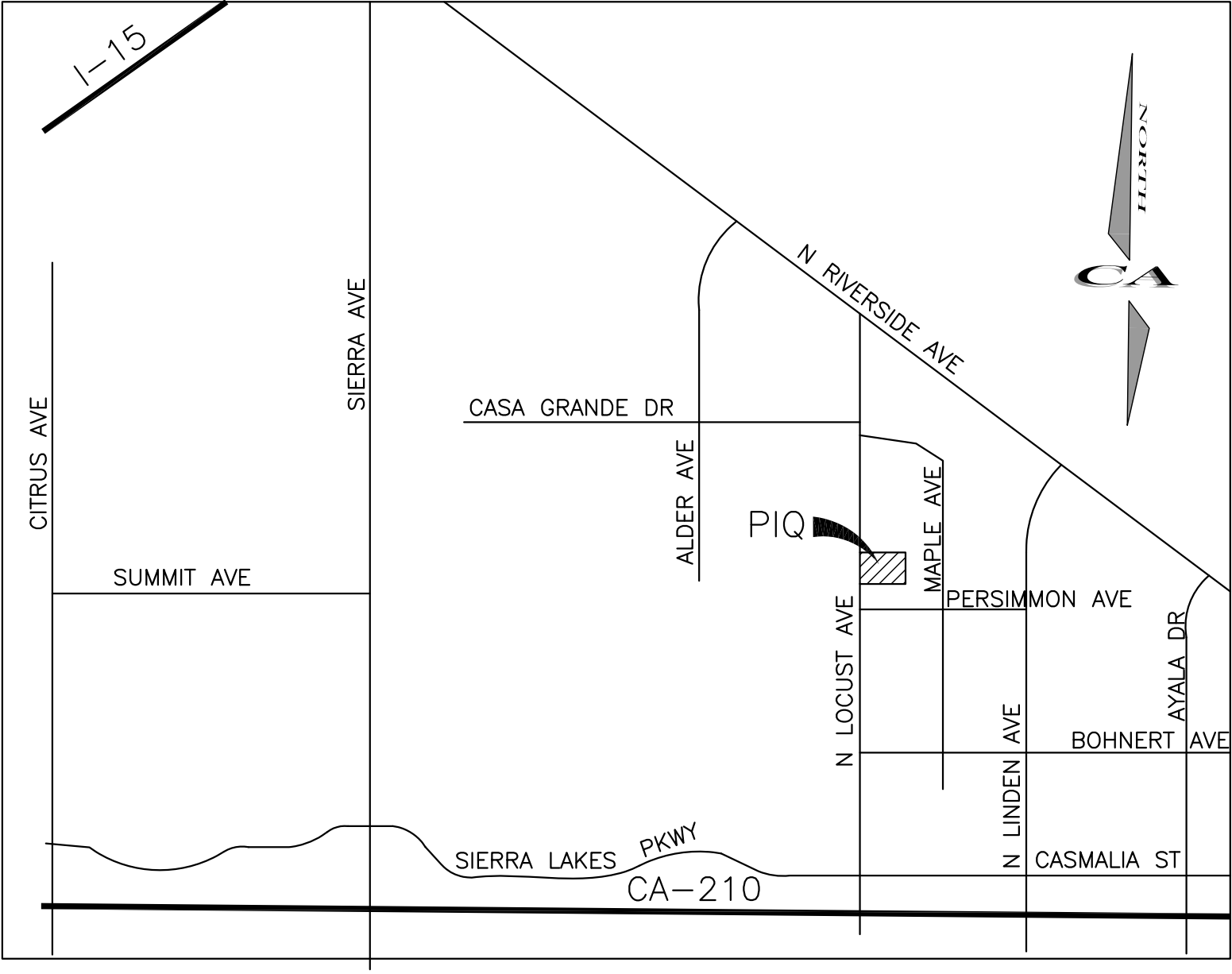
RIALTO DISTRIBUTION CENTER - HYDROLOGY STUDY

It is shown in Appendix "C" that the storm flows for the 100 year storm event are completely contained in the storage facility and infiltrated on-site. The maximum depth in the pipes is shown in the basin routing output to be 6.40'.

11.0 CONCLUSION

The results show that the 100 year storm will be collected and infiltrated.

12.0 VICINITY MAP

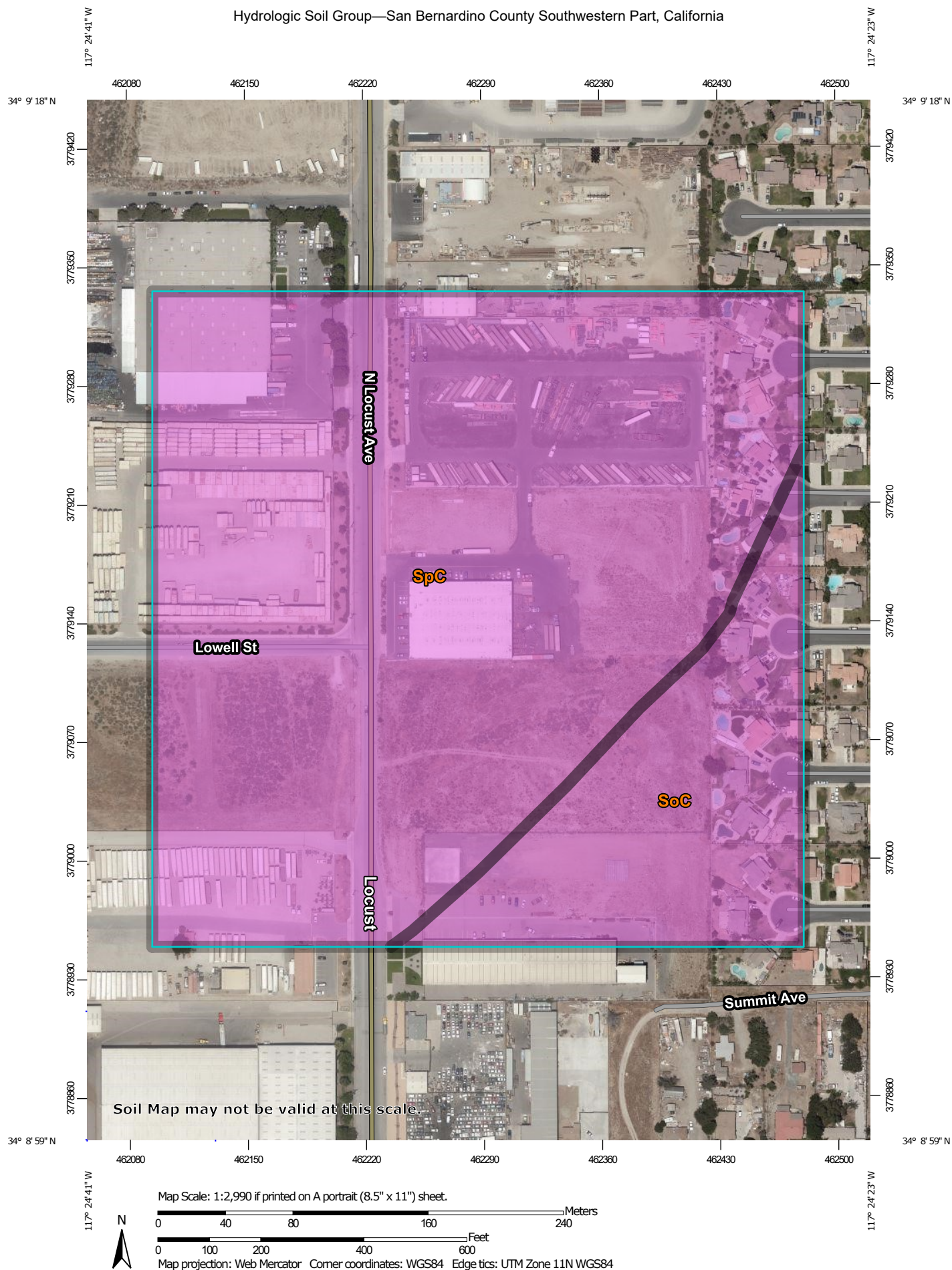


VICINITY MAP

NOT TO SCALE

13.0 SOIL AND RAINFALL DATA TABLES

Hydrologic Soil Group—San Bernardino County Southwestern Part, California



MAP LEGEND

Area of Interest (AOI)









 Area of Interest (AOI)

Soils

Soil Rating Polygons





 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Lines


 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Points






 A
 A/D
 B
 B/D

 C
 C/D
 D
 Not rated or not available

Water Features

 Streams and Canals

Transportation

 Rails
 Interstate Highways
 US Routes
 Major Roads
 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Bernardino County Southwestern Part, California
 Survey Area Data: Version 13, Sep 13, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 1, 2018—Jun 30, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
SoC	Soboba gravelly loamy sand, 0 to 9 percent slopes	A	7.3	19.8%
SpC	Soboba stony loamy sand, 2 to 9 percent slopes	A	29.7	80.2%
Totals for Area of Interest			37.1	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



NOAA Atlas 14, Volume 6, Version 2
Location name: Rialto, California, USA*
Latitude: 34.1518°, Longitude: -117.4097°
Elevation: 1619.97 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	0.138 (0.115-0.168)	0.183 (0.152-0.223)	0.242 (0.200-0.295)	0.289 (0.238-0.355)	0.353 (0.281-0.450)	0.403 (0.313-0.523)	0.453 (0.343-0.603)	0.504 (0.371-0.692)	0.574 (0.405-0.822)	0.629 (0.428-0.933)
10-min	0.198 (0.165-0.240)	0.262 (0.218-0.319)	0.346 (0.287-0.422)	0.414 (0.341-0.510)	0.506 (0.402-0.644)	0.577 (0.448-0.750)	0.649 (0.492-0.865)	0.723 (0.532-0.992)	0.823 (0.581-1.18)	0.901 (0.614-1.34)
15-min	0.239 (0.199-0.290)	0.317 (0.264-0.386)	0.419 (0.347-0.511)	0.501 (0.412-0.616)	0.612 (0.486-0.779)	0.698 (0.542-0.907)	0.785 (0.595-1.05)	0.874 (0.644-1.20)	0.996 (0.702-1.43)	1.09 (0.742-1.62)
30-min	0.361 (0.300-0.438)	0.479 (0.398-0.582)	0.632 (0.524-0.771)	0.757 (0.622-0.930)	0.925 (0.734-1.18)	1.05 (0.819-1.37)	1.19 (0.898-1.58)	1.32 (0.972-1.81)	1.50 (1.06-2.15)	1.65 (1.12-2.44)
60-min	0.550 (0.458-0.668)	0.730 (0.606-0.887)	0.963 (0.798-1.17)	1.15 (0.947-1.42)	1.41 (1.12-1.79)	1.61 (1.25-2.09)	1.80 (1.37-2.40)	2.01 (1.48-2.76)	2.29 (1.62-3.28)	2.51 (1.71-3.72)
2-hr	0.832 (0.692-1.01)	1.09 (0.905-1.32)	1.42 (1.18-1.73)	1.69 (1.39-2.08)	2.05 (1.63-2.61)	2.32 (1.81-3.02)	2.60 (1.97-3.47)	2.88 (2.12-3.96)	3.27 (2.30-4.68)	3.56 (2.42-5.28)
3-hr	1.06 (0.885-1.29)	1.39 (1.15-1.68)	1.80 (1.49-2.19)	2.13 (1.75-2.62)	2.58 (2.05-3.28)	2.92 (2.27-3.79)	3.26 (2.47-4.34)	3.61 (2.65-4.95)	4.07 (2.87-5.83)	4.43 (3.02-6.57)
6-hr	1.58 (1.31-1.91)	2.05 (1.70-2.49)	2.65 (2.19-3.23)	3.13 (2.57-3.85)	3.77 (2.99-4.79)	4.25 (3.30-5.52)	4.73 (3.58-6.31)	5.22 (3.84-7.16)	5.87 (4.14-8.40)	6.36 (4.33-9.44)
12-hr	2.16 (1.79-2.62)	2.81 (2.34-3.42)	3.64 (3.02-4.44)	4.30 (3.54-5.29)	5.17 (4.11-6.58)	5.82 (4.52-7.57)	6.46 (4.90-8.62)	7.11 (5.24-9.76)	7.96 (5.62-11.4)	8.61 (5.86-12.8)
24-hr	2.94 (2.60-3.38)	3.87 (3.42-4.47)	5.05 (4.46-5.85)	5.99 (5.24-6.98)	7.21 (6.11-8.69)	8.13 (6.74-9.99)	9.02 (7.31-11.4)	9.93 (7.82-12.9)	11.1 (8.40-15.0)	12.0 (8.77-16.7)
2-day	3.60 (3.19-4.15)	4.85 (4.29-5.59)	6.45 (5.69-7.46)	7.74 (6.77-9.02)	9.47 (8.02-11.4)	10.8 (8.94-13.3)	12.1 (9.80-15.2)	13.4 (10.6-17.4)	15.3 (11.5-20.6)	16.6 (12.2-23.2)
3-day	3.86 (3.42-4.45)	5.28 (4.67-6.09)	7.16 (6.32-8.28)	8.71 (7.62-10.2)	10.8 (9.18-13.1)	12.5 (10.4-15.4)	14.2 (11.5-17.9)	16.0 (12.6-20.7)	18.4 (13.9-24.8)	20.4 (14.9-28.4)
4-day	4.12 (3.65-4.75)	5.70 (5.04-6.58)	7.82 (6.89-9.04)	9.58 (8.38-11.2)	12.0 (10.2-14.5)	14.0 (11.6-17.2)	16.0 (12.9-20.1)	18.1 (14.3-23.4)	21.1 (15.9-28.4)	23.4 (17.1-32.7)
7-day	4.72 (4.18-5.43)	6.60 (5.83-7.61)	9.13 (8.05-10.6)	11.2 (9.84-13.1)	14.2 (12.0-17.1)	16.6 (13.7-20.4)	19.0 (15.4-23.9)	21.6 (17.0-28.0)	25.2 (19.1-34.0)	28.2 (20.6-39.3)
10-day	5.09 (4.51-5.86)	7.16 (6.34-8.27)	9.97 (8.80-11.5)	12.3 (10.8-14.4)	15.6 (13.2-18.8)	18.3 (15.2-22.5)	21.0 (17.0-26.5)	24.0 (18.9-31.0)	28.1 (21.2-37.9)	31.4 (22.9-43.8)
20-day	6.09 (5.39-7.01)	8.65 (7.65-9.98)	12.2 (10.7-14.1)	15.2 (13.3-17.7)	19.4 (16.4-23.4)	22.8 (18.9-28.0)	26.4 (21.4-33.3)	30.3 (23.8-39.2)	35.7 (27.0-48.2)	40.2 (29.4-56.1)
30-day	7.10 (6.29-8.19)	10.1 (8.94-11.7)	14.3 (12.6-16.5)	17.8 (15.6-20.8)	22.9 (19.4-27.6)	27.0 (22.4-33.3)	31.4 (25.5-39.6)	36.2 (28.5-46.8)	42.9 (32.5-57.9)	48.5 (35.4-67.6)
45-day	8.49 (7.52-9.79)	12.0 (10.6-13.9)	16.9 (14.9-19.6)	21.2 (18.5-24.7)	27.3 (23.1-32.9)	32.3 (26.8-39.7)	37.7 (30.5-47.4)	43.5 (34.3-56.3)	51.8 (39.2-69.9)	58.7 (43.0-82.0)
60-day	9.88 (8.74-11.4)	13.9 (12.3-16.0)	19.4 (17.1-22.5)	24.3 (21.2-28.3)	31.3 (26.5-37.7)	37.0 (30.7-45.6)	43.2 (35.0-54.5)	50.0 (39.4-64.7)	59.8 (45.2-80.6)	67.9 (49.6-94.7)

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.

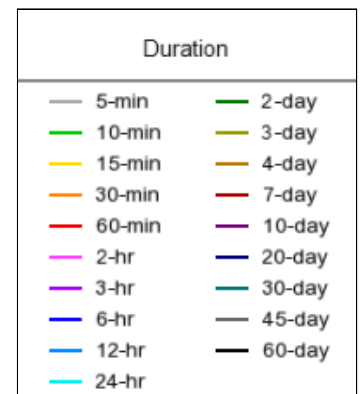
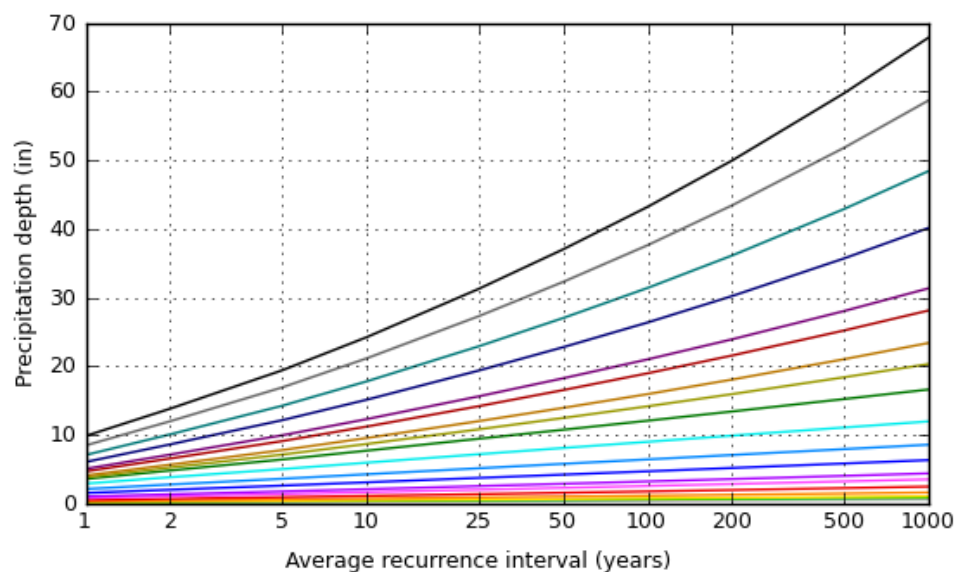
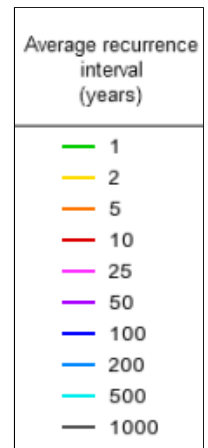
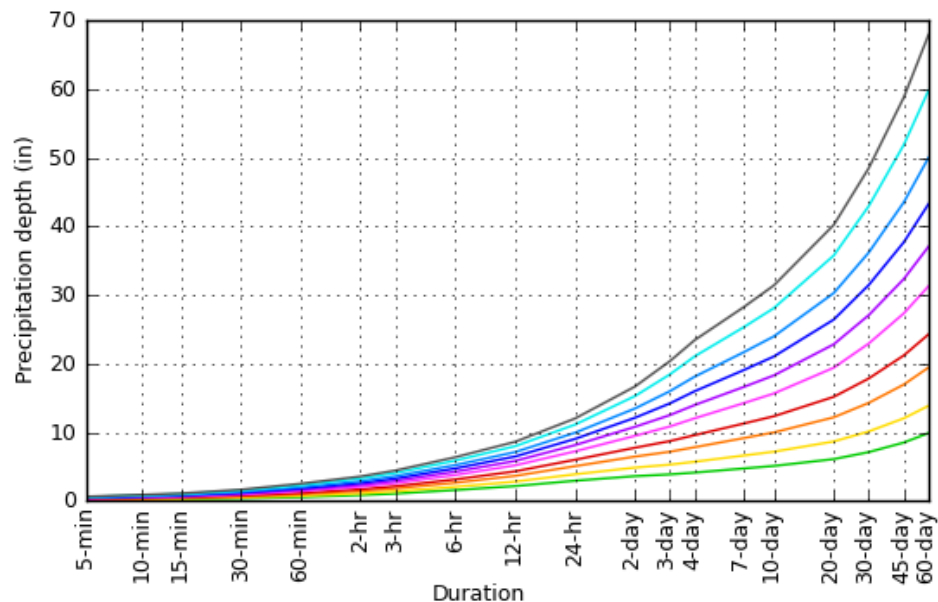
Please refer to NOAA Atlas 14 document for more information.

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PF graphical

PDS-based depth-duration-frequency (DDF) curves

Latitude: 34.1518°, Longitude: -117.4097°



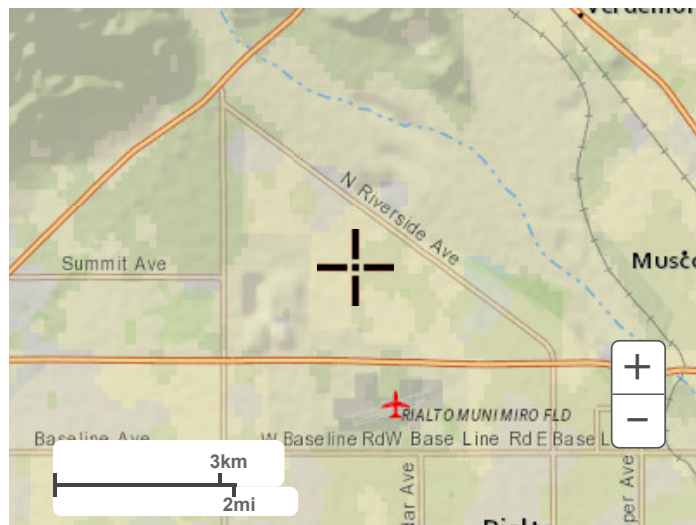
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Maps & aerals

Small scale terrain



Large scale terrain



Large scale map



Large scale aerial

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Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

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APPENDICES

APPENDIX A: EXISTING RATIONAL METHOD, 2, 25 & 100 YEAR STORM FREQUENCY OUTPUT FILES.

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
(c) Copyright 1983-2008 Advanced Engineering Software (aes)
Ver. 15.0 Release Date: 04/01/2008 License ID 1420

Analysis prepared by:

CA Engineering
13821 Newport Ave., Ste 110
Tustin, Ca. 92780

***** DESCRIPTION OF STUDY *****

* EXISTING CONDITION *
* 2 YR STORM *
* *

FILE NAME: 251-55EX.DAT
TIME/DATE OF STUDY: 12:18 12/16/2021

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 2.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 8.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL
10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 1.150
100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 1.800
COMPUTED RAINFALL INTENSITY DATA:
STORM EVENT = 2.00 1-HOUR INTENSITY(INCH/HOUR) = 0.6957
SLOPE OF INTENSITY DURATION CURVE = 0.6000

ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT- / PARK- SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0313 0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 1.00 TO NODE 2.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

```

=====
INITIAL SUBAREA FLOW-LENGTH( FEET ) = 485.00
ELEVATION DATA: UPSTREAM( FEET ) = 1624.40 DOWNSTREAM( FEET ) = 1608.80

Tc = K*[ (LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 16.658
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.501
SUBAREA Tc AND LOSS RATE DATA(AMC I ):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
NATURAL FAIR COVER
"CHAPARRAL,NARROWLEAF" A 2.64 0.95 1.000 35 16.66
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.95
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 1.31
TOTAL AREA(ACRES) = 2.64 PEAK FLOW RATE(CFS) = 1.31

*****
FLOW PROCESS FROM NODE 3.00 TO NODE 4.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH( FEET ) = 359.00
ELEVATION DATA: UPSTREAM( FEET ) = 1617.00 DOWNSTREAM( FEET ) = 1607.50

Tc = K*[ (LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 15.357
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.576
SUBAREA Tc AND LOSS RATE DATA(AMC I ):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS Tc
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
NATURAL FAIR COVER
"CHAPARRAL,NARROWLEAF" A 2.07 0.95 1.000 35 15.36
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.95
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 1.17
TOTAL AREA(ACRES) = 2.07 PEAK FLOW RATE(CFS) = 1.17

=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 2.1 TC(MIN.) = 15.36
EFFECTIVE AREA(ACRES) = 2.07 AREA-AVERAGED Fm(INCH/HR)= 0.95
AREA-AVERAGED Fp(INCH/HR) = 0.95 AREA-AVERAGED Ap = 1.000
PEAK FLOW RATE(CFS) = 1.17
=====
=====
END OF RATIONAL METHOD ANALYSIS

```

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*****
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Ver. 15.0 Release Date: 04/01/2008 License ID 1420

```

Analysis prepared by:

CA Engineering
13821 Newport Ave., Ste 110
Tustin, Ca. 92780

```

***** DESCRIPTION OF STUDY *****
* EXISTING CONDITION *
* 25 YR STORM *
* *
*****

```

FILE NAME: 251-55EX.DAT
TIME/DATE OF STUDY: 12:17 12/16/2021

```

=====
USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=====
--*TIME-OF-CONCENTRATION MODEL*--

```

USER SPECIFIED STORM EVENT(YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 8.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL
10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 1.150
100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 1.800
COMPUTED RAINFALL INTENSITY DATA:
STORM EVENT = 25.00 1-HOUR INTENSITY(INCH/HOUR) = 1.3811
SLOPE OF INTENSITY DURATION CURVE = 0.6000

ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF-WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL IN- / OUT- / SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER WIDTH (FT)	GEOMETRIES LIP (FT)	MANNING HIKE (FT)	FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0313	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

```

*****
FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 485.00
ELEVATION DATA: UPSTREAM(FEET) = 1624.40 DOWNSTREAM(FEET) = 1608.80

```



```

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 16.658
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.980
SUBAREA Tc AND LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS      Tc
    LAND USE              GROUP   (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
NATURAL FAIR COVER
"CHAPARRAL,NARROWLEAF"    A        2.64      0.76      1.000      55      16.66
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.76
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 5.27
TOTAL AREA(ACRES) = 2.64 PEAK FLOW RATE(CFS) = 5.27

*****
FLOW PROCESS FROM NODE 3.00 TO NODE 4.00 IS CODE = 21
-----
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 359.00
ELEVATION DATA: UPSTREAM(FEET) = 1617.00 DOWNSTREAM(FEET) = 1607.50

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 15.357
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.128
SUBAREA Tc AND LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS      Tc
    LAND USE              GROUP   (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
NATURAL FAIR COVER
"CHAPARRAL,NARROWLEAF"    A        2.07      0.76      1.000      55      15.36
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.76
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 4.41
TOTAL AREA(ACRES) = 2.07 PEAK FLOW RATE(CFS) = 4.41
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 2.1 TC(MIN.) = 15.36
EFFECTIVE AREA(ACRES) = 2.07 AREA-AVERAGED Fm(INCH/HR)= 0.76
AREA-AVERAGED Fp(INCH/HR) = 0.76 AREA-AVERAGED Ap = 1.000
PEAK FLOW RATE(CFS) = 4.41
=====
END OF RATIONAL METHOD ANALYSIS

```

```

*****
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Ver. 15.0 Release Date: 04/01/2008 License ID 1420

```

Analysis prepared by:

CA Engineering
13821 Newport Ave., Ste 110
Tustin, Ca. 92780

```

***** DESCRIPTION OF STUDY *****
* EXISTING CONDITION *
* 100 YR STORM *
*
*****

```

FILE NAME: 251-55EX.DAT
TIME/DATE OF STUDY: 12:17 12/16/2021

```

=====
USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=====
--*TIME-OF-CONCENTRATION MODEL*--

```

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 8.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL
10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 1.150
100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 1.800
COMPUTED RAINFALL INTENSITY DATA:
STORM EVENT = 100.00 1-HOUR INTENSITY(INCH/HOUR) = 1.8000
SLOPE OF INTENSITY DURATION CURVE = 0.6000

ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF-WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL IN- / OUT- / SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER WIDTH (FT)	GEOMETRIES LIP (FT)	MANNING HIKE (FT)	FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0313	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

```

*****
FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 485.00
ELEVATION DATA: UPSTREAM(FEET) = 1624.40 DOWNSTREAM(FEET) = 1608.80

```

```

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 16.658
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.883
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.)
NATURAL FAIR COVER
"CHAPARRAL,NARROWLEAF"    A        2.64      0.44      1.000      75      16.66
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.44
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 8.19
TOTAL AREA(ACRES) = 2.64 PEAK FLOW RATE(CFS) = 8.19

*****
FLOW PROCESS FROM NODE 3.00 TO NODE 4.00 IS CODE = 21
-----
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 359.00
ELEVATION DATA: UPSTREAM(FEET) = 1617.00 DOWNSTREAM(FEET) = 1607.50

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 15.357
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.077
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.)
NATURAL FAIR COVER
"CHAPARRAL,NARROWLEAF"    A        2.07      0.44      1.000      75      15.36
SUBAREA AVERAGE PVIOUS LOSS RATE, Fp(INCH/HR) = 0.44
SUBAREA AVERAGE PVIOUS AREA FRACTION, Ap = 1.000
SUBAREA RUNOFF(CFS) = 6.79
TOTAL AREA(ACRES) = 2.07 PEAK FLOW RATE(CFS) = 6.79
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 2.1 TC(MIN.) = 15.36
EFFECTIVE AREA(ACRES) = 2.07 AREA-AVERAGED Fm(INCH/HR)= 0.44
AREA-AVERAGED Fp(INCH/HR) = 0.44 AREA-AVERAGED Ap = 1.000
PEAK FLOW RATE(CFS) = 6.79
=====
END OF RATIONAL METHOD ANALYSIS

```

APPENDIX B: PROPOSED RATIONAL METHOD, 2, 25 & 100 YEAR STORM FREQUENCY OUTPUT FILES.

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*****
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Ver. 15.0 Release Date: 04/01/2008 License ID 1420
```

Analysis prepared by:

CA Engineering
13821 Newport Ave., Ste 110
Tustin, Ca. 92780

```
***** DESCRIPTION OF STUDY *****
* PROPOSED CONDITION *
* 2 YR STORM *
* *
*****
```

FILE NAME: 251-55PR.DAT
TIME/DATE OF STUDY: 14:51 12/16/2021

```
=====
USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=====
--*TIME-OF-CONCENTRATION MODEL*--
```

USER SPECIFIED STORM EVENT(YEAR) = 2.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 8.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL
10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 1.150
100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 1.800
COMPUTED RAINFALL INTENSITY DATA:
STORM EVENT = 2.00 1-HOUR INTENSITY(INCH/HOUR) = 0.6957
SLOPE OF INTENSITY DURATION CURVE = 0.6000

ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH (FT)	LIP (FT)	HIKE (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0313	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

```
*****
```

```

FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
-----
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) =   927.00
ELEVATION DATA: UPSTREAM(FEET) =   1623.80  DOWNSTREAM(FEET) =   1611.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.007
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =   1.924
SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS      Tc
    LAND USE            GROUP  (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL              A      2.19    1.33    0.100    17    11.01
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   1.33
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   0.100
SUBAREA RUNOFF(CFS) =       3.53
TOTAL AREA(ACRES) =       2.19  PEAK FLOW RATE(CFS) =       3.53

*****
FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  31
-----
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) =   1606.00  DOWNSTREAM(FEET) =   1604.50
FLOW LENGTH(FEET) =   190.00  MANNING'S N =   0.013
DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   4.62
ESTIMATED PIPE DIAMETER(INCH) =   15.00  NUMBER OF PIPES =    1
PIPE-FLOW(CFS) =       3.53
PIPE TRAVEL TIME(MIN.) =   0.69  Tc(MIN.) =   11.69
LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =   1117.00 FEET.

*****
FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =    1
-----
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
=====
TOTAL NUMBER OF STREAMS =    3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MIN.) =   11.69
RAINFALL INTENSITY(INCH/HR) =   1.86
AREA-AVERAGED Fm(INCH/HR) =   0.13
AREA-AVERAGED Fp(INCH/HR) =   1.33
AREA-AVERAGED Ap =   0.10
EFFECTIVE STREAM AREA(ACRES) =       2.19
TOTAL STREAM AREA(ACRES) =       2.19
PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.53

*****
FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  21
-----
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) =   126.00
ELEVATION DATA: UPSTREAM(FEET) =   1618.50  DOWNSTREAM(FEET) =   1616.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =   3.090

```

```

SUBAREA Tc AND LOSS RATE DATA(AMC I ):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap      SCS  Tc
    LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL              A        0.67    1.33    0.100    17    5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 1.33
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) =      1.78
TOTAL AREA(ACRES) =      0.67    PEAK FLOW RATE(CFS) =      1.78

*****
FLOW PROCESS FROM NODE      5.00 TO NODE      3.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1611.00 DOWNSTREAM(FEET) = 1604.50
FLOW LENGTH(FEET) = 414.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 9.0 INCH PIPE IS 6.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.91
ESTIMATED PIPE DIAMETER(INCH) = 9.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 1.78
PIPE TRAVEL TIME(MIN.) = 1.41 Tc(MIN.) = 6.41
LONGEST FLOWPATH FROM NODE      4.00 TO NODE      3.00 = 540.00 FEET.

*****
FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
=====
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 6.41
RAINFALL INTENSITY(INCH/HR) = 2.66
AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 1.33
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.67
TOTAL STREAM AREA(ACRES) = 0.67
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.78

*****
FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 474.00
ELEVATION DATA: UPSTREAM(FEET) = 1618.80 DOWNSTREAM(FEET) = 1606.80

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.456
* 2 YEAR RAINFALL INTENSITY(INCH/HR) = 2.431
SUBAREA Tc AND LOSS RATE DATA(AMC I ):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp        Ap      SCS  Tc
    LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL              A        1.85    1.33    0.100    17    7.46
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 1.33
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) =      3.83
TOTAL AREA(ACRES) =      1.85    PEAK FLOW RATE(CFS) =      3.83

*****
FLOW PROCESS FROM NODE      7.00 TO NODE      3.00 IS CODE = 31

```

```

-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1606.80 DOWNSTREAM(FEET) = 1604.50
FLOW LENGTH(FEET) = 41.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 5.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 9.87
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.83
PIPE TRAVEL TIME(MIN.) = 0.07 Tc(MIN.) = 7.53
LONGEST FLOWPATH FROM NODE 6.00 TO NODE 3.00 = 515.00 FEET.

*****
FLOW PROCESS FROM NODE 3.00 TO NODE 3.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<
=====
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:
TIME OF CONCENTRATION(MIN.) = 7.53
RAINFALL INTENSITY(INCH/HR) = 2.42
AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 1.33
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 1.85
TOTAL STREAM AREA(ACRES) = 1.85
PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.83

** CONFLUENCE DATA **

```

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	3.53	11.69	1.856	1.33(0.13)	0.10	2.2	1.00
2	1.78	6.41	2.663	1.33(0.13)	0.10	0.7	4.00
3	3.83	7.53	2.418	1.33(0.13)	0.10	1.9	6.00

```

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 3 STREAMS.

** PEAK FLOW RATE TABLE **

```

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	8.23	6.41	2.663	1.33(0.13)	0.10	3.4	4.00
2	8.45	7.53	2.418	1.33(0.13)	0.10	3.9	6.00
3	7.63	11.69	1.856	1.33(0.13)	0.10	4.7	1.00

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 8.45 Tc(MIN.) = 7.53
EFFECTIVE AREA(ACRES) = 3.93 AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 1.33 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 4.7
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 3.00 = 1117.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 4.7 TC(MIN.) = 7.53
EFFECTIVE AREA(ACRES) = 3.93 AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 1.33 AREA-AVERAGED Ap = 0.100
PEAK FLOW RATE(CFS) = 8.45

** PEAK FLOW RATE TABLE **

```

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
------------------	------------	--------------	------------------------	---------------------	----	---------------	-------------------

1	8.23	6.41	2.663	1.33(0.13)	0.10	3.4	4.00
2	8.45	7.53	2.418	1.33(0.13)	0.10	3.9	6.00
3	7.63	11.69	1.856	1.33(0.13)	0.10	4.7	1.00

=====

=====

END OF RATIONAL METHOD ANALYSIS


```

*****
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Ver. 15.0 Release Date: 04/01/2008 License ID 1420

```

Analysis prepared by:

CA Engineering
13821 Newport Ave., Ste 110
Tustin, Ca. 92780

```

***** DESCRIPTION OF STUDY *****
* PROPOSED CONDITION *
* 25 YR STORM *
* *
*****

```

FILE NAME: 251-55PR.DAT
TIME/DATE OF STUDY: 14:51 12/16/2021

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=====
USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=====
--*TIME-OF-CONCENTRATION MODEL*--

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USER SPECIFIED STORM EVENT(YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 8.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL
10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 1.150
100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 1.800
COMPUTED RAINFALL INTENSITY DATA:
STORM EVENT = 25.00 1-HOUR INTENSITY(INCH/HOUR) = 1.3811
SLOPE OF INTENSITY DURATION CURVE = 0.6000

ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF-WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL IN- / OUT- / SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER WIDTH (FT)	GEOMETRIES LIP (FT)	MANNING HIKE (FT)	FACTOR (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

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*****
FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 927.00
ELEVATION DATA: UPSTREAM(FEET) = 1623.80 DOWNSTREAM(FEET) = 1611.00

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Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.007
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.820
SUBAREA Tc AND LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS      Tc
    LAND USE          GROUP  (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL              A      2.19    0.98    0.100    32    11.01
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 7.34
TOTAL AREA(ACRES) = 2.19 PEAK FLOW RATE(CFS) = 7.34

*****
FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(Feet) = 1606.00 DOWNSTREAM(Feet) = 1604.50
FLOW LENGTH(Feet) = 190.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 18.0 INCH PIPE IS 12.8 INCHES
PIPE-FLOW VELOCITY(Feet/Sec.) = 5.47
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 7.34
PIPE TRAVEL TIME(MIN.) = 0.58 Tc(MIN.) = 11.59
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 3.00 = 1117.00 FEET.

*****
FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
=====
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 11.59
RAINFALL INTENSITY(INCH/HR) = 3.70
AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 2.19
TOTAL STREAM AREA(ACRES) = 2.19
PEAK FLOW RATE(CFS) AT CONFLUENCE = 7.34

*****
FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(Feet) = 126.00
ELEVATION DATA: UPSTREAM(Feet) = 1618.50 DOWNSTREAM(Feet) = 1616.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 6.134
SUBAREA Tc AND LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS      Tc
    LAND USE          GROUP  (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL              A      0.67    0.98    0.100    32     5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 3.64
TOTAL AREA(ACRES) = 0.67 PEAK FLOW RATE(CFS) = 3.64

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*****
FLOW PROCESS FROM NODE      5.00 TO NODE      3.00 IS CODE = 31
-----
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1611.00 DOWNSTREAM(FEET) = 1604.50
FLOW LENGTH(FEET) = 414.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 12.0 INCH PIPE IS 8.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.91
ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.64
PIPE TRAVEL TIME(MIN.) = 1.17 Tc(MIN.) = 6.17
LONGEST FLOWPATH FROM NODE 4.00 TO NODE 3.00 = 540.00 FEET.

*****
FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE = 1
-----
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
=====
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 6.17
RAINFALL INTENSITY(INCH/HR) = 5.41
AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.67
TOTAL STREAM AREA(ACRES) = 0.67
PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.64

*****
FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE = 21
-----
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 474.00
ELEVATION DATA: UPSTREAM(FEET) = 1618.80 DOWNSTREAM(FEET) = 1606.80

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.456
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 4.826
SUBAREA Tc AND LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS      Tc
    LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL            A        1.85    0.98    0.100    32    7.46
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 7.87
TOTAL AREA(ACRES) = 1.85 PEAK FLOW RATE(CFS) = 7.87

*****
FLOW PROCESS FROM NODE      7.00 TO NODE      3.00 IS CODE = 31
-----
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1606.80 DOWNSTREAM(FEET) = 1604.50
FLOW LENGTH(FEET) = 41.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 15.0 INCH PIPE IS 8.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 11.81

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ESTIMATED PIPE DIAMETER(INCH) = 15.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 7.87
PIPE TRAVEL TIME(MIN.) = 0.06    Tc(MIN.) = 7.51
LONGEST FLOWPATH FROM NODE 6.00 TO NODE 3.00 = 515.00 FEET.

*****
FLOW PROCESS FROM NODE 3.00 TO NODE 3.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<
=====
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:
TIME OF CONCENTRATION(MIN.) = 7.51
RAINFALL INTENSITY(INCH/HR) = 4.80
AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 1.85
TOTAL STREAM AREA(ACRES) = 1.85
PEAK FLOW RATE(CFS) AT CONFLUENCE = 7.87

** CONFLUENCE DATA **

```

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	7.34	11.59	3.705	0.98(0.10)	0.10	2.2	1.00
2	3.64	6.17	5.409	0.98(0.10)	0.10	0.7	4.00
3	7.87	7.51	4.804	0.98(0.10)	0.10	1.9	6.00

```

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 3 STREAMS.

** PEAK FLOW RATE TABLE **

```

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	16.68	6.17	5.409	0.98(0.10)	0.10	3.4	4.00
2	17.31	7.51	4.804	0.98(0.10)	0.10	3.9	6.00
3	15.84	11.59	3.705	0.98(0.10)	0.10	4.7	1.00

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 17.31    Tc(MIN.) = 7.51
EFFECTIVE AREA(ACRES) = 3.94    AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.98    AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 4.7
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 3.00 = 1117.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 4.7    TC(MIN.) = 7.51
EFFECTIVE AREA(ACRES) = 3.94    AREA-AVERAGED Fm(INCH/HR)= 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.98    AREA-AVERAGED Ap = 0.100
PEAK FLOW RATE(CFS) = 17.31

** PEAK FLOW RATE TABLE **

```

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	16.68	6.17	5.409	0.98(0.10)	0.10	3.4	4.00
2	17.31	7.51	4.804	0.98(0.10)	0.10	3.9	6.00
3	15.84	11.59	3.705	0.98(0.10)	0.10	4.7	1.00

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=====
END OF RATIONAL METHOD ANALYSIS

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*****
RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
(c) Copyright 1983-2008 Advanced Engineering Software (aes)
Ver. 15.0 Release Date: 04/01/2008 License ID 1420

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Analysis prepared by:

CA Engineering
13821 Newport Ave., Ste 110
Tustin, Ca. 92780

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***** DESCRIPTION OF STUDY *****
* PROPOSED CONDITION *
* 100 YR STORM *
* *
*****

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FILE NAME: 251-55PR.DAT
TIME/DATE OF STUDY: 14:52 12/16/2021

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=====
USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=====
--*TIME-OF-CONCENTRATION MODEL*--

```

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 8.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL
10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 1.150
100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 1.800
COMPUTED RAINFALL INTENSITY DATA:
STORM EVENT = 100.00 1-HOUR INTENSITY(INCH/HOUR) = 1.8000
SLOPE OF INTENSITY DURATION CURVE = 0.6000

ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF-WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL IN- / OUT- / SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER WIDTH (FT)	GEOMETRIES LIP (FT)	MANNING HIKE (FT)	FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0313	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

```

*****
FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 927.00
ELEVATION DATA: UPSTREAM(FEET) = 1623.80 DOWNSTREAM(FEET) = 1611.00

```

```

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.007
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.979
SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS      Tc
    LAND USE          GROUP  (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL            A      2.19    0.74    0.100    52    11.01
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 9.67
TOTAL AREA(ACRES) = 2.19 PEAK FLOW RATE(CFS) = 9.67

*****
FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE = 31
-----
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1606.00 DOWNSTREAM(FEET) = 1604.50
FLOW LENGTH(FEET) = 190.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 21.0 INCH PIPE IS 13.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.91
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 9.67
PIPE TRAVEL TIME(MIN.) = 0.54 Tc(MIN.) = 11.54
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 3.00 = 1117.00 FEET.

*****
FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE = 1
-----
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
=====
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 11.54
RAINFALL INTENSITY(INCH/HR) = 4.84
AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.74
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 2.19
TOTAL STREAM AREA(ACRES) = 2.19
PEAK FLOW RATE(CFS) AT CONFLUENCE = 9.67

*****
FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE = 21
-----
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 126.00
ELEVATION DATA: UPSTREAM(FEET) = 1618.50 DOWNSTREAM(FEET) = 1616.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 5.000
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 7.994
SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp      Ap      SCS      Tc
    LAND USE          GROUP  (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL            A      0.67    0.74    0.100    52    5.00
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 4.78
TOTAL AREA(ACRES) = 0.67 PEAK FLOW RATE(CFS) = 4.78

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*****
FLOW PROCESS FROM NODE      5.00 TO NODE      3.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1611.00 DOWNSTREAM(FEET) = 1604.50
FLOW LENGTH(FEET) = 414.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 15.0 INCH PIPE IS 8.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.45
ESTIMATED PIPE DIAMETER(INCH) = 15.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 4.78
PIPE TRAVEL TIME(MIN.) = 1.07 Tc(MIN.) = 6.07
LONGEST FLOWPATH FROM NODE 4.00 TO NODE 3.00 = 540.00 FEET.

*****
FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
=====
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 6.07
RAINFALL INTENSITY(INCH/HR) = 7.12
AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.74
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.67
TOTAL STREAM AREA(ACRES) = 0.67
PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.78

*****
FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE = 21
-----
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====
INITIAL SUBAREA FLOW-LENGTH(FEET) = 474.00
ELEVATION DATA: UPSTREAM(FEET) = 1618.80 DOWNSTREAM(FEET) = 1606.80

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.456
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.290
SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL      AREA      Fp      Ap      SCS      Tc
    LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
COMMERCIAL            A        1.85    0.74    0.100    52    7.46
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 10.35
TOTAL AREA(ACRES) = 1.85 PEAK FLOW RATE(CFS) = 10.35

*****
FLOW PROCESS FROM NODE      7.00 TO NODE      3.00 IS CODE = 31
-----
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1606.80 DOWNSTREAM(FEET) = 1604.50
FLOW LENGTH(FEET) = 41.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 15.0 INCH PIPE IS 9.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 12.55

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ESTIMATED PIPE DIAMETER(INCH) = 15.00    NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 10.35
PIPE TRAVEL TIME(MIN.) = 0.05    Tc(MIN.) = 7.51
LONGEST FLOWPATH FROM NODE 6.00 TO NODE 3.00 = 515.00 FEET.

*****
FLOW PROCESS FROM NODE 3.00 TO NODE 3.00 IS CODE = 1
-----
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<
=====
TOTAL NUMBER OF STREAMS = 3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 3 ARE:
TIME OF CONCENTRATION(MIN.) = 7.51
RAINFALL INTENSITY(INCH/HR) = 6.26
AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.74
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 1.85
TOTAL STREAM AREA(ACRES) = 1.85
PEAK FLOW RATE(CFS) AT CONFLUENCE = 10.35

** CONFLUENCE DATA **

```

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	9.67	11.54	4.839	0.74(0.07)	0.10	2.2	1.00
2	4.78	6.07	7.116	0.74(0.07)	0.10	0.7	4.00
3	10.35	7.51	6.263	0.74(0.07)	0.10	1.9	6.00

```

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 3 STREAMS.

** PEAK FLOW RATE TABLE **

```

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	21.81	6.07	7.116	0.74(0.07)	0.10	3.3	4.00
2	22.72	7.51	6.263	0.74(0.07)	0.10	3.9	6.00
3	20.87	11.54	4.839	0.74(0.07)	0.10	4.7	1.00

```

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 22.72    Tc(MIN.) = 7.51
EFFECTIVE AREA(ACRES) = 3.94    AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.74    AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 4.7
LONGEST FLOWPATH FROM NODE 1.00 TO NODE 3.00 = 1117.00 FEET.
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 4.7    TC(MIN.) = 7.51
EFFECTIVE AREA(ACRES) = 3.94    AREA-AVERAGED Fm(INCH/HR)= 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.74    AREA-AVERAGED Ap = 0.100
PEAK FLOW RATE(CFS) = 22.72

** PEAK FLOW RATE TABLE **

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STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	21.81	6.07	7.116	0.74(0.07)	0.10	3.3	4.00
2	22.72	7.51	6.263	0.74(0.07)	0.10	3.9	6.00
3	20.87	11.54	4.839	0.74(0.07)	0.10	4.7	1.00

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END OF RATIONAL METHOD ANALYSIS

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APPENDIX C: PROPOSED HYDROGRAPH METHOD & BASIN ROUTING, 100 YEAR STORM FREQUENCY OUTPUT FILE.

SMALL AREA UNIT HYDROGRAPH MODEL

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Analysis prepared by:

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Problem Descriptions:
100 YEAR STORM BASIN ROUTING

RATIONAL METHOD CALIBRATION COEFFICIENT = 1.10
TOTAL CATCHMENT AREA(ACRES) = 4.70
SOIL-LOSS RATE, Fm,(INCH/HR) = 0.070
LOW LOSS FRACTION = 0.080
TIME OF CONCENTRATION(MIN.) = 7.51
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) = 0.45
30-MINUTE POINT RAINFALL VALUE(INCHES) = 1.19
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.80
3-HOUR POINT RAINFALL VALUE(INCHES) = 3.26
6-HOUR POINT RAINFALL VALUE(INCHES) = 4.73
24-HOUR POINT RAINFALL VALUE(INCHES) = 9.02

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 3.58
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = -0.05

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	7.5	15.0	22.5	30.0
0.10	0.0036	0.83	.Q	.	.	.	.
0.23	0.0122	0.84	.Q	.	.	.	.
0.35	0.0209	0.84	.Q	.	.	.	.
0.48	0.0296	0.84	.Q	.	.	.	.
0.60	0.0383	0.85	.Q	.	.	.	.
0.73	0.0471	0.85	.Q	.	.	.	.
0.85	0.0559	0.85	.Q	.	.	.	.
0.98	0.0648	0.86	.Q	.	.	.	.
1.11	0.0736	0.86	.Q	.	.	.	.
1.23	0.0826	0.86	.Q	.	.	.	.

1.36	0.0916	0.87	.Q	.	.	.	.
1.48	0.1006	0.87	.Q	.	.	.	.
1.61	0.1096	0.88	.Q	.	.	.	.
1.73	0.1187	0.88	.Q	.	.	.	.
1.86	0.1279	0.89	.Q	.	.	.	.
1.98	0.1370	0.89	.Q	.	.	.	.
2.11	0.1463	0.89	.Q	.	.	.	.
2.23	0.1555	0.90	.Q	.	.	.	.
2.36	0.1649	0.90	.Q	.	.	.	.
2.48	0.1742	0.91	.Q	.	.	.	.
2.61	0.1836	0.91	.Q	.	.	.	.
2.73	0.1931	0.92	.Q	.	.	.	.
2.86	0.2026	0.92	.Q	.	.	.	.
2.98	0.2121	0.92	.Q	.	.	.	.
3.11	0.2217	0.93	.Q	.	.	.	.
3.23	0.2314	0.93	.Q	.	.	.	.
3.36	0.2411	0.94	.Q	.	.	.	.
3.48	0.2508	0.94	.Q	.	.	.	.
3.61	0.2606	0.95	.Q	.	.	.	.
3.73	0.2705	0.95	.Q	.	.	.	.
3.86	0.2804	0.96	.Q	.	.	.	.
3.98	0.2903	0.96	.Q	.	.	.	.
4.11	0.3004	0.97	.Q	.	.	.	.
4.23	0.3104	0.98	.Q	.	.	.	.
4.36	0.3206	0.98	.Q	.	.	.	.
4.48	0.3307	0.99	.Q	.	.	.	.
4.61	0.3410	0.99	.Q	.	.	.	.
4.73	0.3513	1.00	.Q	.	.	.	.
4.86	0.3617	1.01	.Q	.	.	.	.
4.99	0.3721	1.01	.Q	.	.	.	.
5.11	0.3826	1.02	.Q	.	.	.	.
5.24	0.3931	1.02	.Q	.	.	.	.
5.36	0.4038	1.03	.Q	.	.	.	.
5.49	0.4144	1.04	.Q	.	.	.	.
5.61	0.4252	1.04	.Q	.	.	.	.
5.74	0.4360	1.05	.Q	.	.	.	.
5.86	0.4469	1.06	.Q	.	.	.	.
5.99	0.4579	1.06	.Q	.	.	.	.
6.11	0.4689	1.07	.Q	.	.	.	.
6.24	0.4800	1.08	.Q	.	.	.	.
6.36	0.4912	1.09	.Q	.	.	.	.
6.49	0.5025	1.09	.Q	.	.	.	.
6.61	0.5138	1.10	.Q	.	.	.	.
6.74	0.5252	1.11	.Q	.	.	.	.
6.86	0.5367	1.12	.Q	.	.	.	.
6.99	0.5483	1.12	.Q	.	.	.	.
7.11	0.5600	1.13	.Q	.	.	.	.
7.24	0.5718	1.14	.Q	.	.	.	.
7.36	0.5836	1.15	.Q	.	.	.	.
7.49	0.5955	1.16	.Q	.	.	.	.
7.61	0.6076	1.17	.Q	.	.	.	.
7.74	0.6197	1.18	.Q	.	.	.	.
7.86	0.6319	1.19	.Q	.	.	.	.
7.99	0.6443	1.19	.Q	.	.	.	.
8.11	0.6567	1.21	.Q	.	.	.	.
8.24	0.6692	1.21	.Q	.	.	.	.
8.36	0.6819	1.23	.Q	.	.	.	.
8.49	0.6946	1.24	.Q	.	.	.	.
8.62	0.7075	1.25	.Q	.	.	.	.
8.74	0.7204	1.26	.Q	.	.	.	.
8.87	0.7335	1.27	.Q	.	.	.	.
8.99	0.7468	1.28	.Q	.	.	.	.
9.12	0.7601	1.30	.Q	.	.	.	.

9.24	0.7736	1.31	.Q	.	.	.	.
9.37	0.7872	1.32	.Q	.	.	.	.
9.49	0.8009	1.33	.Q	.	.	.	.
9.62	0.8148	1.35	.Q	.	.	.	.
9.74	0.8288	1.36	.Q	.	.	.	.
9.87	0.8430	1.38	.Q	.	.	.	.
9.99	0.8573	1.39	.Q	.	.	.	.
10.12	0.8718	1.41	.Q	.	.	.	.
10.24	0.8864	1.42	.Q	.	.	.	.
10.37	0.9012	1.44	.Q	.	.	.	.
10.49	0.9162	1.45	.Q	.	.	.	.
10.62	0.9314	1.48	.Q	.	.	.	.
10.74	0.9467	1.49	.Q	.	.	.	.
10.87	0.9623	1.52	. Q	.	.	.	.
10.99	0.9780	1.53	. Q	.	.	.	.
11.12	0.9940	1.56	. Q	.	.	.	.
11.24	1.0101	1.57	. Q	.	.	.	.
11.37	1.0265	1.60	. Q	.	.	.	.
11.49	1.0431	1.61	. Q	.	.	.	.
11.62	1.0600	1.65	. Q	.	.	.	.
11.74	1.0771	1.66	. Q	.	.	.	.
11.87	1.0945	1.70	. Q	.	.	.	.
11.99	1.1122	1.72	. Q	.	.	.	.
12.12	1.1314	2.00	. Q	.	.	.	.
12.24	1.1524	2.04	. Q	.	.	.	.
12.37	1.1737	2.08	. Q	.	.	.	.
12.50	1.1954	2.11	. Q	.	.	.	.
12.62	1.2174	2.15	. Q	.	.	.	.
12.75	1.2398	2.18	. Q	.	.	.	.
12.87	1.2626	2.23	. Q	.	.	.	.
13.00	1.2858	2.26	. Q	.	.	.	.
13.12	1.3094	2.31	. Q	.	.	.	.
13.25	1.3335	2.34	. Q	.	.	.	.
13.37	1.3581	2.41	. Q	.	.	.	.
13.50	1.3832	2.45	. Q	.	.	.	.
13.62	1.4089	2.52	. Q	.	.	.	.
13.75	1.4352	2.56	. Q	.	.	.	.
13.87	1.4621	2.65	. Q	.	.	.	.
14.00	1.4898	2.70	. Q	.	.	.	.
14.12	1.5183	2.82	. Q	.	.	.	.
14.25	1.5478	2.88	. Q	.	.	.	.
14.37	1.5782	3.00	. Q	.	.	.	.
14.50	1.6096	3.07	. Q	.	.	.	.
14.62	1.6422	3.23	. Q	.	.	.	.
14.75	1.6761	3.32	. Q	.	.	.	.
14.87	1.7114	3.52	. Q	.	.	.	.
15.00	1.7484	3.64	. Q	.	.	.	.
15.12	1.7875	3.92	. Q	.	.	.	.
15.25	1.8289	4.08	. Q	.	.	.	.
15.37	1.8734	4.53	. Q	.	.	.	.
15.50	1.9245	5.33	. Q	.	.	.	.
15.62	1.9836	6.10	. Q	.	.	.	.
15.75	2.0496	6.65	. Q	.	.	.	.
15.87	2.1248	7.91	. Q	.	.	.	.
16.00	2.2185	10.19	. Q	.	.	.	.
16.13	2.3898	22.94	. Q	.	.	.	.
16.25	2.5431	6.71	. Q	.	.	.	.
16.38	2.6072	5.68	. Q	.	.	.	.
16.50	2.6587	4.29	. Q	.	.	.	.
16.63	2.7004	3.77	. Q	.	.	.	.
16.75	2.7376	3.41	. Q	.	.	.	.
16.88	2.7715	3.15	. Q	.	.	.	.
17.00	2.8030	2.94	. Q	.	.	.	.

17.13	2.8324	2.75	. Q	.	.	.	.
17.25	2.8600	2.60	. Q	.	.	.	.
17.38	2.8864	2.48	. Q	.	.	.	.
17.50	2.9115	2.38	. Q	.	.	.	.
17.63	2.9356	2.28	. Q	.	.	.	.
17.75	2.9588	2.20	. Q	.	.	.	.
17.88	2.9812	2.13	. Q	.	.	.	.
18.00	3.0029	2.06	. Q	.	.	.	.
18.13	3.0225	1.74	. Q	.	.	.	.
18.25	3.0402	1.68	. Q	.	.	.	.
18.38	3.0573	1.63	. Q	.	.	.	.
18.50	3.0739	1.58	. Q	.	.	.	.
18.63	3.0901	1.54	. Q	.	.	.	.
18.75	3.1059	1.50	. Q	.	.	.	.
18.88	3.1212	1.47	.Q	.	.	.	.
19.00	3.1362	1.43	.Q	.	.	.	.
19.13	3.1508	1.40	.Q	.	.	.	.
19.25	3.1652	1.37	.Q	.	.	.	.
19.38	3.1792	1.34	.Q	.	.	.	.
19.50	3.1929	1.31	.Q	.	.	.	.
19.63	3.2064	1.29	.Q	.	.	.	.
19.76	3.2196	1.27	.Q	.	.	.	.
19.88	3.2326	1.24	.Q	.	.	.	.
20.01	3.2453	1.22	.Q	.	.	.	.
20.13	3.2579	1.20	.Q	.	.	.	.
20.26	3.2702	1.18	.Q	.	.	.	.
20.38	3.2823	1.16	.Q	.	.	.	.
20.51	3.2943	1.15	.Q	.	.	.	.
20.63	3.3060	1.13	.Q	.	.	.	.
20.76	3.3176	1.11	.Q	.	.	.	.
20.88	3.3290	1.10	.Q	.	.	.	.
21.01	3.3403	1.08	.Q	.	.	.	.
21.13	3.3514	1.07	.Q	.	.	.	.
21.26	3.3624	1.05	.Q	.	.	.	.
21.38	3.3732	1.04	.Q	.	.	.	.
21.51	3.3839	1.03	.Q	.	.	.	.
21.63	3.3944	1.01	.Q	.	.	.	.
21.76	3.4049	1.00	.Q	.	.	.	.
21.88	3.4152	0.99	.Q	.	.	.	.
22.01	3.4254	0.98	.Q	.	.	.	.
22.13	3.4354	0.97	.Q	.	.	.	.
22.26	3.4454	0.96	.Q	.	.	.	.
22.38	3.4553	0.95	.Q	.	.	.	.
22.51	3.4650	0.94	.Q	.	.	.	.
22.63	3.4747	0.93	.Q	.	.	.	.
22.76	3.4842	0.92	.Q	.	.	.	.
22.88	3.4937	0.91	.Q	.	.	.	.
23.01	3.5030	0.90	.Q	.	.	.	.
23.13	3.5123	0.89	.Q	.	.	.	.
23.26	3.5215	0.88	.Q	.	.	.	.
23.38	3.5306	0.88	.Q	.	.	.	.
23.51	3.5396	0.87	.Q	.	.	.	.
23.64	3.5485	0.86	.Q	.	.	.	.
23.76	3.5574	0.85	.Q
23.89	3.5661	0.84	.Q
24.01	3.5748	0.84	.Q
24.14	3.5792	0.00	Q

Problem Descriptions:

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FLOW-THROUGH DETENTION BASIN MODEL

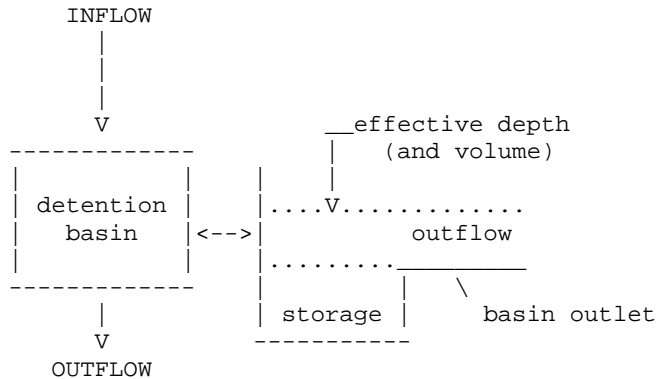
SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:

CONSTANT HYDROGRAPH TIME UNIT(MINUTES) = 7.510

DEAD STORAGE(AF) = 0.00

SPECIFIED DEAD STORAGE(AF) FILLED = 0.00

ASSUMED INITIAL DEPTH(FEET) IN STORAGE BASIN = 0.00



DEPTH-VS.-STORAGE AND DEPTH-VS.-DISCHARGE INFORMATION:

TOTAL NUMBER OF BASIN DEPTH INFORMATION ENTRIES = 10

*BASIN-DEPTH	STORAGE	OUTFLOW	**BASIN-DEPTH	STORAGE	OUTFLOW	*
(FEET)	(ACRE-FEET)	(CFS)	(FEET)	(ACRE-FEET)	(CFS)	
* 0.000	0.000	0.000	** 1.000	0.100	1.470	*
* 2.000	0.269	1.470	** 3.000	0.485	1.470	*
* 4.000	0.723	1.470	** 5.000	0.971	1.470	*
* 6.000	1.198	1.470	** 7.000	1.411	1.470	*
* 8.000	1.588	1.470	** 9.000	1.692	1.470	*

BASIN STORAGE, OUTFLOW AND DEPTH ROUTING VALUES:

INTERVAL	DEPTH	{S-O*DT/2}	{S+O*DT/2}
NUMBER	(FEET)	(ACRE-FEET)	(ACRE-FEET)
1	0.00	0.00000	0.00000
2	1.00	0.09244	0.10765
3	2.00	0.26097	0.27617
4	3.00	0.47704	0.49224
5	4.00	0.71543	0.73063
6	5.00	0.96359	0.97879
7	6.00	1.19086	1.20606
8	7.00	1.40291	1.41811
9	8.00	1.58083	1.59603
10	9.00	1.68487	1.70007

WHERE S=STORAGE(AF);O=OUTFLOW(AF/MIN.);DT=UNIT INTERVAL(MIN.)

DETENTION BASIN ROUTING RESULTS:

NOTE: COMPUTED BASIN DEPTH, OUTFLOW, AND STORAGE QUANTITIES OCCUR AT THE GIVEN TIME. BASIN INFLOW VALUES REPRESENT THE AVERAGE INFLOW DURING THE RECENT HYDROGRAPH UNIT INTERVAL.

TIME	DEAD-STORAGE	INFLOW	EFFECTIVE	OUTFLOW	EFFECTIVE
(HRS)	FILLED(AF)	(CFS)	DEPTH(FT)	(CFS)	VOLUME(AF)
0.104	0.000	0.83	0.08	0.06	0.008

0.229	0.000	0.84	0.15	0.17	0.015
0.354	0.000	0.84	0.21	0.26	0.021
0.479	0.000	0.84	0.26	0.34	0.026
0.604	0.000	0.85	0.30	0.42	0.030
0.730	0.000	0.85	0.34	0.48	0.034
0.855	0.000	0.85	0.38	0.53	0.038
0.980	0.000	0.86	0.41	0.58	0.041
1.105	0.000	0.86	0.43	0.62	0.043
1.230	0.000	0.86	0.45	0.65	0.045
1.355	0.000	0.87	0.47	0.68	0.047
1.481	0.000	0.87	0.49	0.71	0.049
1.606	0.000	0.88	0.51	0.73	0.051
1.731	0.000	0.88	0.52	0.75	0.052
1.856	0.000	0.89	0.53	0.77	0.053
1.981	0.000	0.89	0.54	0.79	0.054
2.106	0.000	0.89	0.55	0.80	0.055
2.232	0.000	0.90	0.56	0.82	0.056
2.357	0.000	0.90	0.57	0.83	0.057
2.482	0.000	0.91	0.57	0.84	0.057
2.607	0.000	0.91	0.58	0.85	0.058
2.732	0.000	0.92	0.59	0.86	0.059
2.857	0.000	0.92	0.59	0.87	0.059
2.983	0.000	0.92	0.60	0.87	0.060
3.108	0.000	0.93	0.60	0.88	0.060
3.233	0.000	0.93	0.61	0.89	0.061
3.358	0.000	0.94	0.61	0.90	0.061
3.483	0.000	0.94	0.62	0.90	0.062
3.608	0.000	0.95	0.62	0.91	0.062
3.734	0.000	0.95	0.62	0.91	0.062
3.859	0.000	0.96	0.63	0.92	0.063
3.984	0.000	0.96	0.63	0.93	0.063
4.109	0.000	0.97	0.64	0.93	0.064
4.234	0.000	0.98	0.64	0.94	0.064
4.359	0.000	0.98	0.64	0.94	0.064
4.485	0.000	0.99	0.65	0.95	0.065
4.610	0.000	0.99	0.65	0.96	0.065
4.735	0.000	1.00	0.66	0.96	0.066
4.860	0.000	1.01	0.66	0.97	0.066
4.985	0.000	1.01	0.66	0.97	0.066
5.110	0.000	1.02	0.67	0.98	0.067
5.236	0.000	1.02	0.67	0.98	0.067
5.361	0.000	1.03	0.68	0.99	0.068
5.486	0.000	1.04	0.68	1.00	0.068
5.611	0.000	1.04	0.68	1.00	0.068
5.736	0.000	1.05	0.69	1.01	0.069
5.861	0.000	1.06	0.69	1.02	0.069
5.987	0.000	1.06	0.70	1.02	0.070
6.112	0.000	1.07	0.70	1.03	0.070
6.237	0.000	1.08	0.71	1.03	0.071
6.362	0.000	1.09	0.71	1.04	0.071
6.487	0.000	1.09	0.72	1.05	0.072
6.612	0.000	1.10	0.72	1.05	0.072
6.738	0.000	1.11	0.72	1.06	0.072
6.863	0.000	1.12	0.73	1.07	0.073
6.988	0.000	1.12	0.73	1.08	0.073
7.113	0.000	1.13	0.74	1.08	0.074
7.238	0.000	1.14	0.74	1.09	0.075
7.364	0.000	1.15	0.75	1.10	0.075
7.489	0.000	1.16	0.76	1.11	0.076
7.614	0.000	1.17	0.76	1.11	0.076
7.739	0.000	1.18	0.77	1.12	0.077
7.864	0.000	1.19	0.77	1.13	0.077
7.989	0.000	1.19	0.78	1.14	0.078

8.115	0.000	1.21	0.78	1.15	0.078
8.240	0.000	1.21	0.79	1.16	0.079
8.365	0.000	1.23	0.80	1.17	0.080
8.490	0.000	1.24	0.80	1.18	0.080
8.615	0.000	1.25	0.81	1.19	0.081
8.740	0.000	1.26	0.82	1.20	0.082
8.865	0.000	1.27	0.82	1.21	0.082
8.991	0.000	1.28	0.83	1.22	0.083
9.116	0.000	1.30	0.84	1.23	0.084
9.241	0.000	1.31	0.84	1.24	0.085
9.366	0.000	1.32	0.85	1.25	0.085
9.491	0.000	1.33	0.86	1.26	0.086
9.616	0.000	1.35	0.87	1.27	0.087
9.742	0.000	1.36	0.88	1.28	0.088
9.867	0.000	1.38	0.89	1.29	0.089
9.992	0.000	1.39	0.89	1.31	0.089
10.117	0.000	1.41	0.90	1.32	0.090
10.242	0.000	1.42	0.91	1.33	0.091
10.367	0.000	1.44	0.92	1.35	0.092
10.493	0.000	1.45	0.93	1.36	0.093
10.618	0.000	1.48	0.94	1.38	0.094
10.743	0.000	1.49	0.95	1.39	0.095
10.868	0.000	1.52	0.96	1.41	0.096
10.993	0.000	1.53	0.97	1.42	0.097
11.118	0.000	1.56	0.99	1.44	0.099
11.244	0.000	1.57	1.00	1.46	0.100
11.369	0.000	1.60	1.01	1.47	0.101
11.494	0.000	1.61	1.02	1.47	0.103
11.619	0.000	1.65	1.03	1.47	0.104
11.744	0.000	1.66	1.04	1.47	0.106
11.870	0.000	1.70	1.05	1.47	0.109
11.995	0.000	1.72	1.07	1.47	0.111
12.120	0.000	2.00	1.10	1.47	0.117
12.245	0.000	2.04	1.14	1.47	0.123
12.370	0.000	2.08	1.17	1.47	0.129
12.495	0.000	2.11	1.21	1.47	0.136
12.620	0.000	2.15	1.25	1.47	0.143
12.746	0.000	2.18	1.30	1.47	0.150
12.871	0.000	2.23	1.34	1.47	0.158
12.996	0.000	2.26	1.39	1.47	0.166
13.121	0.000	2.31	1.44	1.47	0.175
13.246	0.000	2.34	1.50	1.47	0.184
13.372	0.000	2.41	1.56	1.47	0.194
13.497	0.000	2.45	1.62	1.47	0.204
13.622	0.000	2.52	1.68	1.47	0.215
13.747	0.000	2.56	1.75	1.47	0.226
13.872	0.000	2.65	1.82	1.47	0.238
13.997	0.000	2.70	1.89	1.47	0.251
14.122	0.000	2.82	1.98	1.47	0.265
14.248	0.000	2.88	2.05	1.47	0.279
14.373	0.000	3.00	2.12	1.47	0.295
14.498	0.000	3.07	2.20	1.47	0.312
14.623	0.000	3.23	2.28	1.47	0.330
14.748	0.000	3.32	2.37	1.47	0.349
14.873	0.000	3.52	2.47	1.47	0.370
14.999	0.000	3.64	2.57	1.47	0.393
15.124	0.000	3.92	2.69	1.47	0.418
15.249	0.000	4.08	2.82	1.47	0.445
15.374	0.000	4.53	2.96	1.47	0.477
15.499	0.000	5.33	3.13	1.47	0.517
15.624	0.000	6.10	3.34	1.47	0.565
15.750	0.000	6.65	3.56	1.47	0.618
15.875	0.000	7.91	3.84	1.47	0.685

16.000	0.000	10.19	4.21	1.47	0.775
16.125	0.000	22.94	5.11	1.47	0.997
16.250	0.000	6.71	5.35	1.47	1.051
16.375	0.000	5.68	5.54	1.47	1.095
16.501	0.000	4.29	5.67	1.47	1.124
16.626	0.000	3.77	5.78	1.47	1.148
16.751	0.000	3.41	5.86	1.47	1.168
16.876	0.000	3.15	5.94	1.47	1.185
17.001	0.000	2.94	6.01	1.47	1.200
17.126	0.000	2.75	6.07	1.47	1.213
17.252	0.000	2.60	6.13	1.47	1.225
17.377	0.000	2.48	6.18	1.47	1.236
17.502	0.000	2.38	6.22	1.47	1.245
17.627	0.000	2.28	6.26	1.47	1.253
17.752	0.000	2.20	6.30	1.47	1.261
17.878	0.000	2.13	6.33	1.47	1.268
18.003	0.000	2.06	6.36	1.47	1.274
18.128	0.000	1.74	6.37	1.47	1.277
18.253	0.000	1.68	6.38	1.47	1.279
18.378	0.000	1.63	6.39	1.47	1.281
18.503	0.000	1.58	6.39	1.47	1.282
18.628	0.000	1.54	6.40	1.47	1.282
18.754	0.000	1.50	<u>6.40</u>	1.47	1.283
18.879	0.000	1.47	6.40	1.47	1.283
19.004	0.000	1.43	6.40	1.47	1.282
19.129	0.000	1.40	6.39	1.47	1.282
19.254	0.000	1.37	6.39	1.47	1.281
19.379	0.000	1.34	6.38	1.47	1.279
19.505	0.000	1.31	6.37	1.47	1.278
19.630	0.000	1.29	6.36	1.47	1.276
19.755	0.000	1.27	6.35	1.47	1.274
19.880	0.000	1.24	6.34	1.47	1.271
20.005	0.000	1.22	6.33	1.47	1.269
20.130	0.000	1.20	6.32	1.47	1.266
20.256	0.000	1.18	6.30	1.47	1.263
20.381	0.000	1.16	6.29	1.47	1.260
20.506	0.000	1.15	6.27	1.47	1.256
20.631	0.000	1.13	6.26	1.47	1.253
20.756	0.000	1.11	6.24	1.47	1.249
20.882	0.000	1.10	6.22	1.47	1.245
21.007	0.000	1.08	6.20	1.47	1.241
21.132	0.000	1.07	6.18	1.47	1.237
21.257	0.000	1.05	6.16	1.47	1.233
21.382	0.000	1.04	6.14	1.47	1.228
21.507	0.000	1.03	6.12	1.47	1.224
21.632	0.000	1.01	6.10	1.47	1.219
21.758	0.000	1.00	6.07	1.47	1.214
21.883	0.000	0.99	6.05	1.47	1.209
22.008	0.000	0.98	6.03	1.47	1.204
22.133	0.000	0.97	6.00	1.47	1.199
22.258	0.000	0.96	5.98	1.47	1.194
22.384	0.000	0.95	5.96	1.47	1.188
22.509	0.000	0.94	5.93	1.47	1.183
22.634	0.000	0.93	5.91	1.47	1.177
22.759	0.000	0.92	5.88	1.47	1.172
22.884	0.000	0.91	5.86	1.47	1.166
23.009	0.000	0.90	5.83	1.47	1.160
23.135	0.000	0.89	5.80	1.47	1.154
23.260	0.000	0.88	5.78	1.47	1.148
23.385	0.000	0.88	5.75	1.47	1.142
23.510	0.000	0.87	5.72	1.47	1.135
23.635	0.000	0.86	5.69	1.47	1.129
23.760	0.000	0.85	5.67	1.47	1.123

23.885	0.000	0.84	5.64	1.47	1.116
24.011	0.000	0.84	5.61	1.47	1.110
24.136	0.000	0.00	5.54	1.47	1.095

**APPENDIX D: STORAGE VOLUME & OUTFLOW CALCULATIONS AND \bar{Y} bar
CALCULATIONS**

STORAGE PIPE CALCULATIONS

LOCUST AVE.

VOLUME = 1250 LF - 96" DIA. PIPE INF. FACILITY

OUTFLOW:

INFILTRATION

INFILTRATION RATE - 5.07 "/HR (WQMP Worksheet H)

FACILITY AREA - 12,500 SF

TOTAL INF. = $5.07"/HR * (1/3600 \text{ SEC}/HR * 1/12 \text{ FT}/IN) * 12,500 = 1.47 \text{ CFS}$

OUTLET		STORAGE		
HEAD (h)	OUTLET FLOW			
	CFS	CF	AF	TOTAL
1	1.47	4375	0.10044	0.10044
2	1.47	7324	0.16814	0.26857
3	1.47	9412	0.21607	0.48464
4	1.47	10384	0.23838	0.72303
5	1.47	10810	0.24816	0.97119
6	1.47	9900	0.22727	1.19846
7	1.47	9237	0.21205	1.41051
8	1.47	7750	0.17792	1.58843
9	1.47	4532	0.10404	1.69247

YBAR CALCULATIONS

DEVELOPED AREA A						
2 YEAR STORM						
P24 = 3.87 in.						
SUBAREA	ACRES	CN	S	Ia	Yj	Yj*Aj
A1	2.19	94	0.64	0.13	0.83	1.81
A2	0.67	94	0.64	0.13	0.83	0.55
A3	1.85	94	0.64	0.13	0.83	1.53
TOTAL	4.71					

$$Y = (\sum Y_j * A_j) / A \quad Y = 0.83$$

$$Y_{bar} = 1 - Y \quad Y_{bar} = 0.17$$

DEVELOPED AREA A						
25 YEAR STORM						
P24 = 7.21 in.						
SUBAREA	ACRES	CN	S	Ia	Yj	Yj*Aj
A1	2.19	94	0.64	0.13	0.90	1.97
A2	0.67	94	0.64	0.13	0.90	0.60
A3	1.85	94	0.64	0.13	0.90	1.67
TOTAL	4.71					

$$Y = (\sum Y_j * A_j) / A \quad Y = 0.90$$

$$Y_{bar} = 1 - Y \quad Y_{bar} = 0.10$$

DEVELOPED AREA A						
100 YEAR STORM						
P24 = 9.02 in.						
SUBAREA	ACRES	CN	S	Ia	Yj	Yj*Aj
A1	2.19	94	0.64	0.13	0.92	2.01
A2	0.67	94	0.64	0.13	0.92	0.62
A3	1.85	94	0.64	0.13	0.92	1.70
TOTAL	4.71					

$$Y = (\sum Y_j * A_j) / A \quad Y = 0.92$$

$$Y_{bar} = 1 - Y \quad Y_{bar} = 0.08$$

DEFINITIONS:

CN - CURVE NUMBER OF HYDRAULIC SOIL COVER
 S - ESTIMATE OF TOTAL SOIL CAPACITY
 Ia - INITIAL ABSTRACTION
 Yj - 24-HR STORM RUNOFF YIELD FRACTION
 Ybar - CATCHMENT LOW LOSS FRACTION

EXHIBITS

EXHIBIT A: EXISTING CONDITION HYDROLOGY MAP

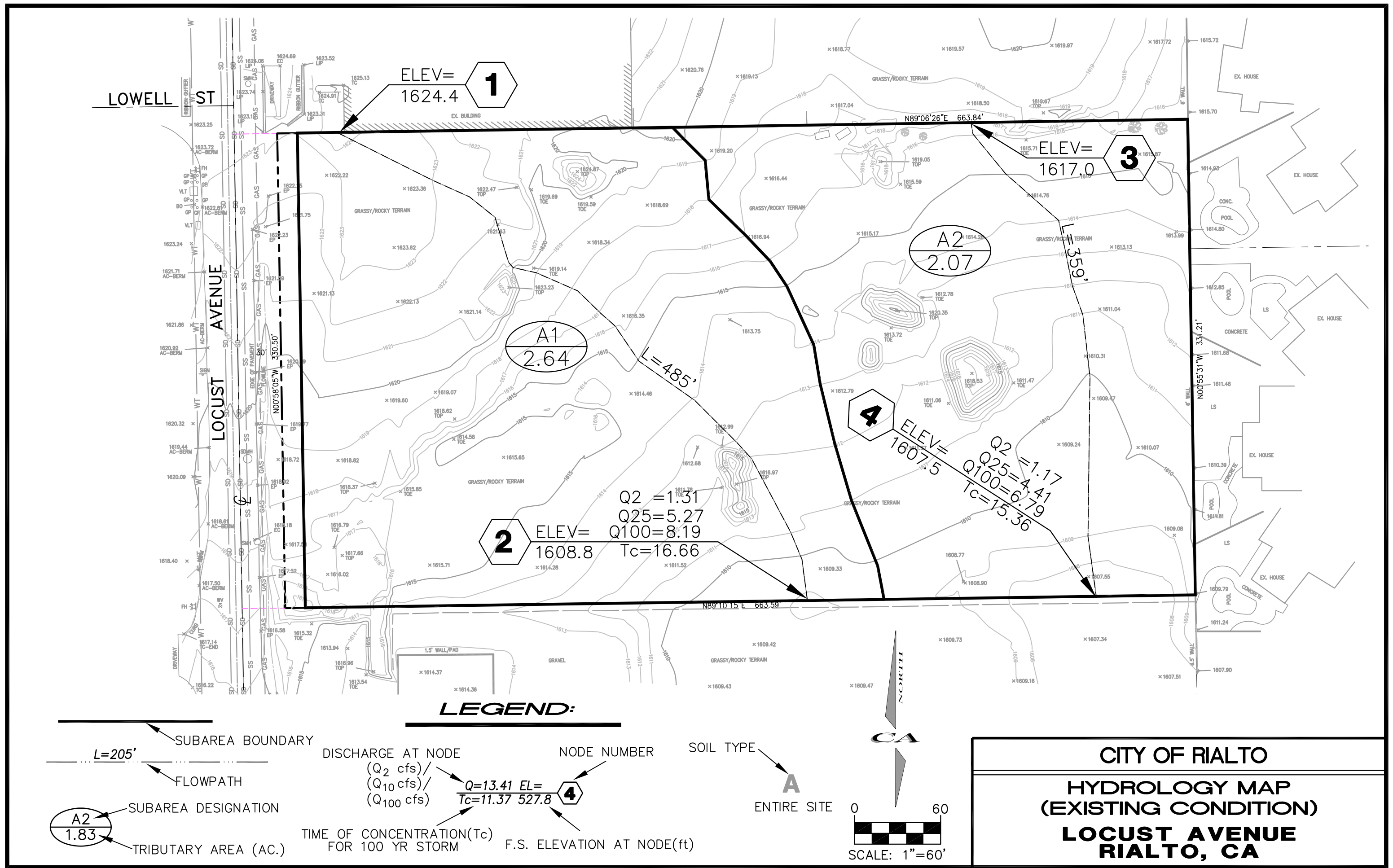


EXHIBIT B: PROPOSED CONDITION HYDROLOGY MAP

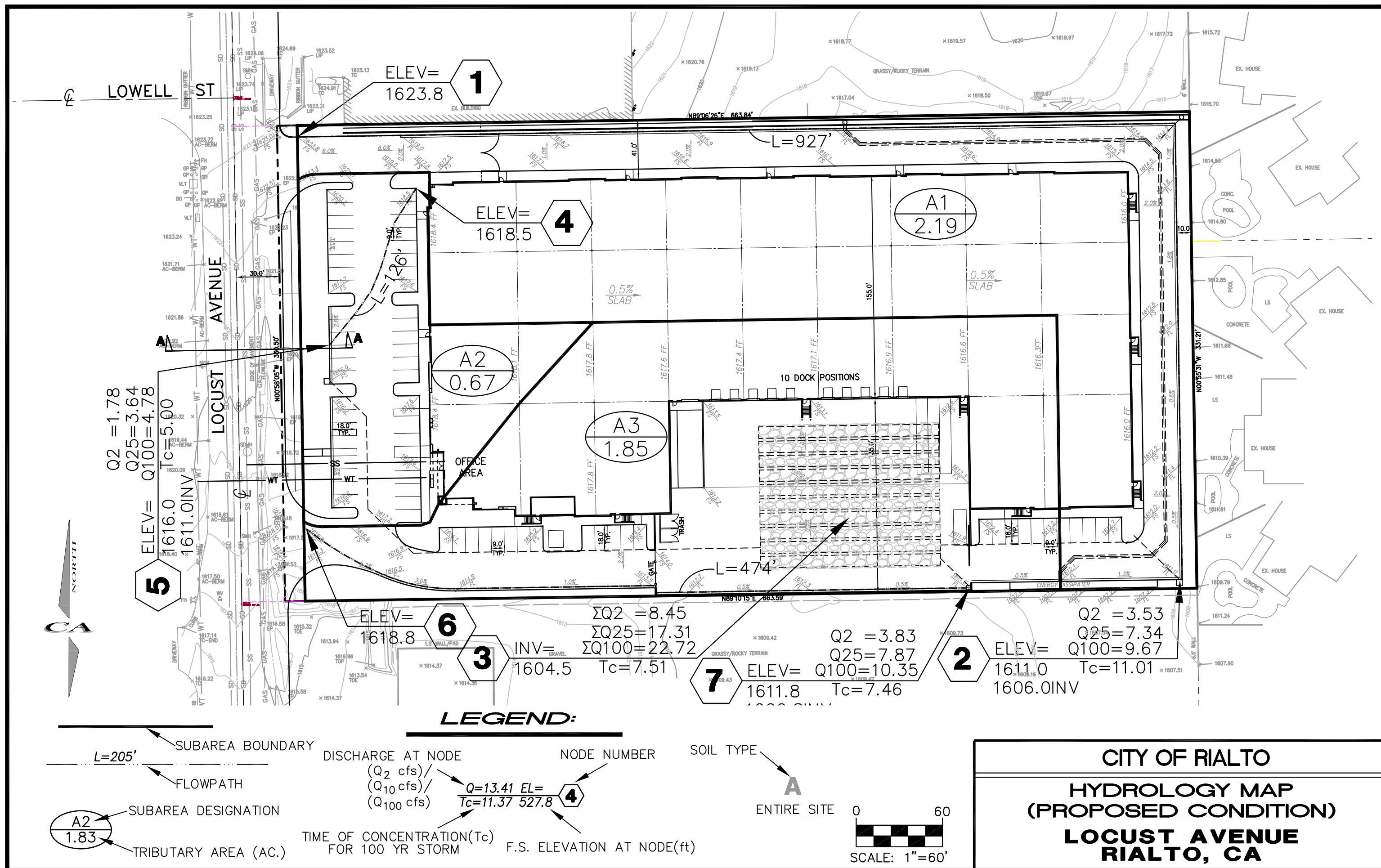


EXHIBIT C: FIRM MAP

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, NINGS12
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 confirm 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.

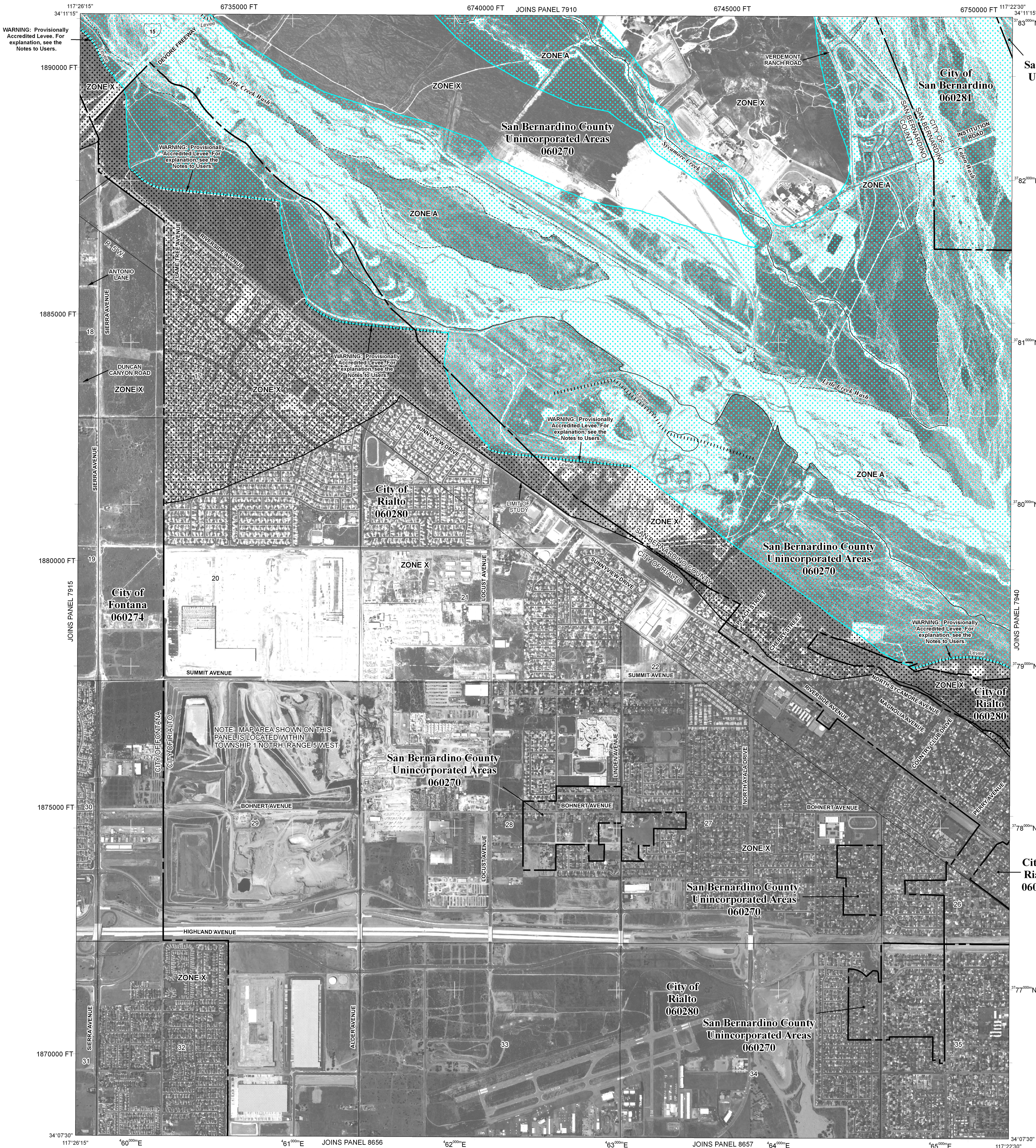
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

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>.

WARNING: This map contains levees, dikes, or other structures that have been provisionally accredited and mapped as providing protection from the 1-percent-annual-chance flood. To maintain accreditation, the levee owner or community is required to submit documentation necessary to comply with 44 CFR Section 65.10 by August 8, 2009. Because of the risk of overtopping or failure of the structure, communities should take proper precautions to protect lives and minimize damages in these areas, such as issuing an evacuation plan and encouraging property owners to purchase flood insurance.



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 identified. 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.
- Base Flood Elevation line and value; elevation in feet*
- Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

- Cross section line
- Traverse line
- Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
- 1000-meter Universal Transverse Mercator grid values, zone 11N
- 5000-foot grid ticks; California State Plane coordinate system, zone V (FIPSZONE 0405), Lambert Conformal Conic projection
- Bench mark (see explanation in Notes to Users section of this FIRM panel)
- River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

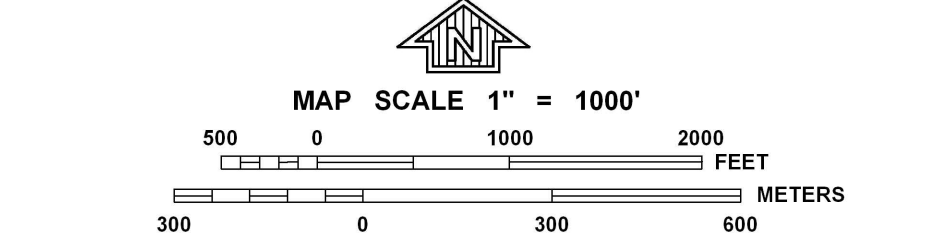
EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP

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 1-800-538-6620.



NATIONAL FLOOD INSURANCE PROGRAM

FIRM

PANEL 7920H

FLOOD INSURANCE RATE MAP

SAN BERNARDINO COUNTY, CALIFORNIA AND INCORPORATED AREAS

PANEL 7920 OF 9400

(SEE MAP INDEX FOR FIRM LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
FONTANA, CITY OF	060274	7920	H
RIALTO, CITY OF	060280	7920	H
SAN BERNARDINO COUNTY	060270	7920	H
SAN BERNARDINO, CITY OF	060281	7920	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
06071C7920H

MAP REVISED
AUGUST 28, 2008

Federal Emergency Management Agency

EXHIBIT D: WQMP SITE PLAN

PRELIMINARY
WQMP SITE PLAN
2889 N. LOCUST AVE.
RIALTO, CA

PROJECT DATA:

TOTAL SITE AREA OF PROPOSED DEVELOPMENT: 4.71 AC (205,044 SF)

BUILDING AREA: 96,748 SF
WALKWAYS / CONC. GUTTER / DOCK AREAS: 38,491 SF
DRIVEWAYS / DRIVE AISLES / PARKING AREAS: 49,135 SF

20,670 SF LANDSCAPING PROVIDED (10.1% PERVIOUS AREA)

CURRENT USE: VACANT
PROPOSED USE: INDUSTRIAL

WATERSHED:
SANTA ANA RIVER

WQMP DCV CALCULATION

AREA 1

AREA = 4.71 AC (205,044 SF)
RUNOFF COEFFICIENT (90% IMPERVIOUS)
 $C = 0.858 * (.90)^3 - 0.78 * (.90)^2 + 0.774 * (.90) + .04 = 0.730$
2YR 1 HR STORM = 0.730 IN
 $P6 = 1.4807 * 0.730 = 1.0809$ IN
 $DCV = 205,044 \text{ SF} * 0.730 * 1.0809 \text{ IN} / 12 \text{ IN/FT} * 1.963 = 26,466 \text{ CF}$

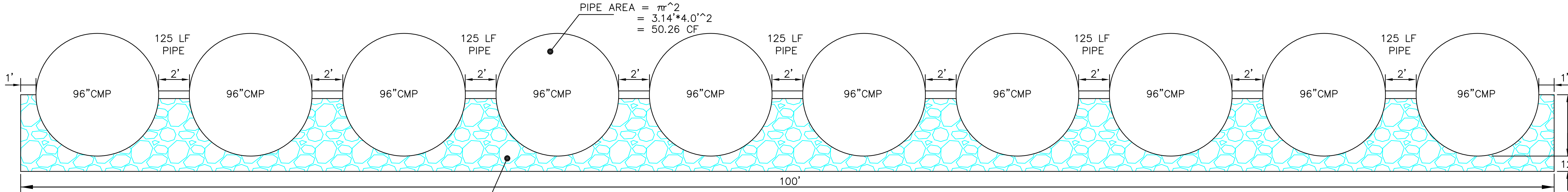
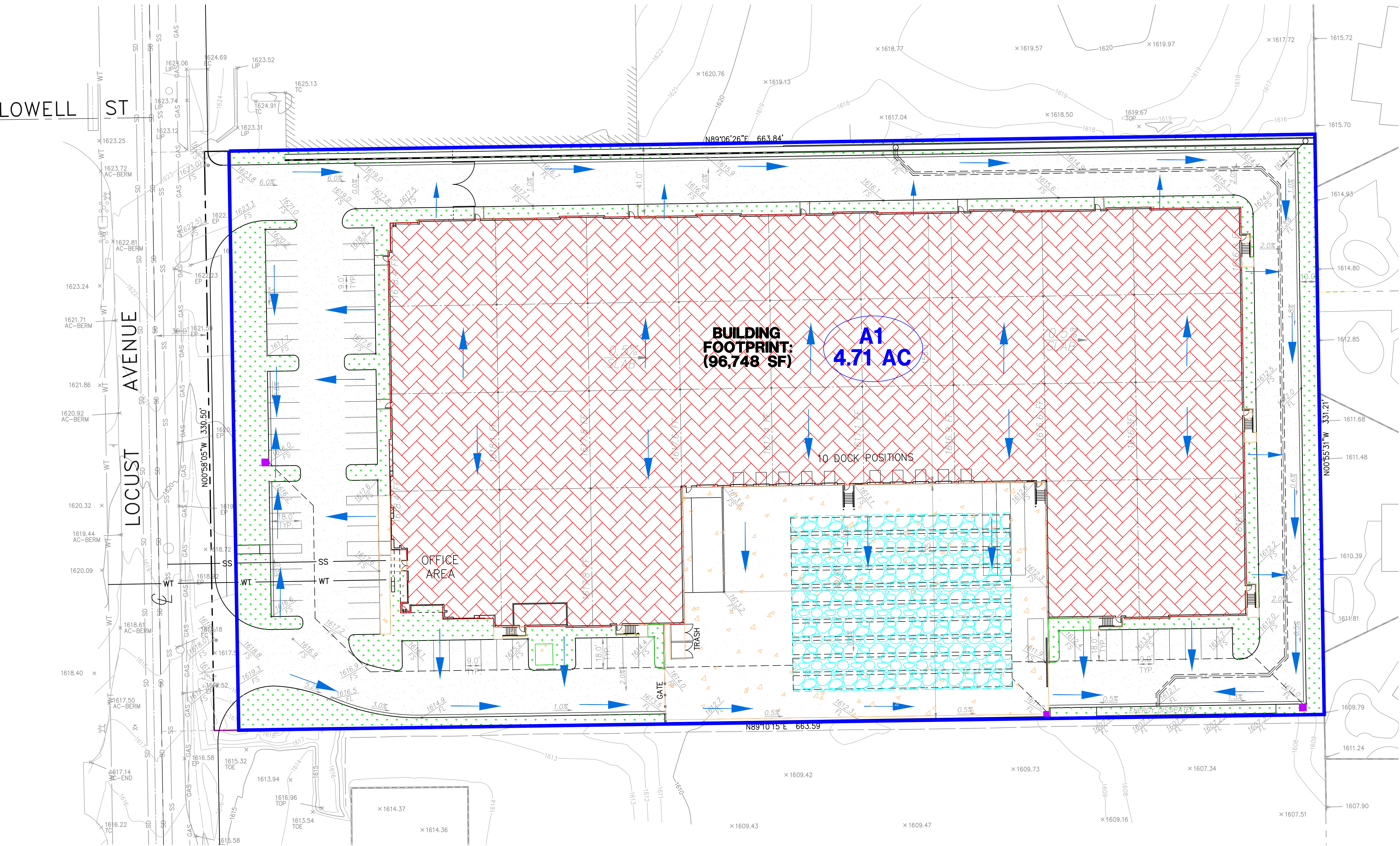
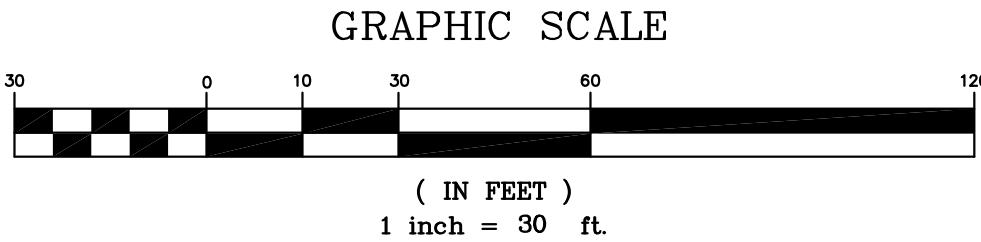
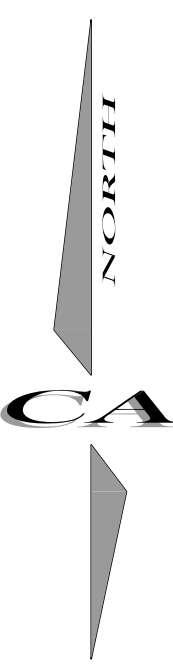
BMP VOLUME CALCULATION

BMP VOLUME
PIPE CROSS SECTIONAL AREA = $(50.26) * 10 \text{ CF/LF} = 502.60 \text{ CF/LF}$
ROCK CROSS SECTIONAL AREA = $248.70 \text{ CF/LF ROCK AREA} * 0.35 = 87.05 \text{ CF/LF}$
TOTAL CROSS SECTIONAL AREA = $589.65 \text{ CF/LF} * 125 \text{ LF} = 73,706 \text{ CF}$
EFFECTIVE DEPTH = $73,706 \text{ CF} / 12,500 \text{ SF BOTTOM} = 5.90'$

$Vret = (Pdesign / 12 * SAinf * Tfill) + (SAres * Dres * Nagg)$
 $Pdesign = 15.5" \text{ MEASURED} / 3.06 \text{ S.F.} = 5.07" / \text{HR}$
 $SAinf = 12,500 \text{ SF}$
 $SAres = 12,500 \text{ SF}$
 $Tfill = 3 \text{ HRS}$
 $Dres = \text{EFFECTIVE DEPTH} = 5.90'$
 $Nagg = 1.0 \text{ (EFFECTIVE DEPTH ACCOUNTED FOR ROCK)}$
 $Vret = (5.07 / 12 * 12,500 * 3) + (12,500 * 5.90 * 1)$
 $Vret = 89,594 \text{ CF}$
BMP VOLUME (89,594 CF) > DCV VOLUME (26,466 CF)

BMP LEGEND

- AREA 1**
- DRAINAGE AREAS
 - FLOW DIRECTION
 - UNDERGROUND INFILTRATION PIPE PER DETAIL HEREON
 - LANDSCAPE AREA EFFICIENT IRRIGATION
LANDSCAPE AREA RUNOFF-MINIMIZING DESIGN
 - PROPOSED BUILDING
 - ASPHALT CONCRETE DRIVE AISLES
 - CONCRETE HARDSCAPE/ENHANCED PAVING
 - CATCH BASIN WITH INSERT FILTER & STORM DRAIN STENCIL SIGNAGE
 - TRASH ENCLOSURE



ROCK AREA = (FACILITY AREA - PIPE AREA) * 0.35
 $= (100 * 5) - (0.5 * 50.26 * 10) = 248.70 \text{ CF/LF}$
 $248.70 \text{ CF/LF} * 125 \text{ LF} = 31,089 \text{ CF} * 0.35 = 10,881 \text{ CF}$

INFILTRATION BMP
CROSS SECTION

1" = 4'

	PREPARED BY:	DATE	BY	REVISION	DATE
	CA ENGINEERING, INC.				Dec 28 2021
	Planning • Engineering • Surveying				JOB NO.
	13821 NEWPORT AVE., STE 110				251-55
	TUSTIN, CA 92780				Sht. C-2
	949-724-9480 949-724-9484 FAX				